Academic Program Description Form

University Name: *University of Basrah*

Faculty/Institute: *Collage of Engineering*

Scientific Department: *Computer Engineering Department*

Academic or Professional Program Name: *Computer Engineering Department*

Final Certificate Name: *Bachelor of Computer Engineering*

Academic System: *Bologna*

Description Preparation Date: 2024

File Completion Date: 14/5/ 2025

Signature:

Head of Department Name:

Dr. Musaab Adil Alaziz

Date: 1/9/2025

Signature:

Scientific Associate Name:

Dr. Muneer A. Ismael

Date: 1/9/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Ali Kamil M.

Date: 1/9/2025

Signature:

University of Basrah
College of Engineering
Dean Office

Approval of the Dean

Prof. Dr. Mofeed Turky Rashid

1. Program Vision

A scientific and practical pioneering environment in both research and teaching sectors and has the capability of keeping pace with the continues growth of the technological developments in the fields of computer engineering and information technology.

2. Program Mission

The department seeks to provide the excellent environment that stimulates creativity, innovation, research and development in order to produce highly qualified computer engineers who are able to serve the labor market locally and globally.

3. Program Objectives

1. Provide highly qualified and competitive computer engineers who can deal with the professional challenges in both private and public sectors since that are well prepared and fully equipped for a successful career as computer engineers.
2. Providing advanced academic programs in the computer engineering field for both theoretical and practical sectors that match the international standards and meet the labor market needs.
3. Encourage the development of the scientific research in computer engineering field especially the information technology, computer software, computer networks, telecommunication systems, AI and robotics.
4. Communicate effectively in a variety of professional contexts with the private, public and government sectors.
5. Create enabling environment for the faculty member that helps them to improve their teaching and research skills.

4. Program Accreditation

5. Other external influences

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	7	14	6%	
College Requirements	7	34	14%	
Department Requirements	37	192	80%	
Summer Training	required			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	**practical**
Level one / First Sem.	CoE111	Calculus I	4	
	CoE112	Electrical Circuits 1	4	2
	CoE113	Programming & Problems Solving	4	2
	CoE114	Fundamentals of Logic systems	3	
	CoE115	Industrial Chemistry	2	
	UoB101	English Language I	2	
	CoE121	Calculus II	4	
	CoE122	Digital Logic Circuits	3	2

	CoE123	Object Oriented Programming	3	2
	CoE124	Engineering Design/ Auto CAD	1	2
	CoE125	Device Physics	2	
	UoB201	English language II	2	
	UoB102	Democracy and Human Rights	2	
	CoE211	Calculus III	4	
	CoE212	Discrete Structures	4	
	CoE213	Signals & Systems	4	
	CoE214	Digital System Design	3	1
	CoE215	Electrical Circuits 2	3	1
	UoB104	Arabic Language I	2	
	UoB205	Crimes of Baath Party	2	
	CoE221	Differential Equations	4	
	CoE222	Probability and Statistics	3	
	CoE223	Microprocessor Programming	3	2
	CoE224	Algorithms	3	2
	CoE225	Digital Electronics	2	
	UoB204	Arabic Language II	2	
	CoE311	Linear Algebra	3	2
	CoE312	Computer Architecture	3	
	CoE313	Operating Systems	3	2
	CoE314	Artificial Intelligence	3	
	CoE315	Analog Electronics	3	2
	CoE316	Engineering Economics	2	
	CoE321	Numerical Analysis	3	

	CoE322	Microprocessor Interface	3	2
	CoE323	Instrumentation	2	
	CoE324	Digital Communication	3	
	CoE325	Computer Maintenance	1	2
	CoE326	Digital Signal Processing	2	2
	CoE411	Embedded Computing Systems	2	2
	CoE412	Computer Network	2	2
	CoE413	Control Systems	2	
	CoE4P	Engineering Project (continued)	2	3
	CoE414	Project management	2	
	CoE415	Image Processing	2	2
	CoE421	Information Security	2	
	CoE422	Software Design	2	2
	CoE423	Networks Technology	2	2
	CoE424	Parallel Processing Architecture	3	
	CoE4P	Engineering Project	2	3
	CoE226	Ethics, Society, Profession	2	
	CoE425	Discrete Control Systems	2	2

8. Expected learning outcomes of the program

Knowledge

1-1. Clarify the basic concepts of computer systems and their applications in social and industrial fields.
1-2. Acquiring skill in dealing with problems and dealing with them through computer systems.
1-3. Acquiring basic skills for the software industry.
1-4. Acquiring experience in industrial computer systems.
1-5. Designing programmed home systems.
1-6. Making websites and databases for various engineering systems.
1-7. Achieving the a to k criterion.

Skills

2-1. The ability to design simple and advanced programs in different programming languages.
2-2. The ability to think in addressing the issues by algorithms and methods of work.
2-3. Writing scientific reports, reading charts and analyzing digital data.

Ethics

3-1. Attention: Arousing students 'attention by implementing one of the application programs on the display screen in the hall

3-2. Response: Follow up the student's interaction with the material displayed on the screen

3-3. Interest: following up on the interest of the student who interacted more with the presented material, by increasing this interaction by requesting other programs and applications to display

3-4. Formation of direction: meaning that the student is sympathetic to the presentation and may have an opinion towards the presented topic and defend it.

3-5. The formation of value behavior: meaning that the student reaches the top of the emotional ladder, so that he has a constant level in the lesson and does not lethargic or fidget.

9. Teaching and Learning Strategies

1. Explanation and clarification using the class lectures.
2. Tutorials hours.
3. Self-learning using homework and small projects.
4. Short tests (quizzes).
5. Reports.
6. Mid-terms and final exams.

10. Evaluation methods

- Quizzes
- Assignments
- Projects / Lab.
- Report
- Midterm Exam
- Final Exam

11. Faculty

Faculty Members

Name	Academic Rank	Specialization		Number of the teaching staff	
		General	Special	Staff	Lecturer
Gaida A. Al-Suhail	Prof.	Electrical Engineering	Communications & Networks		
Ali A. Abed	Prof.	Electrical Engineering	Computer & Control		
Abbas A. Jasim	Assist. Prof.	Computer	Computer		
Mohammed A. Al-Ibadi	Assist. Prof.	Engineering	Engineering		
Wasan A. Wali	Assist. Prof.	Computer	Computer		
Fatemah K. Al-Assfor	Assist. Prof.	Engineering	Engineering		
Mohannad H. Al-Ali	Assist. Prof.	Electrical Engineering	Control		
Alaa F. Al-Ibadi	Assist. Prof.	Electrical Engineering	Computer Architecture		
Loai Ali Talib	Lecturer	Electrical Engineering	Communications & Signal Processing		
Musaab A. Alaziz	Lecturer	Electrical Engineering	Computer &Control		
Imad A. Jassim	Lecturer	Electrical Engineering	Computer &Control		
Hassanin Sh. Faham	Lecturer	Computer	Computer		
Ali N. Ibraheem	Lecturer	Engineering	Engineering		
Dunia Sattar Tahir	Lecturer	Electrical Engineering	Communications & Networks		
Hiba H. Abdulzahraa	Lecturer	Computer	Computer		
Hanadi A, Jabir	Lecturer	Engineering	Engineering		
Atheel K. Abdulzahraa	Lecturer	Computer	Artificial Intelligence		

Sarah Aziz Al-Hilfi	Lecturer	Engineering	Computer		
Intesar H. Aledani	Lecturer	Computer	Engineering		
Ali E. Hameed	Lecturer	Engineering	Computer		
Ali M. Ahmed	Lecturer	Computer	Engineering		
Dhayaa Raissan Khudher	Lecturer	Engineering	Computer		
Khalid A. Abbas	Assist. Lecture	Computer	Engineering		
Amjed A. Majeed	Assist. Lecture	Engineering	Computer & Control		
Gasak Ch. Abdulhussian	Assist. Lecture	Computer	Computer		
Mohammed K. Joudah	Assist. Lecture	Engineering	Engineering		
Umulhuda G. Abood	Assist. Lecture	Computer	Computer & Control		
Hanadi S. Ahmed	Assist. Lecture	Engineering	Digital Signal Processing		
Ali M. Fadhil	Assist. Lecture	Computer	Communications & Networks		

Professional Development
Mentoring new faculty members
Professional development of faculty members

12. Acceptance Criterion
Average: not less than 90% Age: Not more than 25 years old Number: Up to 125 students annually

13. The most important sources of information about the program
1. The websites of Iraqi and foreign universities. 2. Workshops held by the Ministry of Higher Education in addition to the Ministry's standards. 3. Twinning with the University of Oklahoma, USA. 4. ABET American Academic Accreditation Program. 5. IEEE Computer Engineering Body of Knowledge

14. Program Development Plan

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE111	Calculus I	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
Calculus I	
2. Course Code:	
CoE111	
3. Semester / Year:	
First Year/ First Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
62	
7. Course administrator's name (mention all, if more than one name)	
Name: Wasan A. Wali Email: Wasan.wali@@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	• Calculus gives engineers the ability to model and control systems. It provides a way to construct relatively simple quantitative and deduce their consequences and the ability to find the effects of changing conditions on the system being investigated. This semester reviews the basic ideas a student need to start calculus for engineering. Topics include a brief review of functions, followed by a discussion of limits, derivatives, and applications of differential calculus to real-world problem areas. An introduction to integration concludes the course, with a brief description of complex geometry.
9. Teaching and Learning Strategies	
Strategy	1- Explanation and clarification using the class lectures. 2- Tutorials hours. 3- Reading and self-learning. 4- Home Works. 5- Discussions and workshops 6- Reports. 7- Presentation. 8- Short tests (quizzes).

