

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



Academic Program and Course Description for computer technical engineering

2024

Academic Program Description Form

University Name: Alayen Iraqi university

Faculty/Institute: ...Engineering technical collage.....

Scientific Department: computer technical engineering

Academic or Professional Program Name: computer technical engineering.....

Final Certificate Name: ..BSc.....

Academic System: ...Annual.....

Description Preparation Date: 18/10/2024

File Completion Date: 28/12/2024

Signature:

Head of Department Name:

Dr: Ghadeer Ibrahim Madi

Date: 25/1/2025



Signature:

Scientific Associate

Name: Dr. Raaid Nasur

Kadham

Date: 25/1/2025

أ.م.د. رائد ناصر العبدري
معاون العميد للشؤون العلمية

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date: 25/1/2025 Mohamed Hussam Haidar

Signature:



Approval of the Dean

Approval of the Dean

Academic Program Description Form

1. Program Vision

Qualifying distinguished and innovative competencies scientifically and with high skill and professional and ethical behavior who are able to keep pace with developments in the fields of computer techniques and facing the engineering scientific challenges to provide applicable solutions and community service.

2. Program Mission

Graduating distinguished technical engineers with qualified scientific and ethical levels and high efficiency in the fields of computer techniques by providing an advanced scientific environment and specialized faculty to be able to complete the process of higher education and professional learning and provide community service within multidisciplinary work times.

3. Program Objectives

PEO1: competently apply engineering methods to solve professional problems associated with the design, development, manufacture, and maintenance of computers techniques and related systems and understand the social, ethical, and environmental context of their work.

PEO2: communicate effectively with diverse and international communities, collaborate competently in cross-functional teams, and assume leadership roles while meeting the expectations of their employers.

PEO3: habitually engage in technical professional development.

4. Program Accreditation

5. Other external influences

Labor market: where many seminars and meetings held to discuss academic and applied content

with employers

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	٦	١٣	%	
College Requirements	١0	٥2	24%	
Department Requirements	٢٦	١٤٧	70%	
Summer Training				
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
Third year	CE 311	Computer Networks Fundamentals	2	2
Third year	CE 331	Control Engineering Fundamentals	2	2
Third year	CE 321	Digital Communication	2	2
Third year	CE 323	Digital Signal Processing	2	2
Third year	CE 341	Engineering Analysis	2	2
Third year	CE 351	Artificial intelligence and expert systems	2	2
Third year	CE 322	Real Time Systems Design	2	2
Third year	CE 312	Computer Networks Simulators	2	2
Fourth year	CE 411	Computer Networks Protocols	2	2
Fourth year	CE 421	Information Theory and Coding	2	2
Fourth year	CE 422	Mobile Communication systems	2	2
Fourth year	CE 461	Project Management	2	2
Fourth year	CE 423	Multimedia Computing	2	2
Fourth year	CE 413	Security of Computer and Networks	2	2
Fourth year	CE 412	Advanced Computer Technology	2	2

8. Expected learning outcomes of the program

Knowledge	
A1	Knowledge and understanding of telecommunications networks and how to connect them.

A2	Knowledge and understanding of the digital signal and how to analyze them.
A3	Knowledge and understanding of parts of computers and how to address their problems.
A4	Knowledge and understanding of electronic circuits for different computerized devices and how to design them.
A5	Knowledge and understanding of different programming languages and how to take advantage of them.
A6	Know the types of digital systems and how to design and program them.
Skills	
B1	Linking internal and external networks wired and wireless.
B2	Design and Implementation of printed circuit boards.
B3	Installation and interfacing communications of computerized operations Systems.
B4	Skills of maintaining personal and industrial computerized systems.
B5	Decision-making skills
Ethics	
C1	Planting the spirit of creativity among students to ensure that they can find innovative solutions to problems.
C2	Students develop the ability to work together effectively as teams
C3	Sense of responsibility among students and psychological configuration to carry burdens.
C4	Development to ensure the values and perseverance to get the job done and to reach satisfactory results.