	9- Training and activities during lecture. 10- Mid-terms and final exams. 11- Encourage the student to: • Fully present in class. • Asking the questions that help to understand the material better. • Interaction during lectures • Practicing the examples, homework, and problems.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Preliminaries	Real numbers and the real line, lines, circles, and parabolas, functions and their graphs,	Theoretical	Discussion & questions
2	4	Preliminaries	Absolute value function, greatest integer function, signum function,	Theoretical &Tutorial	Discussion & questions
3	4	Preliminaries	domain and range algebraic functions, combining functions, shifting and scaling	Theoretical	Discussion & questions
4	4	Preliminaries	function graphs, even and odd functions, trigonometric functions	Theoretical &Tutorial	Discussion & questions Short exam
5	4	Differentiation	Limits, continuity and differentiability. Rules of Differentiation, chain rule,	Theoretical	Discussion & questions

6	4	Differentiation	implicit differentiation, higher order differentiation, application, time rate,	Theoretical &Tutorial	Discussion & questions
7	4	Differentiation	maxima and minima, concave, curve plotting, inverse functions	Theoretical	Discussion & questions
8	4	Differentiation	the limit sinx/x , trigonometric functions and their inverse.	Theoretical &Tutorial	Discussion & questions Short exam
9	4	Integration	Finite integration, rules of integration,	Theoretical	Discussion & questions
10	4	Integration	applications, area, volume, arc-length,	Theoretical &Tutorial	Discussion & questions
11	4	Integration	integration methods, special integrals,	Theoretical	Discussion & questions
12	4	Integration	rotating and shifting of axes, conical sections.	Theoretical &Tutorial	Discussion & questions Short exam
13	4	Vectors	Vectors in the plane, in the space, scalar and vector products, triple products. Equations of lines and planes in the space.	Theoretical	Discussion & questions Short exam
14	4	Complex Geometry	Complex numbers: z = x +jy as an affix on the real point.(x y), modulus, argument, conjugate, addition, subtraction, products.	Theoretical &Tutorial	Discussion & questions

15	4	Complex Geometry	(Cartesian, trigonometric, polar and exponential) forms, transformations: translation, rotation by an angle .	Theoretical &Tutorial	Discussion & questions Short exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 10	LO #1, 2, 4 and 6
	Assignments	3	15% (15)	3, 12	LO #2, 3, 4,5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO # 4, 5,7 and 8
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1- Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc
Main references (sources)	Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE112	Electrical Circuits 1	Support	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
Electrical Circuits 1	
2. Course Code:	
CoE112	
3. Semester / Year:	
First Year/ First Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
57	
7. Course administrator's name (mention all, if more than one name)	
Name: Ali Mohammed Ahmed Email: ali.ahmed@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Understanding basic circuit components, such as resistors, capacitors, and inductors, and their properties. 2. Familiarizing with various types of circuits, such as series, parallel, and combination circuits. 3. Analyzing DC circuits using different analysis techniques. 4. Analyzing AC circuits using complex impedance and phasor notation. 5. Understanding the behavior of circuits with reactive components. 6. Understanding the concept of power and energy in circuits. 7. Developing practical skills in designing and building basic electrical circuits.
9. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1st	3.8	Units, atomic structure, conductor, semiconductor and isolator. Electrical current, potential and potential difference.	Introduction to electrical circuits	Theoretical	Questions and discussions
2nd	3.8	Electromotive force (EMF). Resistance and conductance, resistor types, color code resistance, ohm's law, linear and nonlinear resistance, electrical energy and power, efficiency.	Introduction to electrical circuits	Theoretical +Toutorial	Questions and discussions (Quiz)
3rd	3.8	Serial and parallel circuits,	DC Circuit analysis	Theoretical	Questions and discussions
4th	3.8	Kirchhoff's law, internal resistance of source, dependent sources, source transformation.	DC Circuit analysis	Theoretical	Questions and discussions (Quiz)
5th	3.8	Methods of analysis, Branch current, Mesh analysis, node analysis, examples, delta/ star transformation.	DC Circuit analysis	Theoretical +Toutorial	Questions and discussions
6th	3.8	Superposition, Thevenin	Network Theory	Theoretical	Questions and discussions
7th	3.8	Norton, maximum power transfer.	Network Theory	Theoretical +Toutorial	Questions and discussions
8th	3.8	AC quantities resistance, reactance, and impedance, conductance, susceptance, and admittance,	AC Circuit	Theoretical	Questions and discussions (Quiz)
9th	3.8	peak values, maximum, average, and r.m.s values,	AC Circuit	Theoretical	Questions and discussions
10th	3.8	phasor quantities. AC circuit analysis (equivalent impedance,	AC Circuit	Theoretical	Questions and discussions
11th	3.8	power in AC circuit, power factor,.	AC Circuit	Theoretical	Questions and discussions

12th	3.8	Complex quantity, complex power, power factor correction	AC Circuit	Theoretical +Toutorial	Questions and discussions
13th	3.8	Series resonance, quality factor, selectivity, half power frequencies and bandwidth.	Resonance:	Theoretical	Questions and discussions
14th	3.8	parallel resonance, quality factor, selectivity, half power frequencies and bandwidth.	Resonance:	Theoretical +Toutorial	Questions and discussions
15th	3.8	Single phase, and three phase circuits, star/delta transformation.	Three Phase Systems	Theoretical +Toutorial	Questions and discussions

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	Introductory Circuit Analysis, R. Boylestad, Pearson
Recommended books and references (scientific journals, reports...)	

Electronic References, Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE116	English Language I	Support or related learning activity	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
English Language I	
2. Course Code:	
CoE116	
3. Semester / Year:	
First Year/ First Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
43	
7. Course administrator's name (mention all, if more than one name)	
Name: Sarah Aziz Al-Hilfi Email: sara.aziz@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	The main aim of this module is to enable the student to use the English language effectively for study purposes across the curriculum. Also, to develop and integrate the use of the four language skills: Reading, Listening, Speaking and Writing to revise and reinforce structure already learnt. The module presents the following principles that related to both writing and reading skills: 1. The ability to write English correctly. 2. Master the Mechanics of academic writing; for example, using correct punctuation marks, capital letters, etc... 3. Writing neatly and legibly using the appropriate vocabulary and the correct grammatical items. 4. Writing coherently in more than one paragraph, complete accurately and fluently semi-controlled compositions such as events, trends, and processes. 5. understanding the total content and underlying meaning in the context. 6. Follow the sequence of ideas, facts etc... 7. locate Significant points and features. 8. identifying and understanding phrase or sentence groups.

	9. predict outcomes. 10.grasp meaning of words and sentences
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Singular and Plural Nouns	English Language I	Theoretical	Questions, discussion and Quizzes
2	3	English Tenses Part I	English Language I	Theoretical	Questions, discussion and Quizzes
3	3	English Tenses Part II	English Language I	Theoretical	Questions, discussion and Quizzes
4	3	Prepositions and Modal Verbs	English Language I	Theoretical	Questions, discussion and Quizzes
5	3	Compound nouns and Compound Adjectives	English Language I	Theoretical	Questions, discussion and Quizzes
6	3	Academic Writing	English Language I	Theoretical	Questions, discussion and Quizzes
7	3	Trends	English Language I	Theoretical	Questions, discussion and Quizzes
8	3	Describing Trends	English Language I	Theoretical	Questions, discussion and Quizzes
9	3	Describing Trends, vocabulary, and word order.	English Language I	Theoretical	Questions, discussion and Quizzes
10	3	Tables and bar charts	English Language I	Theoretical	Questions, discussion and Quizzes

11	3	Describing Tables and bar charts, vocabulary, and word order.	English Language I	Theoretical	Questions, discussion and Quizzes
12	3	Pie Charts	English Language I	Theoretical	Questions, discussion and Quizzes
13	3	Describing Pie Charts, vocabulary, and word order.	English Language I	Theoretical	Questions, discussion and Quizzes
14	3	Describing Projections	English Language I	Theoretical	Questions, discussion and Quizzes
15	3	Formal and informal Email Writing	English Language I	Theoretical	Questions, discussion and Quizzes
16	3	Preparatory week before the final Exam	English Language I	Theoretical	Questions, discussion and Quizzes

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, and 3
	Assignments	3	15% (10)	2, 6, 10	LO # 3, 4, and 5
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 2, 3,4 and 5
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-5
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Headway Academic Skills
Main references (sources)	All versions of Headway

Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	British Council, Learn English online

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE114	Fundamentals of Logic systems	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
Fundamentals of Logic systems	
2. Course Code:	
CoE114	
3. Semester / Year:	
1st semester - First Year	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
78	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Atheel K. Abdulzahraa Email: atheel.abdulzahraa@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	This course aims to enable the student to learn basics of digital systems design: 1. Numbering Systems and Conversion between different number systems. 2. Mathematical Operations of different number systems. 3. Principles and laws of Boolean algebra. 4. Simplification logical functions using K-Map. 5. Design the Logic circuits. Coding systems.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Introduction to Digital Systems [Decimal, Binary, Octal, Hexadecimal, etc.] and Number – Base Conversions	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Arithmetic operations	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Complements of Numbers	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Binary Logic Gates and Discussion	Digital systems and number systems	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Basic Definition and Rules of Boolean Algebra	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Canonical and Standard Forms [sum of products, product of sums]	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Discussion	Boolean Algebra	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	The Karnough Map Method	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Don’t-Care Terms	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	NAND and NOR Implementation	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Logic Circuits	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Discussion	Gate – level minimization	Theoretical and Tutorial	Questions, discussion and Quizzes

13	3	Weighted Codes [BCD, etc.]	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Ex – n Codes and Gray code	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Design of different codes	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes
16	3	Preparatory week before the final Exam	Coding systems	Theoretical and Tutorial	Questions, discussion and Quizzes

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 5 and 7
	Assignments	3	15% (15)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of logic design. Cengage Learning by Roth Jr, Charles H., Larry L. Kinney, and Eugene B. John.
Main references (sources)	Digital computer fundamentals. McGraw-Hill, Inc, by Bartee, Thomas C.
Recommended books and references (scientific journals, reports...)	

Electronic References, Websites	https://www.coursera.org/lecture/build-a-computer/unit-1-3-logic-gates-Aqrh6

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First Year	CoE113	Programming and Problem Solving	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:
Programming and Problem Solving
2. Course Code:
CoE113
3. Semester / Year:
1st semester/ 1st year
4. Description Preparation Date:
2024
5. Available Attendance Forms:
Presence / on-line
6. Number of Credit Hours (Total) / Number of Units (Total)
45
7. Course administrator's name (mention all, if more than one name)
Name: Dhayaa R. Khudher Email: dhayaa.khudher@uobasrah.edu.iq
8. Email: Course Objectives

Course Objectives	• The Programming and Problem-Solving module focuses on developing skills in programming and problem-solving techniques. This module aims to provide students with a solid foundation in computer programming concepts and the ability to apply these concepts to solve real-world problems. Throughout the module, students will learn various programming languages, such as C++. They will gain a thorough understanding of fundamental programming concepts like variables, data types, control structures (loops and conditionals) and functions. The module may cover the following topics: 1- Introduction to programming: Basic programming concepts, syntax, and logic. 2- Data types and variables: Working with different data types such as numbers, strings, and boolean values. Understanding variables and their usage. 3- Control structures: Implementing decision-making statements (if-else, switch-case) and loops (for, while) to control program flow. 4- Functions and modular programming: Creating reusable code blocks through functions and organizing code into modules.

	Throughout the module, students will have hands-on programming assignments and projects to reinforce their understanding of the concepts taught. They will practice problem-solving skills by tackling programming challenges and implementing solutions using the learned programming techniques. • By the end of the module, students should be proficient in at least one programming language and have the ability to approach and solve complex problems using programming and problem-solving strategies. These skills are essential for further studies in computer science and for careers in software development and related fields.
9. Teaching and Learning Strategies	
Strategy	1. Practice and Hands-on Coding: Regular practice is crucial for mastering programming concepts. Students should actively engage in coding exercises, programming assignments, and projects. Practicing coding helps reinforce understanding, improves syntax familiarity, and builds problem-solving skills. 2. Break Down Problems: Encourage students to break down complex problems into smaller, manageable components. This strategy helps in understanding the problem better and enables step-by-step solutions. Students can use techniques like pseudocode or flowcharts to visualize and plan their approach. 3. Debugging and Troubleshooting: Debugging is an essential skill for programmers. Students should develop the ability to identify and fix errors in their code systematically. Encourage them to use debugging tools, print statements, and step-through debugging techniques to locate and rectify issues. 4. Collaborative Learning: Foster a collaborative learning environment where students can work together, share ideas, and discuss solutions. Group projects or coding exercises can facilitate collaboration, allowing students to learn from each other, solve problems collectively, and gain exposure to different perspectives and approaches. 5. Seek Help and Resources: Encourage students to seek help when needed. They can consult the course instructor, teaching assistants, or online resources such as documentation, tutorials, and programming forums. Encouraging them to explore different resources broadens their understanding and exposes them to different problem-solving techniques. 6. Test and Debug Incrementally: Advise students to test and debug their code incrementally as they develop their solutions. By testing and verifying smaller parts of the code before proceeding to the next

	section, they can identify and fix errors early, reducing the complexity of debugging later. 7. Analyze and Optimize Algorithms: Teach students to analyze algorithms in terms of time and space complexity. They should understand the efficiency trade-offs of different algorithms and data structures and be able to select the most appropriate solution for a given problem. 8. Read and Analyze Code Examples: Encourage students to read and analyze code examples, both simple and complex. This practice helps them understand different programming techniques, coding patterns, and best practices employed by experienced programmers. They can also gain insights into problem-solving approaches. 9. Reflect and Review: Incorporate regular opportunities for students to reflect on their learning progress and review their code. This reflection and review process helps them identify areas for improvement, reinforce concepts, and solidify their understanding of programming principles. 10. Stay Updated and Explore Further: Programming languages and technologies evolve rapidly. Encourage students to stay updated with the latest developments and explore additional resources beyond the curriculum. They can explore new programming languages, libraries, frameworks, or online coding challenges to expand their skills and knowledge.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Variables, data types, operations	Introduction to programming	Theoretical	Questions, discussion and Quizzes
2	4	Paradigms: functional, procedural, object oriented	Introduction to programming	Theoretical and Tutorial	Questions, discussion and Quizzes
3	4	Strategies, process, implementation, debugging	Problem- solving algorithms	Theoretical	Questions, discussion and Quizzes
4	4	Concepts of algorithms, structured decomposition	Problem- solving algorithms	Theoretical and Tutorial	Questions, discussion and Quizzes

5	4	Syntax & semantics, variables, types, expressions, math functions	Programming in C++	Theoretical	Questions, discussion and Quizzes
6	4	Logical operations, I/O, functions, encapsulation, hiding,	Programming in C++	Theoretical	Questions, discussion and Quizzes
7	4	Conditional, iterative, control structure	Control structures	Theoretical	Questions, discussion and Quizzes
8	4	Loops, sequencing, selection, iteration functions	Control structures	Theoretical	Questions, discussion and Quizzes
9	4	Primitive types, arrays, strings	Basic data structures	Theoretical and Tutorial	Questions, discussion and Quizzes
10	4	Records, stack, heap allocation	Basic data structures	Theoretical	Questions, discussion and Quizzes
11	4	Static structure programming	Structure programming	Theoretical	Questions, discussion and Quizzes
12	4	Dynamic structured programming	Structure programming	Theoretical and Tutorial	Questions, discussion and Quizzes
13	4	Recursive math functions, divide and conquer strategies	Recursion	Theoretical	Questions, discussion and Quizzes
14	4	Recursive backtracking, implementation	Recursion	Theoretical	Questions, discussion and Quizzes
15	4	Different topics	Discussion and revision	Theoretical and Tutorial	Questions, discussion and Quizzes

11. Course Evaluation

	Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome

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

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	C++ Primer, 5th Edition by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo
Main references (sources)	C++ Essentials, By Sharam Hekmat, 2005 PragSoft
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	1. https://www.geeksforgeeks.org/ 2. https://github.com/ 3. https://www.khanacademy.org/ 4. https://www.codecademy.com/

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE 125	Device Physics	Basic	X	X	X	X	X	X	X	X	X	X	X	X

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

Course Description Form

1. Course Name:	
Device Physics	
2. Course Code:	
CoE 125	
3. Semester / Year:	
First Year/ Second Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
32	
7. Course administrator's name (mention all, if more than one name)	
Name: Mohannad H. Al-Ali Email: mohannad.khalaf@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	1. Gain a basic understanding of semiconductor material properties. Determine the properties of a pn junction including the ideal current–voltage characteristics of the pn junction diode. Examine dc analysis techniques for diode circuits. Develop an equivalent circuit for a diode that is used when a small, time-varying signal is applied to a diode circuit. 2. Determine the operation of diode rectifier circuits, Zener diode voltage regulator circuit, clipper and clamper circuits. Analyze circuits that contain more than one diode. Understand the operation and characteristics of photodiode and light-emitting diode circuits. 3. Study the structure, operation, and characteristics of MOSFETs and become familiar with the dc analysis of MOSFET circuits. Understand the operation and characteristics of the junction field-effect transistor and and analyze the dc response of JFET circuits. 4. Develop the small-signal models of MOSFETs and analyze the common-source, source-follower, and common-gate amplifiers. 5. Discuss the physical structure and operation of the bipolar junction transistor. Understand and become familiar with the dc analysis of BJT. Develop the small-signal models of BJTs and analyze the common-emitter, emitter-follower, and common-base amplifiers. Discuss the

	general frequency response characteristics of MOSFET and BJT amplifiers.
9. Teaching and Learning Strategies	
Strategy	1. Class lectures. 2. Tutoring. 3. Homework. 4. quizzes 6.Mid-term and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Semiconductor Materials and Properties: Intrinsic and extrinsic semiconductors, drift and diffusion currents, excess carriers.	Device Physics	Theory	Questions, discussion and Quizzes
2	2	The pn Junction: Reverse-biased pn Junction, forward-biased pn Junction, ideal current–voltage relationship. Diode DC Analysis: Piecewise linear model. Diode AC Equivalent Circuit: Small-signal equivalent circuit.	Device Physics	Theory	Questions, discussion and Quizzes
3	2	Diode Circuits: Rectifier circuits, Zener diode circuits, clipper and clamper circuits.	Device Physics	Theory	Questions, discussion and Quizzes
4	2	Diode Circuits: Multiple-diode circuits, photodiode and LED circuits.	Device Physics	Theory	Questions, discussion and Quizzes
5	2	MOSFET: Structure, operation modes, ideal and non-ideal current-voltage characteristics.	Device Physics	Theory	Questions, discussion and Quizzes
6	2	MOSFET DC Circuit Analysis: Common-source circuit.	Device Physics	Theory	Questions, discussion and Quizzes
7	2	Multistage MOSFET Circuits: Cascade and cascode configurations. Junction Field-Effect Transistor: pn JFET and MESFET operation, current-voltage characteristics, DC analysis.	Device Physics	Theory	Questions, discussion and Quizzes

8	2	The MOSFET Amplifier: Small-signal equivalent circuit. Basic Transistor Amplifier Configurations: Common-source amplifier.	Device Physics	Theory	Questions, discussion and Quizzes
9	2	Basic Transistor Amplifier Configurations: Common-drain amplifier and common-gate configuration.	Device Physics	Theory	Questions, discussion and Quizzes
10	2	Multistage Amplifiers: Cascade and cascode circuits. Basic JFET Amplifiers: Small-signal equivalent circuit.	Device Physics	Theory	Questions, discussion and Quizzes
11	2	Basic Bipolar Junction Transistor: Structure, operation modes, ideal current-voltage characteristics. DC Analysis of Transistor Circuits: Common emitter circuit.	Device Physics	Theory	Questions, discussion and Quizzes
12	2	Bipolar Transistor Biasing. Multistage BJT Circuits.	Device Physics	Theory	Questions, discussion and Quizzes
13	2	The Bipolar Linear Amplifier: Small-signal equivalent circuit. Basic Transistor Amplifier Configurations: Common-emitter amplifiers.	Device Physics	Theory	Questions, discussion and Quizzes
14	2	Basic Transistor Amplifier Configurations: Common-collector amplifier and common-base amplifier.	Device Physics	Theory	Questions, discussion and Quizzes
15	2	Multistage Amplifiers: Cascade and cascode configurations. Amplifier Frequency Response: MOSEFT and BJT.	Device Physics	Theory	Questions, discussion and Quizzes

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (20)	5, 10	LO # 1-6
	Assignments	8	20% (20)	2, 3, 4, 5, 6, 8, 9, and 10	LO # 1-6
	Projects / Lab.				

	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	D. A. Neamen, "Microelectronics: Circuit Analysis and Design". USA: McGraw-Hill, 4th ed., 2010.
Main references (sources)	A. Sedra and K. C. Smith, ``Microelectronics Circuits". New York, USA: Oxford Univ. Press, 7th ed., 2015.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE 123	Engineering design /Auto CAD	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
Engineering design /Auto CAD	
2. Course Code:	
CoE 123	
3. Semester / Year:	
First Year/ Second Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
47	
7. Course administrator's name (mention all, if more than one name)	
Name: Hanadi A. Jaber Email: hanadi.jaber@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	This course aims to introduce students to the basic concepts of computer engineering drawing. AutoCAD software is used to draw engineering designs. The course includes knowledge about AutoCAD tools and their properties for developing different software designs in different applications. After completing this course, students are expected to become proficient in the main topics of Computer Drawing by AutoCAD and have the opportunity to explore current topics in the field. The course introduces the principles of: 1. Introduction to AutoCAD software, explaining the status bar, command line, and drawing area. 2. Introducing the two-dimensional drawing. Explain the drawing commands, line, circle, Arc, ellipse, polygon, polyline, etc. 3. Explaining the modify commands, mirror, array, rotate, fillet/ chamfer. 4. Explaining the concepts of adding text, dimensions.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours.