9. Teaching and Learning Strategies

1. Use the strategy of cooperation and assistance during the educational process.
2. Field visits to relevant ministries and educational institutions.
3. Organizing seminars, courses and workshops for students that encourage spiritual values.
4. Discussions during lectures.
5. Labs
6. Discussions

10. Evaluation methods

1. Observing students' interaction with electronic circuits
2. Problems -based scenarios
3. Homework
4. Questionnaires
5. Short MCQs

6. Oral exam and direct questions in the class
7. Midterm exam
8. Electronic exams on the electronic platform
9. Final exam

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
	9	11			6	14

Professional Development

Mentoring new faculty members

Participation in training courses held within the college.

Professional development of faculty members

The department organizes different courses through the center of continuing education in several areas.

12. Acceptance Criterion

This is done according to the acceptance rate in the engineering group (of Electrical Engineering Technical College, Technical Engineering Department) within the electronic form approved by the Ministry of Higher Education and Scientific Research (central admission). The central admission standards have been applied to the college since the 2017 academic year.

13. The most important sources of information about the program

1. Lectures given by the subject teacher.
2. Books available in the college library.
3. Books on the Al-Ayen University platform.

4. Any website related to studying electronic circuits. Using modern references, using the latest books used in international universities, and developing the curriculum annually in a way that is compatible with university education

14.	Program Development Plan
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1. Creating an urgency for innovation and change
2. Overcoming barriers that often get in the way of effective change efforts
3. Looking outward for innovative inspiration and best practices
4. Determining the need for new facilities
5. Budgeting for marketing and recruitment efforts

			Program Skills Outline																
						Required program Learning outcomes													
Year/Level	Course Code	Course Name	Basic or optional	Knowledge						Skills					Ethics				
				A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	B 4	B 5	C 1	C 2	C 3	C 4	
Third	CE 311	Computer Networks Fundamentals	Basic	X	X		X	X	X	X	X		X	X	X	X		X	
	CE 331	Control Engineering Fundamentals	Basic	X	X	X		X	X	X	X	X		X	X	X			
	CE 321	Digital Communication	Basic	X	X	X	X		X	X	X	X	X		X	X		X	
	CE 323	Digital Signal Processing	Basic	X	X	X	X	X		X	X		X	X	X	X	X		
	CE 341	Engineering Analysis	Basic	X	X		X	X	X	X	X	X		X	X	X		X	
	CE 351	Artificial Intelligence	optional	X	X	X		X	X	X	X	X	X		X	X	X		
	CE 322	Real Time Systems Design	Basic	X	X	X	X		X	X	X		X	X	X	X		X	
	CE 312	Computer Networks Simulators	Basic	X	X	X	X	X		X	X	X		X	X	X	X		
Fourth	CE 411	Computer Networks Protocols	Basic	X	X		X	X	X	X	X		X	X	X	X		X	
	CE 421	Information Theory and Coding	Basic	X	X	X		X	X	X	X	X		X	X	X	X		

	CE 422	Mobile Communication systems	Basic	X	X	X	X		X	X	X	X	X		X	X		X
	CE 461	Project Management	Basic	X	X	X	X	X		X	X		X	X	X	X	X	
	CE 423	Multimedia Computing	Basic	X	X		X	X	X	X	X	X		X	X	X		X
	CE 413	Security of Computer and Networks	Basic	X	X	X		X	X	X	X	X	X		X	X	X	
	CE 412	Advanced Computer Technology	optional	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:					
Artificial intelligence and expert systems					
2. Course Code:					
CE 351					
3. Semester / Year:					
Third year (Annual)					
4. Description Preparation Date:					
18/01/2025					
5. Available Attendance Forms:					
Compulsory					
6. Number of Credit Hours (Total) / Number of Units (Total)					
120 hr./4U					
7. Course administrator's name (mention all, if more than one name)					
Name: Nadwa Sabeeh Jaber Email: Nadwa.Sabeeh@alayen.edu.iq					
8. Course Objectives					
Course Objectives	1. Knowledge of artificial neural networks. 2. The ability to choose artificial neural network 3. Knowledge of the learning algorithms in artificial neural network 4. Identify the learning algorithms in artificial neural networks 5. Identify the genetic algorithm search 6. The ability to identify the types of genetic algorithms				
9. Teaching and Learning Strategies					
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the 5. projects Discussions during lectures.				
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	8	A1,A2, B1,B2, C1	Introduction and role of ANNs, fundamentals of	1- Whiteboard and PowerPoint	- Short MCQs - Oral exam and direct