	3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports 6.Mid-terms and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3		Introduction to AutoCAD by explain the interfaces tools	Theoretical lecture + practical by AutoCAD program	Exercise and discussion
2	3		Coordinate systems and show the method of entering points	Theoretical lecture + tutorial + practical	Homework
3	3		Drawing commands line and rectangle	Theoretical lecture + tutorial	Exercise and discussion
4	3		Circle and Arc commands	Theoretical lecture + tutorial + practical	Exercise and discussion
5	3		Polygon, Ellipse and polyline commands	Theoretical lecture + tutorial + practical	Homework
6	3		Modify tools bar Move, copy and mirror commands	Theoretical lecture + tutorial + practical	Exercise and discussion
7	3		Quiz and discussion	Theoretical lecture + tutorial + practical	Quiz

8	3		Array and offset commands	Theoretical lecture + tutorial + practical	Exercise and discussion
9	3		Fillet, chamfer and strength	Theoretical lecture + tutorial + practical	Exercise and discussion
10	3		Rotate, scale and explode	Theoretical lecture + tutorial + practical	homework
11	3		Trim, extend	Theoretical lecture + tutorial + practical	Exercise and discussion
12	3		Break, lengthen	Theoretical lecture + tutorial + practical	Exercise and discussion
13	3		Text and Dimensions Inserted a Text	Theoretical lecture + tutorial + practical	quiz
14	3		Inserted Dimensions linear and aligned	Theoretical lecture + tutorial + practical	homework
15	3		Insert Leader	Theoretical lecture + tutorial + practical	Exercise and discussion

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	3	10% (15)	5, 12	LO #1, 2, 5 and 7

Formative assessment	**Assignments**	3	15% (15)	2, 6, 10	LO # 1, 3, 5 and 6
	Projects / Lab.	1	10% (10)	2,3,5	LO # 1, 4, 6 and 8
	Report	-	-	-	-
Summative assessment	**Midterm Exam**	1.5 hr	30% (30)	7	LO # 1-7
	Final Exam	2hr	30% (30)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	AutoCAD 2014 Fundamentals
Main references (sources)	AutoCAD 2021 Tutorial First Level 2D Fundamentals
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Solved examples in AutoCAD. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE121	Calculus II	Base	X	X	X	X	X	X	X	X	X	X	X	X

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

Course Description Form

1. Course Name:	
Calculus II	
2. Course Code:	
CoE121	
3. Semester / Year:	
First Year/ Second Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
62	
7. Course administrator's name (mention all, if more than one name)	
Name: Wasan A. Wali Email: Wasan.wali@@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	5. Calculus II demands familiarity with mathematical concepts from Calculus I: integration, differentiation, limits, integrals, trigonometric properties, the fundamental theorem of calculus, and graphing techniques. The goal of the semester is to improve students' problem-solving abilities through examples and problems covered in lectures, problem sets, exams, and quizzes. The semester expounds and focuses on the topics: Coordinates, determinants, matrices, multiple Integrals, and functions of two or more variables. The students apply basic concepts and more difficult problems to develop students critical thinking skills.
9. Teaching and Learning Strategies	
Strategy	1- Explanation and clarification using the class lectures. 2- Tutorials hours. 3- Reading and self-learning. 4- Home Works. 5- Discussions and workshops

	6- Reports. 7- Presentation. 8- Short tests (quizzes). 9- Training and activities during lecture. 10- Mid-terms and final exams. 11- Encourage the student to: • Fully present in class. • Asking the questions that help to understand the material better. • Interaction during lectures • Practicing the examples, homework, and problems.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Coordinates	Polar coordinates: areas and lengths in polar coordinates	Theoretical	Discussion & questions
2	4	Coordinates	equivalent points and equivalent equations,	Theoretical &Tutorial	Discussion & questions
3	4	Coordinates	the relation between the Cartesian and the polar systems	Theoretical	Discussion & questions
4	4	Coordinates	Three dimensional coordinates: Cartesian, cylindrical, and spherical	Theoretical &Tutorial	Discussion & questions
Short exam					
5	4	Determinants and Matrices	Matrix basics, add and subtract matrices, multiply a	Theoretical	Discussion & questions

			matrix by a scalar, multiply matrices		
6	4	Determinants and Matrices	Take the transpose of a matrix, special types of matrices, matrix properties,	Theoretical &Tutorial	Discussion & questions
7	4	Determinants and Matrices	some properties of		
determinants, system of linear equations, Gramer's rule ,matrice	Theoretical	Discussion & questions			
8	4	Determinants and Matrices	some and product of matrices, the inverse of matrix, solution of linear equations by matrices	Theoretical &Tutorial	Discussion & questions
Short exam					
9	4	Functions of two or more variables	Partial differentiation	Theoretical	Discussion & questions
10	4	Functions of two or more variables	Total differential	Theoretical &Tutorial	Discussion & questions
Short exam					
11	4	Multiple Integrals	Double integrals over rectangles, double integrals over general regions,	Theoretical	Discussion & questions

11. Course Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 10	LO #1, 2, 4 and 6
	Assignments	3	15% (15)	3, 12	LO #2, 3, 4,5 and 6
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	14	LO # 4, 5,7 and 8
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Calculus, By Anton Bivens Davis, 2002 Anton Textbooks, Inc
Main references (sources)	Advanced Engineering Mathematics, By Erwin Kreyszig, 1999, John Wiley & Sons, Inc
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE122	Digital Logic Circuits	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

1. Course Name:	
Digital Logic Circuits	
2. Course Code:	
CoE122	
3. Semester / Year:	
First Year/ Second Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
72	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Atheel K. Abdulzahraa Email: atheel.abdulzahraa@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	6. Analyze and design the combinational logic circuits like (adder circuits, subtractor circuits, comparator circuits, multiplexer, and etc.). 7. Analyze and implement the sequential logic circuits (Latches and Flip - Flops). 8. Analyze and design a different types of register circuits (shift register). 9. Analyze and design the counter circuits (synchronous counters and asynchronous counters).
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Binary Adder– Subtractor [Half and Full adders, Half and Full subtractors]	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
2	3	Arithmetic operations	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
3	3	Comparator circuits	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
4	3	Multiplexer	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
5	3	Multiplexer & Demultiplexer	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
6	3	Decoder & Encoders	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
7	3	Discussion	Combinational logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
8	3	Sequential Circuits	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
9	3	Flip - Flops	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
10	3	Latches	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
11	3	Discussion	Sequential logic circuits	Theoretical and Tutorial	Questions, discussion and Quizzes
12	3	Registers	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
13	3	Shift Registers	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
14	3	Synchronous Counters	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes
15	3	Asynchronous Counters	Registers and Counters	Theoretical and Tutorial	Questions, discussion and Quizzes

11. Course Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fundamentals of logic design. Cengage Learning by Roth Jr, Charles H., Larry L. Kinney, and Eugene B. John.
Main references (sources)	Digital computer fundamentals. McGraw-Hill, Inc, by Bartee, Thomas C.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.coursera.org/lecture/build-a-computer/unit-1-3-logic-gates-Aqrh6

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First year	CoE123	Object Oriented Programming	Basic	X	X	X	X	X	X	X	X	X	X	X	X

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

Course Description Form

1. Course Name:	
Object Oriented Programming	
2. Course Code:	
CoE123	
3. Semester / Year:	
First Year/ Second Semester	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Presence / on-line	
6. Number of Credit Hours (Total) / Number of Units (Total)	
82	
7. Course administrator's name (mention all, if more than one name)	
Name: Dhayaa R. Khudher Email: dhayaa.khudher@uobasrah.edu.iq	
8. Email: Course Objectives	
Course Objectives	The Object-Oriented Programming (OOP) module aims to introduce students to the fundamental concepts and principles of object-oriented programming and enable them to apply these concepts in software development. The specific aims of the module may include: 1. Understanding OOP Principles: The module aims to provide a solid understanding of the core principles of object-oriented programming, such as encapsulation, inheritance, polymorphism, and abstraction. Students will learn how these principles contribute to code organization, reusability, and maintainability. 2. Applying OOP Concepts: The module aims to develop students' ability to apply OOP concepts in practical programming scenarios. Students will learn how to define classes, create objects, and use inheritance and polymorphism to model and solve real-world problems. 3. Designing and Implementing Classes: The module aims to enhance students' skills in designing and implementing classes effectively. Students will learn how to define class attributes and methods, manage access levels, and establish relationships between classes.

	4. Implementing Inheritance and Polymorphism: The module aims to enable students to understand and utilize inheritance and polymorphism effectively. Students will learn how to create class hierarchies, derive subclasses from base classes, and override methods to achieve specialized behavior. 5. Managing Object State: The module aims to equip students with techniques for managing object state using instance variables and methods. Students will learn how to ensure data integrity, apply access modifiers, and implement appropriate getter and setter methods. 6. Utilizing Design Patterns: The module aims to introduce students to common design patterns and their application in OOP. Students will learn about design patterns such as the Singleton pattern, Factory pattern, and Observer pattern, and how they can be used to solve recurring design problems. 7. Debugging and Troubleshooting OOP Code: The module aims to develop students' skills in debugging and troubleshooting object-oriented code. Students will learn techniques for identifying and fixing errors, handling exceptions, and ensuring the correctness of their OOP implementations. 8. Applying OOP in Software Development: The module aims to provide students with practical experience in applying OOP principles and techniques in software development projects. Students will work on OOP-based projects, applying concepts such as inheritance, polymorphism, and encapsulation to design and implement robust and scalable software solutions. 9. Understanding OOP Best Practices: The module aims to familiarize students with industry best practices and coding standards in object-oriented programming. Students will learn about topics such as code organization, naming conventions, documentation, and code reusability, to develop clean and maintainable code. 10. Overall, the Object-Oriented Programming module aims to equip students with a solid foundation in object-oriented programming concepts, enabling them to design and implement efficient, modular, and scalable software solutions using OOP principles
9. Teaching and Learning Strategies	
Strategy	Object-oriented programming (OOP) is a programming paradigm that organizes code into objects, which are instances of classes that encapsulate data and behavior. OOP provides several strategies and principles that help in designing and implementing effective and

	maintainable software solutions. Here are some commonly used strategies in object-oriented programming: 1. Encapsulation: Encapsulation is the practice of bundling data and methods together within a class. It hides the internal details of an object and provides a clean interface to interact with it. Encapsulation promotes information hiding and helps maintain the integrity of the object's data. 2. Inheritance: Inheritance allows you to create new classes based on existing classes, inheriting their attributes and behaviors. It promotes code reuse, as common attributes and methods can be defined in a base class and shared among derived classes. Inheritance supports the "is-a" relationship between classes, where a derived class is a specialized version of the base class. 3. Polymorphism: Polymorphism allows objects of different classes to be treated as instances of a common base class. It enables the use of the same interface for different objects, providing flexibility and extensibility. Polymorphism is often achieved through method overriding and method overloading. 4. Abstraction: Abstraction focuses on defining essential properties and behaviors while hiding unnecessary details. It simplifies complex systems by providing a high-level view and reducing complexity. Abstract classes and interfaces are used to define common behavior and serve as blueprints for concrete classes. 5. Composition: Composition involves building complex objects by combining simpler objects. It emphasizes the "has-a" relationship between classes. Instead of inheriting behavior, an object is composed of other objects as components or parts. This approach offers flexibility, as components can be easily added, removed, or replaced. 6. Association: Association represents a relationship between two or more classes. It can be a one-to-one, one-to-many, or many-to-many relationship. Associations are established through instance variables, and they define how objects interact and communicate with each other. 7. SOLID principles: SOLID is an acronym for a set of five principles that guide software design in OOP. These principles are Single Responsibility Principle (SRP), Open-Closed Principle (OCP), Liskov Substitution Principle (LSP), Interface Segregation Principle (ISP), and Dependency Inversion Principle (DIP). Adhering to these principles helps create modular, maintainable, and extensible code.

	These strategies and principles provide a foundation for designing and implementing object-oriented systems. They promote code reusability, modularity, maintainability, and flexibility, enabling developers to build robust and scalable software solutions

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Class hierarchies, object.	Object-oriented programming in C++	Theoretical	Questions, discussion
2	4	Data member and member functions, Access specifiers	Object-oriented programming in C++	Theoretical+ Tutorial	Questions, discussion, and quiz
3	4	Encapsulation, Abstraction Polymorphism, Dynamic binding.	Object-oriented programming in C++	Theoretical	Questions, discussion
4	4	Inheritance, and Operator overloading	Object-oriented programming in C++	Theoretical+ Tutorial	Questions, discussion, and quiz
5	4	Pointers and references	Data Structures	Theoretical	Questions, discussion
6	4	Linked List structures and the types	Data Structures	Theoretical+ Tutorial	Questions, discussion
7	4	Implementation strategies for stacks, queues, and hash tables,	Data Structures	Theoretical	Questions, discussion
8	4	Implementation strategies for graphs and trees.	Data Structures	Theoretical+ Tutorial	Questions, discussion, and quiz
9	4	definition and role in computer engineering. Components.	Database systems	Theoretical	Questions, discussion
10	4	Database management system (DBMS),	Database systems	Theoretical	Questions, discussion
11	4	Database architectures (possibilities, concept, data independence), and query	Database systems	Theoretical	Questions, discussion

12	4	Concepts (key, foreign key, record, relation),	Data modeling	Theoretical	Questions, discussion
13	4	Conceptual models	Data modeling	Theoretical	Questions, discussion, and quiz
14	4	(Possibilities, entity-relationship model and UML; strengths and weaknesses), and object-oriented models.	Structured query language (SQL)	Theoretical	Questions, discussion
15	4	Fundamental concepts including data definition	Structured query language (SQL)	Theoretical+ Tutorial	Questions, discussion

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	C++ Primer, 5th Edition by Stanley B. Lippman, Josée Lajoie, Barbara E. Moo
Main references (sources)	C++ Programming: From Problem Analysis to Program Design. Fifth Edition. D.S Malik
Recommended books and references (scientific	1. https://www.geeksforgeeks.org/ 2. https://github.com/ 3. https://www.khanacademy.org/ 4. https://www.codecademy.com/

journals, reports...)	
Electronic References, Websites	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE211	Calculus III	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester3

1. Course Name:	
Calculus III	
2. Course Code:	
CoE211	
3. Semester / Year:	
Second Year/ Semester3	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Heba Hakim Email: hiba.abdulzahrah@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	**A- Knowledge and Understanding** 1. Acquisition of mathematical knowledge to understand the environment and deal with society. 2. Understand the nature of mathematics as an integrated system of knowledge and its role in explaining some natural phenomena. 3. Realizing the integration of experience, for example, in investing mathematical knowledge in other fields of study. 4. Expressing attitudes stemming from reality and trying to find an explanation or a solution to them. **B. Subject-specific skills** 1. Using the language of mathematics in communicating and expressing life situations. 2.The ability to build mathematical models of engineering structures.

	3.The ability to present and discuss mathematical ideas and acquire the skill of mathematical proof. 4. Employs reading and listening skills to explain mathematical ideas and provide convincing justifications.

9. Teaching and Learning Strategies

Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Mid-terms and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Sequences and subsequences, limits, uniqueness of limits.	Sequences and series.	Theoretical	Discussion and Question
Week 2	4	Series convergence and divergence: comparison test, comparison of ratios, integral test, test of alternating series, absolute and conditional convergence.	Sequences and series.	Theoretical	Discussion and Question +Assignment
Week 3	4	infinite series test for convergence, power series for functions, Taylor's theorem, Mclaurian series	Sequences and series.	Theoretical	Discussion and Question
Week 4	4	convergence of power series, differentiation and integration	Sequences and series.	Theoretical	Discussion and Question +Quiz
Week 5	4	solution of differential equations by series, Legender	Sequences and series.	Theoretical	Discussion and Question

		and Bessel equations.			
Week 6	4	scalars and vectors, components of a vector, addition of vectors, multiplication by scalars, vector in space, dot product, cross product, forms of equation of a curve in space	Vector Analysis	Theoretical	Discussion and Question +Assignment
Week 7	4	parametric representation, tangential and normal, vectors, curvature, radius of curvature, forms of equation of a surface in space,	Vector Analysis	Theoretical	Discussion and Question +Quiz
Week 8	4	gradient and normal vectors, vector function in Cartesian cylindrical and spherical coordinates,	Vector Analysis	Theoretical	Discussion and Question
Week 9	4	speed, and acceleration, line, surface, and volume integrals and Divergence theorem.	Vector Analysis	Theoretical	Discussion and Question
Week 10	4	Functions of two or more variables, tangent plane and normal line, the directional derivative, the gradient, the chain rule for partial derivatives, the total differential	Partial Differentiation:	Theoretical	Discussion and Question +Assignment

Week 11	4	Maximum and minimum of two independent variables.	Partial Differentiation	Theoretical	Discussion and Question
Week 12	4	Laplace Transform: transforms and properties.	Laplace Transform.	Theoretical	Discussion and Question +Quiz
Week 13	4	inverse transform, partial fraction, application.	Laplace Transform.	Theoretical	Discussion and Question +Report
Week 14	4	DE solutions using Laplace transform	Laplace Transform.	Theoretical	Discussion and Question
Week 15	4	Different topics	Discussion and revision	Theoretical	Discussion and Question
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (15)	4,7,12	LO #1, 2, 5,7 and 10
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5, 6 and 9
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment					

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Thomas, "Calculus and Analytic Geometry". Kreyszig, "Advanced Engineering Mathematics".
Main references (sources)	
Recommended books and references (scientific journals, reports...)	

Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE212	Discrete Structures	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester3

1. Course Name:	
Discrete Structures	
2. Course Code:	
CoE212	
3. Semester / Year:	
Second Year/ Semester3	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
100/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Asst. Prof. Mohammed A. Ali Email: mohammed.joudah@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of discrete mathematics and structures and their use for problem solving and systems design in science and engineering. The course introduces the principles of logic, set theory, relations, functions, number systems, and their operations. It also introduces the principles of counting and its basic ways, such as permutations, combinations, counting methods, and methods of proof and their mathematical laws. The course enables students to think logically in reasoning and to use rapid methods of counting. A- Knowledge and Understanding 1- Clarify the basic concepts of logical methods in proofing laws. 2- Gain new skills in counting methods. 3- Gain basic skills to building computing systems.

	4- Gain basic understanding of system programming and operating systems. B. Subject-specific skills 1 - The ability to transform issues into programs and applications design. 2 - The ability to think logically in addressing a particular problems. 3 - The ability to use fast counting methods. 4 - The ability to gain experience in methods of proof.

9. Teaching and Learning Strategies

Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Propositional logic	Mathematical Logic	Theoretical	Discussion and Question
Week 2	4	Logical reasoning	Mathematical Induction	Theoretical	Discussion and Question +Assignment
Week 3	4	Basics	Set Theory	Theoretical	Discussion and Question
Week 4	4	Set operations	Set Theory	Theoretical	Discussion and Question
Week 5	4	Properties, Combining relations	Relations	Theoretical	Discussion and Question +Quiz
Week 6	4	Closures, Equivalence, partial ordering	Relations	Theoretical	Discussion and Question +Assignment
Week 7	4	One-to-one, onto, inverse, composition, graphs	Functions	Theoretical	Discussion and Question
Week 8	4	Predicates, preconditions and postconditions	Predicates	Theoretical	Discussion and Question
Week 9	4	Universal Quantifier, Existential Quantifier, Restricted	Quantifiers	Theoretical	Discussion and Question

		Domains, Using Quantifiers in System Specifications			
Week 10	4	Primes, greatest common divisors, least common multiple, euclidean algorithm	Integer Representations	Theoretical	Discussion and Question +Assignment
Week 11	4	Sequences, recurrence relations, summations	Sequences and Summations	Theoretical	Discussion and Question
Week 12	4	Product rule, Sum rule, Subtraction Rule, Division Rule, Tree Diagrams, Pigeonhole Principle	Counting	Theoretical	Discussion and Question +Quiz
Week 13	4	Permutations	Permutations	Theoretical	Discussion and Question
Week 14	4	Combinations, Binomial Coefficients and Identities, Repetitions	Combinations	Theoretical	Discussion and Question
Week 15	4	Recursively Defined Functions, Sets and Structures, Structural Induction	Structural Induction	Theoretical	Discussion and Question
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam

11. Course Evaluation

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

Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment					

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Fundamentals Approach to Discrete Mathematics, D.P Acharjya
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Discrete Mathematics and Its Applications, Rosen
Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second	CoE213	Signals & Systems	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester3

1. Course Name:	
Signals & Systems	
2. Course Code:	
CoE213	
3. Semester / Year:	
Second Year/ Semester3	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
100/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Emad A. Jasim Email: emad.abdulrazaq@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce students to this fundamental field of computer science, which enables students to focus on the study of mathematics and mathematical analysis and their use for problem solving and systems design in science and engineering. The course introduces the principles of transforming systems and signals to mathematical equation, set theory, functions and their operations. It also introduces the principles of analyzing the equations into time domain and frequency domain and learning the transformation relations between each other. Also, this course give the student the knowledge of the easiest way in the analyzing and obtaining the results in optimum way. **A- Knowledge and Understanding** 1- Clarify the basic concepts of mathematical analyzing methods for signals and systems. 2- Gain new skills in transformation methods between the mathematical equations of different variables. 3- Gain basic skills to building computing systems and evaluating the systems to obtain the optimum system as properties and application.