			biological Neural Network, basic principles of ANNs and their early structure	and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	questions in the class • Midterm exam • Electronic exams on the electronic platform • Final exam
3	4	A2,A6, B1,B2,B4 C2,C3	Properties of ANN, advantage, and disadvantage		
4,5,6,7	16		network architectures, logic gates		
8,9,10	12	A1,A2, B1,B4, C1,C3	Types of learning rules, learning algorithms, training styles		
11,12,13,14	16	A1,A2,A3,A5 B1,B2,B3 C2	Hub, Adaline, Mdaline, delta rule		
15,16	8	A2,A5,A3, B1,B2,B3 C1,C2	Important Perception function, neuron model, perception architecture, learning rules, training (train)		
17,18	8	A1,A5,A6, B1,B2,B43 C2,C3,C1	The back propagation learning procedure, derivation of the BP algorithm, Back propagation training		
19,20	8	A1A2,A3, B1,B3,B4 C1,C2	Search algorithm, Genetic algorithm		
21,22,23,24	16	A2,A6,A3, B2,B3,B4 C1	Type of operators, population, selection, crossover, crossover rate, mutation, mutation rate		
25,26,27	12	A1A3 B1,B3,B4 C1,C2,C3	Population, selection, crossover, and mutation algorithms		
28	4	A1A2,A3,A5 B1,B2,B4 C2	Application of genetic algorithms		
30,29	8	A5A6 B1,B3 C1,C2,C3	Advantage and disadvantage of Genetic		

			algorithms		
11.Course Evaluation					
		Time/Number	Weight (Marks)	Week Due	
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10	
	Semester 1 Quizzes	2	25% (25)	17, 25	
	Projects / Lab.	1	10% (10)	Continuous	
	Final Exam	3hr	40% (40)	30	
Total assessment			100% (100 Marks)		
12.Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1-Fundamental of neural network architectures ,algorithms, applications, Laurene Fausette.		
Main references (sources)			Introduction to Genetic algorithms; S.N.Sivanandam · S.N.Deepa; Springer 2008		
Recommended books and references (scientific journals, reports...)			Introduction to Genetic algorithms; S.N.Sivanandam · S.N.Deepa; Springer 2008		
Electronic References, Websites					

Course Description Form

1. Course Name:	
Computer Networks Fundamentals	
2. Course Code:	
CE 311	
3. Semester / Year:	
Third year (Annual)	
4. Description Preparation Date:	
18/01/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total):	
120 h/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Magdy Adel Abdelhay Email: Magdy.Adel@alayen.edu.iq Name: Baneen Shuaibth Bzaiea Email: Baneen.shuaibth@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Know the types of computer networks 2. Know the types of devices of Computer Networks 3. Learn methods of linking computer networks 4. Know how to relay information through computer networks 5. Know the types of protocols and programs that is appropriate for computer networks depending on the desired application.
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the