	4- Gain basic understanding of system programming and operating systems. **B. Subject-specific skills** 1 - The ability to transform signals and systems into mathematical equations. 2 - The ability to choose the optimum way in processing a particular problems. 3 - The ability to use fast counting methods. 4 - The ability to gain experience in methods of proof.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Signals Classification	Type of Signals and Signal Operations	Theoretical	Discussion and Question
Week 2	4	Signal Models	Some Useful Signal Models	Theoretical	Discussion and Question +Assignment
Week 3	4	Signal Spectrum	Phasors and Frequency Spectrum	Theoretical	Discussion and Question
Week 4	4	Frequency Domain	Fourier Series	Theoretical	Discussion and Question
Week 5	4	Frequency Domain	Fourier Transform	Theoretical	Discussion and Question +Quiz
Week 6	4	Frequency Domain	Fourier Transform Properties	Theoretical	Discussion and Question +Assignment
Week 7	4	Systems Classification	System Types and Description	Theoretical	Discussion and Question
Week 8	4	Systems Analysis	Time Domain Analysis	Theoretical	Discussion and Question
Week 9	4	System Analysis	Convolution	Theoretical	Discussion and Question
Week 10	4		System Analysis	Theoretical	Discussion and Question +Assignment
Week 11	4	Frequency Domain Analysis	System Analysis	Theoretical	Discussion and Question

Week 12	4	Laplace Transform	Signals Modulation	Theoretical	Discussion and Question +Quiz
Week 13	4		Amplitude Modulation	Theoretical	Discussion and Question
Week 14	4	Types of Signals Modulation	Frequency Modulation	Theoretical	Discussion and Question
Week 15	4	Amplitude Modulation	Phase Modulation	Theoretical	Discussion and Question
Week 16	4		Preparatory week before the final Exam	Theoretical	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 12	LO #1, 2, 3, 5 and 7
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 2, 3, 4, 5,6 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 2, 3, 4, 5 6 and 7
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment					

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Signals-and-Systems - by Oppenheim
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Analog and Digital Communication - Schaum
Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE214	Digital System Design	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester3

1. Course Name:	
Digital System Design	
2. Course Code:	
CoE214	
3. Semester / Year:	
Second Year/ Semester3	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Dunia Sattar Tahir Email: Dunia.tahir@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduction and Overview: combinational versus sequential circuits, Hierarchical design of combinational circuits using logic modules, PLA, Random-access memory (RAM), realization of logic functions using PLA and/ or RAM. 2. Analysis of Sequential logic circuits: Finite state machines (FSMs), clocked and un-clocked, Mealy vs. Moore models of FSMs, Modeling FSM behavior: State diagrams and state tables, timing diagrams, algorithmic state machine charts, Analysis of synchronous and asynchronous circuits. 3. Design of Sequential logic circuits: Design of synchronous sequential circuits: State minimization, state assignment, next state and output equation realization. Sequential functional units: Data registers, shift registers, counters, sequence detectors, synchronizers, controllers. 4. Realization using field-programmable gate arrays (FPGAs): Control concepts: Register transfer notation, major control state, sequences of micro-operations, conditional execution of micro-operations. Programmable logic devices (PLDs) and field-

	programmable gate arrays (FPGAs), PLAs, ROMs, PALs, complex PLDs. 5. Realization using ASM Charts: Using Algorithmic State Machine to represent the physical hardware circuits. 6. VHDL: Write programs in VHDL for combinational and sequential circuits.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.

10. Course Structure

Weekly Theoretical Plan

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	Memory and Programmable Logic Devices – Design ROM, PLA and PAL- I.	Programmable logic Devices	Theoretical	Discussion and Question
Week 2	4	Memory and Programmable Logic Devices – Design ROM, PLA and PAL- II.	Programmable logic Devices	Theoretical	Discussion and Question
Week 3	4	Memory and Programmable Logic Devices – Design FPGA.	Programmable logic Devices	Theoretical	Discussion and Question Quiz/ Assignment
Week 4	4	Analysis sequential circuits – I.	Analysis of asynchronous sequential Circuits	Theoretical	Discussion and Question
Week 5	4	Analysis sequential circuits – II.	Analysis of asynchronous sequential Circuits	Theoretical	Discussion and Question

Week 6	4	Analysis sequential circuits – III.	Analysis of asynchronous sequential Circuits	Theoretical	Discussion and Question
Week 7	4	Design of a sequence detector using a Mealy machine		Theoretical	Quiz Assignment
Week 8	4	Design of a sequence detector using a Moore machine.		Theoretical	Discussion and Question
Week 9	4	Design finite state machines Using ROMs, PLDs and FPGAs.		Theoretical	Midterm Exam
Week 10	4	Design finite state machines using one-hot state assignment.		Theoretical	Discussion and Question +Assignment
Week 11	4	Reduction techniques of sequential circuits – I.	Reduction of State Tables State assignment	Theoretical	Discussion and Question
Week 12	4	Reduction techniques of sequential circuits – II.	Reduction of State Tables State assignment	Theoretical	Discussion and Question +Quiz
Week 13	4	Principal component of an Algorithmic State Machine (ASM) chart and conversion of a state graph to an ASM Chart.	ASM Chart	Theoretical	Assignment/ Report
Week 14	4	Design digital systems using ASM chart.	ASM Chart	Theoretical	Discussion and Question
Week 15	4	Detection of hazards in logic circuits and design free hazards logic circuits.	Hazards	Theoretical	Discussion and Question
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam
Weekly Lab. Plan					

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	2	Lab 1: Introduction to Altera Quartus II Software Design - I.		Tutorial	Questions, Discussion and Quiz
Week 2	2	Lab 2: Introduction to Altera Quartus II Software Design - II.		Tutorial	Questions, Discussion and Quiz
Week 3	2	Lab 3: Implementation of all logic gates using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 4	2	Lab 4: Implementation of arithmetic logic circuits using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 5	2	Lab 5: Implementation of Multiplexer/ demultiplexer using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 6	2	Lab 6: Implementation of Decoder/ encoder using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 7	2	Lab 7: Implementation of ROM using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 8	2	Lab 8: Implementation of PLA and PAL using VHDL.		Tutorial	Questions, Discussion and Quiz
Week 9	2	Lab 9: Implementation of Flip-Flops using VHDL - I.		Tutorial	Questions, Discussion and Quiz
Week 10	2	Lab 10: Implementation of Flip-Flops using VHDL - II.		Tutorial	Questions, Discussion and Quiz

Week 11	2	Lab 11: Design counters using VHDL - I.		Tutorial	Questions, Discussion and Quiz
Week 12	2	Lab 12: Design counters using VHDL - II.		Tutorial	Questions, Discussion and Quiz
Week 13	2	Lab 13: Design registers using VHDL - I.		Tutorial	Questions, Discussion and Quiz
Week 14	2	Lab 14: Design registers using VHDL - II.		Tutorial	Questions, Discussion and Quiz
Week 15	2	Lab 15: Implementation of combinational logic circuits using structural model.		Tutorial	Questions, Discussion and Quiz
Week 16	2	Preparatory week before the final Exam		Tutorial	Questions, Discussion and Quiz

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 7, 12	LO #1, 2, 3, 4, 6, 7 , 8 and 10
	Assignments	2	10% (10)	3, 7, 10, 13	LO # 2, 3, 5, 8 and 11
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,9, 11 and 12
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment					

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Logic Design, Charles H. Roth, Jr.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Digital Design, M. Morris Mano

Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second	CoE215	Electrical Circuits 2	Basic	X	X	X		X	X	X	X	X	X	X	X

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

Course Description Form

Second Stage / Semester3

1. Course Name:	
Electrical Circuits 2	
2. Course Code:	
CoE215	
3. Semester / Year:	
Second Year/ Semester3	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ali Mohammed Ahmed Email: ali.ahmed@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	1. Understanding AC power concepts and terminologies. 2. Familiarity with the various types of resonant circuits and their applications. 3. Analysis of first and second order transient circuits. 4. Understanding the concept of frequency response and transfer functions. 5. Understanding the concept of two port networks and their different parameters. 6. Study of the mutual inductance and magnetically coupled circuits.
9. Teaching and Learning Strategies	

Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Weekly Theoretical Plan

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	4	AC Power: instantaneous and average power		Theoretical	Discussion and Question
Week 2	4	Maximum average power, apparent power, and power factor		Theoretical	Discussion and Question +Assignment
Week 3	4	Complex power and power factor correction		Theoretical	Discussion and Question
Week 4	4	Series and parallel resonant circuits, quality factor and selectivity		Theoretical	Discussion and Question
Week 5	4	Concept of natural and forced responses + the source-free RC circuits + The source-free RL circuits		Theoretical	Discussion and Question +Quiz
Week 6	4	Driven RC and RL circuits		Theoretical	Discussion and Question
Week 7	4	Mid-term exam + The source-free parallel RLC circuits		Theoretical	Discussion and Question
Week 8	4	The overdamped, critically damped, and underdamped parallel and series RLC circuits		Theoretical	Discussion and Question
Week 9	4	Frequency response, transfer functions, and bode diagrams		Theoretical	Discussion and Question

Week 10	4	Basic filter design (LPF, HPF, and BPF)		Theoretical	Discussion and Question +Quiz
Week 11	4	Two port networks		Theoretical	Discussion and Question
Week 12	4	Interconnection of networks		Theoretical	Discussion and Question +Assignment
Week 13	4	Magnetically coupled circuits		Theoretical	Report
Week 14	4	Energy in a coupled circuit		Theoretical	Discussion and Question
Week 15	4	Linear and ideal transformers		Theoretical	Discussion and Question
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam
Weekly Lab. Plan					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	2	Lab 1: The Oscilloscope and the Function Generator		Tutorial	Discussion and Question
Week 2	2	Lab 2: The Oscilloscope and the Function Generator (continued)		Tutorial	Discussion and Question
Week 3	2	Lab 3: RL and RC circuits		Tutorial	Discussion and Question
Week 4	2	Lab 4: RL and RC circuits (continued)		Tutorial	Discussion and Question
Week 5	2	Lab 5: RLC series and parallel circuits		Tutorial	Discussion and Question
Week 6	2	Lab 6: Resonance in Series RLC Circuits		Tutorial	Discussion and Question
Week 7	2	Lab 7: Resonance in Series RLC Circuits (continued)		Tutorial	Discussion and Question
Week 8	2	Lab 8: Resonance in Parallel RLC Circuits		Tutorial	Discussion and Question
Week 9	2	Lab 9: Resonance in Parallel RLC		Tutorial	Discussion and Question

		Circuits (continued)			
Week 10	2	Lab 10: Transient Response of an RC Circuit		Tutorial	Discussion and Question
Week 11	2	Lab 11: Transient Response of an RC Circuit (continued)		Tutorial	Discussion and Question
Week 12	2	Lab 12: Transient Response of RLC Circuits		Tutorial	Discussion and Question
Week 13	2	Lab 13: Transient Response of RLC Circuits (continued)		Tutorial	Discussion and Question
Week 14	2	Lab 14: Two port networks		Tutorial	Discussion and Question
Week 15	2	Lab 15: Two port networks (continued)		Tutorial	Discussion and Question
Week 16	2	Preparatory week before the final Exam		Tutorial	Discussion and Question

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment					

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education
Main references (sources)	

Recommended books and references (scientific journals, reports...)	Engineering Circuit Analysis, W. Hayt and J. Kemmerly
Electronic References, Websites	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE221	Differential Equations	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester4

1. Course Name:	
Differential Equations	
2. Course Code:	
CoE221	
3. Semester / Year:	
Second Year/ Semester 4	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Heba Hakim Email: hiba.abdulzahrah@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduction to Differential Equations: Definitions and terminology. Initial-value problems. Differential equations as mathematical models Learn the partial differentiation and its properties. 2. First-Order Differential Equations: Solution curves without a solution; direction fields, autonomous first-order differential equations. Separation of variables . Linear equations . Exact equations . Solutions by substitutions. 3. Modeling with First-Order Differential Equations: Linear models; exponential growth and decay, Newton's law of cooling, mixture problems, series circuits Non-linear models; logistic growth, chemical reactions. Systems of differential equations; radioactive series, mixtures, predator-prey models, competition models, networks. 4. Higher-Order Differential Equations: Linear differential equations; initial-value and boundary-value problems, homogenous equations, non-homogeneous equations. Reduction of order. Homogenous linear equations with constant coefficients.

	Undetermined coefficients; superposition approach, annihilator approach. 5. Modeling with Higher-Order Differential Equations: Linear models with initial value problems; spring/mass systems with free undamped motion, free damped motion, and driven motion; series circuit analogue. Linear models with boundary value problems. Nonlinear models.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Mid-terms and final exams.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	4	Separation of variables.	First order Differential Equation	Theoretical	Discussion and Question
Week 2	4	Homogeneous Differential Equations .Solutions by substitutions.	First order Differential Equation	Theoretical	Assignment+Quiz
Week 3	4	Exact Differential Equations .	First order Differential Equation	Theoretical	Discussion and Question
Week 4	4	Linear Differential Equations .	First order Differential Equation	Theoretical	Discussion and Question
Week 5	4	2nd order Homogeneous Differential Equations	Linear Differential Equations of 2nd and higher order	Theoretical	Discussion and Question
Week 6	4	Eular Cauchy 2nd order Homogeneous Differential Equations	Linear Differential Equations of 2nd and higher order	Theoretical	Discussion and Question+Assignment
Week 7	4	2nd order Non-Homogeneous Differential Equations	Linear Differential Equations of 2nd and higher order	Theoretical	Discussion and Question

Week 8	4	Higher order Differential Equations	Linear Differential Equations of 2nd and higher order	Theoretical	Discussion and Question
Week 9	4	Linear models; exponential growth and decay,	Modeling with First-Order Differential Equations:	Theoretical	Discussion and Question
Week 10	4	Newton's law of cooling, mixture problems, series circuits	Modeling with First-Order Differential Equations:	Theoretical	Assignment+Quiz
Week 11	4	Non-linear models; logistic growth, chemical reactions. Systems of differential equations; radioactive series, mixtures, predator-prey models,	Modeling with First-Order Differential Equations:	Theoretical	Discussion and Question
Week 12	4	Linear models with initial value problems; spring/mass systems with free undamped motion,	Modeling with Higher-Order Differential Equations	Theoretical	Discussion and Question
Week 13	4	Linear models with initial value problems; spring/mass systems with free damped motion, and driven motion.	Modeling with Higher-Order Differential Equations	Theoretical	Discussion and Question+ Report
Week 14	4	Series circuit analogue.		Theoretical	Discussion and Question

		Linear models with boundary value problems. Nonlinear models.			
Week 15	4		Modeling with Higher-Order Differential Equations	Theoretical	Discussion and Question
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (15)	2, 7, 10	LO #1, 2, 5, 7 and 10
	Assignments	3	15% (10)	2, 6, 10	LO # 1, 3, 5 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	13	LO # 1, 4, 5 and 6
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Thomas, "Calculus and Analytic Geometry".
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Kreyszig, "Advanced Engineering Mathematics".

Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE222	Probability and Statistics	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

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Description Form

Second Stage / Semester4

1. Course Name:	
Probability and Statistics	
2. Course Code:	
CoE222	
3. Semester / Year:	
Second Year/ Semester 4	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
125/5	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Emad A. Jasim Email: emad.abdulrazaq@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce students to this basic field of engineering sciences, which enables students to focus on studying mathematics and ways to clarify statistics for experiments or systems that are studied or analyzed and use them to solve problems and design systems in science and engineering such as calculating the rate and the amount of variance and others. The course introduces the principles of calculating the probability distribution and random variables such as the normal, exponential, uniform distribution, etc., and the operations that take place on them. It also introduces students to the principles of counting and its basic methods such as permutations, combinations, counting methods, and methods of proof and proof of mathematical laws. The course enables students to think logically in reasoning and to use rapid methods of counting. A- Knowledge and Understanding 1- Clarify the basic concepts of methodological methods in proof 2- Gain new skills in counting methods. 3- Gain basic skills to building computing systems.

	4- Gain a basic understanding of how to expect results and make a study based on the expected results. B. Subject-specific skills 1 - The ability to count and clarify the collected data in the simplest possible way. 2 - The ability to think logically in deducing solutions to problems. 3 - The ability to use fast counting methods. 4 - The ability to gain experience in methods of proof.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Short tests (quizzes). 5. Reports. 6. Mid-terms and final exams.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	4	Statistics	Basic of Statistics	Theoretical	Discussion and Question
Week 2	4	Statistics Graphes	Histogram and Box plot	Theoretical	Discussion and Question
Week 3	4	Probability	Introduction of Probability	Theoretical	Discussion and Question +Assignment
Week 4	4	Counting	Counting Techniques	Theoretical	Discussion and Question
Week 5	4	Probability Classification	Types of Probability	Theoretical	Discussion and Question
Week 6	4	Probability Analyzing	Tree Diagrams and Probability Models	Theoretical	Discussion and Question
Week 7	4	Methods of counting Probability	Conditional Probability	Theoretical	Discussion and Question
Week 8	4	Methods of counting Probability	Theorem of Total Probability	Theoretical	Discussion and Question +Quiz
Week 9	4	Probability Distribution	Random Variables	Theoretical	Discussion and Question +Assignment

Week 10	4	Probability Distribution Functions	Continuous Distribution Functions	Theoretical	Discussion and Question
Week 11	4	Probability Distribution Functions	Discrete Distribution Functions	Theoretical	Discussion and Question
Week 12	4	Probability Distribution Functions	Some Special Distribution Functions	Theoretical	Discussion and Question
Week 13	4	Expectation	Principles of Expectation and Moments	Theoretical	Discussion and Question +Quiz
Week 14	4	Sampling and Estimation	Principles of Sampling and Estimation	Theoretical	Discussion and Question +Assignment
Week 15	4	Estimation	Confidence Interval	Theoretical	Discussion and Question +Report
Week 16	4	Preparatory week before the final Exam		Theoretical	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	8, 13	LO #1, 2, 3, 5 and 7
	Assignments	3	15% (15)	3, 9, 14	LO # 1, 2, 3, 4, 5,6 and 7
	Projects / Lab.	-	-	-	-
	Report	1	15% (15)	15	LO # 1, 2, 3, 4, 5 6 and 7
Summative assessment	**Midterm Exam**	1.5 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	A First Course in Probability By Sheldon Ross
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Fundamentals of probability and statistics for engineers , By T. T. Soong
Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE223	Microprocessor Programming	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester4

1. Course Name:	
Microprocessor Programming	
2. Course Code:	
CoE223	
3. Semester / Year:	
Second Year/ Semester 4	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Dunia Sattar Tahir Email: Dunia.tahir@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	The objective of this course is to teach students the basic concepts of microprocessor-based systems, and introduces the assembly language for Intel *x86* microprocessor family.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.
10. Course Structure	
Weekly Theoretical Plan	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	Introduction and history of microprocessors.		Theoretical	Discussion and Question
Week 2	3	Microprocessor architecture of Intel *x86* microprocessor family.		Theoretical	Discussion and Question
Week 3	3	Memory management of Intel *x86* microprocessor family.		Theoretical	Quiz+Assignment
Week 4	3	Addressing modes of Intel *x86* microprocessor family.		Theoretical	Discussion and Question
Week 5	3	Instruction format of Intel *x86* microprocessor family.		Theoretical	Discussion and Question
Week 6	3	Assembly language programming.		Theoretical	Discussion and Question
Week 7	3	Data transfer instructions.		Theoretical	Quiz/ Assignment
Week 8	3	Stack operations.		Theoretical	Discussion and Question
Week 9	3	Arithmetic instructions – I.		Theoretical	Discussion and Question
Week 10	3	Arithmetic instructions – II.		Theoretical	Discussion and Question+Assignment
Week 11	3	Bit Manipulation instructions.		Theoretical	Discussion and Question
Week 12	3	Control transfer instructions – Jump instructions.		Theoretical	Discussion and Question+Quiz
Week 13	3	Control transfer instructions – Loop instructions.		Theoretical	Assignment+ Report
Week 14	3	Control transfer instructions – Subroutine instructions.		Theoretical	Discussion and Question

Week 15	3	String instructions.		Theoretical	Discussion and Question
Week 16	3	Preparatory week before the final Exam		Theoretical	Final Exam
Weekly Lab. Plan					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	2	Lab 1: Debug Program – Memory management commands.		Tutorial	Discussion and Question
Week 2	2	Lab 2: Debug Program – Assembler commands.		Tutorial	Discussion and Question
Week 3	2	Lab 3: Lab 2: Debug Program – Program control commands.		Tutorial	Discussion and Question
Week 4	2	Lab 4: Addressing modes of Intel x_{86} microprocessor family.		Tutorial	Discussion and Question
Week 5	2	Lab 5: Data transfer Instructions.		Tutorial	Discussion and Question
Week 6	2	Lab 6: Stack instructions.		Tutorial	Discussion and Question
Week 7	2	Lab 7: Input and output instructions.		Tutorial	Discussion and Question
Week 8	2	Lab 8: Addition and subtraction instructions.		Tutorial	Discussion and Question
Week 9	2	Lab 9: Multiplication and division instructions.		Tutorial	Discussion and Question
Week 10	2	Lab 10: Logical instructions.		Tutorial	Discussion and Question
Week 11	2	Lab 11: Shift and rotate instructions.		Tutorial	Discussion and Question
Week 12	2	Lab 12: Control transfer		Tutorial	Discussion and Question

		instructions - Jump instructions.			
Week 13	2	Lab 13: Control transfer instructions - Loop instructions.		Tutorial	Discussion and Question
Week 14	2	Lab 14: Control transfer instructions – Call and ret instructions.		Tutorial	Discussion and Question
Week 15	2	Lab 15: String instructions.		Tutorial	Discussion and Question
Week 16	2	Preparatory week before the final Exam		Tutorial	Final Exam

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	The 8088 and 8086 microprocessors Programming, Interfacing, Software, Hardware, and Applications, Fourth Edition, Walter A. Triebel and Avtar Singh
Main references (sources)	
Recommended books and references	The intel microprocessors, Eighth Edition, BARRY B. BREY.

(scientific journals, reports...)	
Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE224	Algorithms	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester4

1. Course Name:	
Algorithms	
2. Course Code:	
CoE224	
3. Semester / Year:	
Second Year/ Semester 4	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
150/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Musaab A. Alaziz Email: mosab.adil@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	This course aims to introduce students to this fundamental field of computer science and computer engineering, which enables students to focus on the study of data structures and programming background and make them expert in programming the common algorithms and data structures with full understanding to the complexity of each algorithm, using the JAVA and C++ programming languages. Most searching, sorting, and graph algorithms are covered in this course. The students will perform laboratory exercises in programming the commonplace algorithms in C++. The students will also be exposed to computation models and computational complexity. **A- Knowledge and Understanding** 1. Clarify the basic concepts of data structures 2. Gain new skills in finding the growing and the complexity of functions. 3. Gain the skills to compute the complexity of the programming code.

	4. Understanding searching and sorting algorithms. 5. Understanding simple table problems with modern solutions. 6. Gain basic understanding in Graph algorithms. **B. Subject-specific skills** 1 - The ability to transform issues into programs and applications design. 2 - The ability to think logically in addressing a particular problem. 3 - The ability to design algorithms to solve problems. 4 - The ability to gain experience in simplify complex problems.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small projects. 4. Laboratories. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams for both theoretical and Lab subjects.
10. Course Structure	

Weekly Theoretical Plan

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	Basic algorithms, algorithm using	Introduction	Theoretical	Discussion and Question
Week 2	3	complexity, the purpose and role of algorithms in computer engineering.	Introduction	Theoretical	Discussion and Question
Week 3	3	behavior (best, average, and worst case), Big “O,” little “o,” omega, and theta notation, measurements	Algorithmic analysis	Theoretical	Discussion and Question +Assignment
Week 4	3	Time and space tradeoffs, recursive algorithms. Distributed algorithms Concurrency and Scheduling.	Algorithmic analysis	Theoretical	Discussion and Question
Week 5	3	Dynamic connectivity, quick	Art of Algorithms	Theoretical	Discussion and Question

		find, quick union, improvements			
Week 6	3	Trees, graphs, Binary tree, and Binary search tree.	Data Structure	Theoretical	Discussion and Question +Quiz
Week 7	3	Selection, Insertion, Bubble, and Shell sort	Sorting	Theoretical	Discussion and Question
Week 8	3	Merge sort, Quick sort, duplicate keys, system sorts	Sorting	Theoretical	Discussion and Question
Week 9	3	Binary heap, and heap sort	Sorting	Theoretical	Discussion and Question
Week 10	3	API, sequential search, binary search, ordered operations.	Symbol Tables	Theoretical	Discussion and Question
Week 11	3	BST, ordered operations, deletion	Binary Search Trees	Theoretical	Discussion and Question
Week 12	3	2-3 Search trees, red-black BSTs	Binary Search Trees	Theoretical	Discussion and Question +Quiz
Week 13	3	Hash functions, sperate chaining, linear probing	Hash Tables	Theoretical	Assignment +Report
Week 14	3	DFS, BFS, connected components.	Undirected Graph	Theoretical	Discussion and Question
Week 15	3	Searching, topological sorting, MST, and Shortest path algorithms	Undirected Graph	Theoretical	Discussion and Question
Week 16	3	Preparatory week before the final Exam		Theoretical	Final Exam
Weekly Lab. Plan					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
Week 1	2	Lab 1: Data structure – linked list, stack, queue		Tutorial	Discussion and Question
Week 2	2	Lab 2: Linear search, find the max		Tutorial	Discussion and Question
Week 3	2	Lab 3: Binary Search, Greedy Algorithm		Tutorial	Discussion and Question
Week 4	2	Lab 4: 3-sum (and its improved way)		Tutorial	Discussion and Question
Week 5	2	Lab5: Binary tree		Tutorial	Discussion and Question

Week 6	2	Lab 6: Quick find, Quick union, Weighted Quick-Union		Tutorial	Discussion and Question
Week 7	2	Lab 7: Selection and insertion sort		Tutorial	Discussion and Question
Week 8	2	Lab 8 : Bubble and Shell sort		Tutorial	Discussion and Question
Week 9	2	Lab 9: Merge sort		Tutorial	Discussion and Question
Week 10	2	Lab 10: Midterm exam		Tutorial	Discussion and Question
Week 11	2	Lab 11: Quick sort		Tutorial	Discussion and Question
Week 12	2	Lab 12: Heap sort		Tutorial	Discussion and Question
Week 13	2	Lab 13: Binary Search tree, 2-3 tree, and red black tree		Tutorial	Discussion and Question
Week 14	2	Lab 14: Mixed of experiments of previous topics.		Tutorial	Discussion and Question
Week 15	2	Lab 15: Mixed of experiments of previous topics.		Tutorial	Discussion and Question
Week 16	2	**Preparatory week before the final Exam**		Tutorial	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3, 7 and 8
	Assignments	2	10% (10)	3, 13	LO # 2, 4 and 8
	Projects / Lab.	1	15% (15)	Continuous	
	Report	1	5% (5)	13	LO # 4,5, 6 and 7
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-7
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Algorithms 4th edition by R. Sedgewick and K. Wayne, Addison-Wesley Professional, 2011, ISBN 0-321-57351-X.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Algorithms 3rd edition by R. Sedgewick, Addison-WesleyProfessional.
Electronic References, Websites	websites. Libraries sites in international universities.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Second Year	CoE225	Digital Electronics	Basic	x	x	x	x	x	x	x	x	x	x	x	x

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

Course Description Form

Second Stage / Semester4

1. Course Name:	
Digital Electronics	
2. Course Code:	
CoE225	
3. Semester / Year:	
Second Year/ Semester 4	
4. Description Preparation Date:	
10/9/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
125/5	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Ali A. Abed Email: ali.abed@uobasrah.edu.iq	
8. Course Objectives	
Course Objectives	The objective of this course is to introduce students to this fundamental area of computer science which enables students to focus on the study of design and analysis of digital electronic circuits using the theoretical methods and simulation programs. This course is the fundamental of many other courses such as: computer architecture, digital control, logic design, VLSI, etc.
9. Teaching and Learning Strategies	
Strategy	1. Explanation and clarification using the class lectures. 2. Tutorials hours. 3. Self-learning using homework and small simulation projects. 4. Class projects. 5. Short tests (quizzes). 6. Reports. 7. Mid-terms and final exams
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	Introduction – VTC, ideal logic, noise margins, logic levels, design goals, dynamic response, rise time and fall time, propagation delay, PDP.		Theoretical	Discussion and Question
Week 2	3	NMOS logic design, inverter with resistive load, W/L ratio, load-line visualization, load resistor problems.		Theoretical	Discussion and Question
Week 3	3	Transistor alternative to the load resistor, saturated load inverter, NMOS NAND and NOR gates, Complex logic design, power dissipation.		Theoretical	Discussion and Question +Assignment
Week 4	3	Dynamic behavior of MOS logic gates, PMOS logic.		Theoretical	Simulation
Week 5	3	Introduction to CMOS logic design, CMOS inverter, Static characteristics, CMOS VTC, Noise margins.		Theoretical	Discussion and Question
Week 6	3	Dynamic behavior of CMOS inverters, propagation delay, rise and fall times, cascaded inverters,		Theoretical	Discussion and Question +Quiz, Simulation
Week 7	3	Static power dissipation, dynamic power dissipation, PDP, CMOS NOR and NAND gates, Transistor sizing,		Theoretical	Discussion and Question

		CMOS complex gates, minimum size design, cascade buffers.			
Week 8	3	Introduction to MOS memory and storage circuits, random access memory, static memory cell (6-T cell), read and write operations.		Theoretical	Discussion and Question
Week 9	3	Dynamic memory cell, 1-T cell DRAM, read and write operation, 4-T cell, sense amplifier.		Theoretical	Simulation
Week 10	3	Address decoders, ROM memory design, Flip-Flops design, D-Latch.		Theoretical	Discussion and Question
Week 11	3	Bipolar logic circuits, Current switch (emitter-coupled pair), Static behavior of the current switch, current switch analysis, ECL gate analysis and design, current source implementation.		Theoretical	Discussion and Question
Week 12	3	ECL OR-NOR gate, Emitter follower, PDP characteristics.		Theoretical	Discussion and Question +Quiz
Week 13	3	Saturating bipolar inverter: analysis and design, TTL prototype, power analysis in TTL prototype, Fanout of TTL prototype.		Theoretical	Discussion and Question +Assignment, Class Project
Week 14	3	Standard 7400 TTL inverter, analysis and design, power consumption, PDP, Fanout, Multi-		Theoretical	Discussion and Question

		emitter logic gates, BiCMOS logic.			
Week 15	3	Preparatory week before the final Exam		Theoretical	Discussion and Question
Week 16	3	Final Exam		Theoretical	Final Exam

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	6, 12	LO #1, 2, 3 and 4
	Assignments	2	10% (10)	3, 13	LO #1, 2, 3 and 4
	Projects / Lab.	3	15% (15)	4, 6, 9	LO #1, 2, 3 and 4
	Report	1	5% (5)	13	LO # 1, and 2
Summative assessment	**Midterm Exam**	2 hrs	10% (10)	8	LO # 1-3
	Final Exam	3 hrs	50% (50)	16	All
Total assessment			100% (100 Marks)		

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Microelectronic Circuit Design, Fourth Edition, Richard C. Jaeger and Travis N. Blalock https://tailieuhoctap123blog.files.wordpress.com/2016/06/microelectronic-circuit-design-4th-edition-jaeger1.pdf
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	websites. Libraries sites in international universities.