			expertise to help develop		
			4. Practical skills side and consolidate the principles necessary to carry out the		
			5. projects		
			6. Discussions during lectures.		
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	8	A1, A2, A4, B1, B2, C1, C4	Introduction, and classify the computer networks according to application, size, transmission technology.	1- Whiteboard and PowerPoint and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
3	4	A4, A6, B2, B5, C1, C2	LANs: Topologies, CSMA/CD, Token Access protocols, and IP addressing		
4	4	A5, A6, B4, C1, C2	Connection-Oriented Versus Connectionless Service, and Service Primitives		
5,6	8	A1, A5, B4, B5, C2, C4	The ISO reference Model, and TCP/IP Reference Model.		
7	4	A1, A2, A6, B2, C1, C2	Metropolitan Area Networks, Wide Area Networks, Internetworks, and VPNs		
8	4	A1, A2, A6, B2, C1, C2, C4	Digital signal (size of : text files, image files, voice files, and videos files)		
9	4	,5A1, A2, A ,4B1, B2, B ,4 ,2C1, C	Bandwidth-Limited Signals, The Maximum Data Rate		

			of a Channel		
10	4	,6A1, A4, A ,5B1, B2, B 4C1, C	guided transmission media, and wireless transmission		
11	4	,5A1, A2, A ,5B1, B2, B 4C1, C	Communication satellites: Geostationary, Medium-Earth Orbit, and Low-Earth Orbit Satellites		
12,13	8	,6A3, A4, A ,2B4, B5, C 4C	Digital modulation and multiplexing: Baseband, Pass band, FDM,TDM, and CDM		
14,15,16	12	,2A4, A5, B 4B5, C2, C	public switched telephone network: Structure of the Telephone System, DSL, and Trunks and Multiplexing, and Switching (Circuit switching & packet swishing)		
17	4	,2A3, A4, B 4B5, C2, C	cable television		
18,19,20	12	,5A1, A6, B 4C	DATA LINK LAYER DESIGN ISSUES: Framing, Error Control, and Flow Control		
21,22	8	,2A2, A5, B 2B4, C	ELEMENTARY DATA LINK PROTOCOLS		
23,24	8	,6A1, A5, A ,2B4, B5, C 4C	ELEMENTARY DATA LINK PROTOCOLS		
25	4	,2A5, A6, B 4C	Network Layer (Store-and- Forward Packet Switching)		

26	4	,2A2, A6, B 2B5, C	Network Layer (Implementation of Connectionless Service)		
27,28	8	,4A2, A6, B 1B5, C	Network layer (Implementation of Connection- Oriented Service)		
29	4	,5A4, B2, B 2C	Network Layer (Routing Algorithms)		
30	4	,6A2, A5, A 4B1, C2, C	Network Layer (Broadcast Routing)		

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books any)	Data Communications and Networking by McGraw Hill Forouzan Networking Series
Main references (sources)	Data Communications and Networking by McGraw Hill Forouzan Networking Series
Recommended books and references (scientific journals, reports...)	Computer Networking by James F. Kurose Univers of Massachusetts, Amherst
A- Recommended books and references (scientific journals, reports...).	Computer Networking by James F. Kurose Univers of Massachusetts, Amherst

Course Description Form

1. Course Name:					
Computer Networks Simulators					
2. Course Code:					
CE 312					
3. Semester / Year:					
Third year (Annual)					
4. Description Preparation Date:					
18/01/2025					
5. Available Attendance Forms:					
Compulsory					
6. Number of Credit Hours (Total) / Number of Units (Total)					
120hr/4Unit					
7. Course administrator's name (mention all, if more than one name)					
Name: Zahraa Rasim Email: Zahraa.Rasim@alayen.edu.iq					
8. Course Objectives					
Course Objectives		1. Know the types of computer networks 2. Know the types of devices of Computer Networks 3. Learn methods of linking computer networks and simulators packet tarcer 4. Know how to relay information through computer networks 5. Know the types of protocols and programs that is appropriate for computer networks depending on the desired application.			
9. Teaching and Learning Strategies					
Strategy		1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the 5. projects 6. Discussions during lectures.			
10. Course Structure					
Week	Hour s	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3	12	A1,A2,A3,A5 B1,B2,B3 C2,C3	(Simulation Overview), the three models (network	1- Whiteboard and	1. Short MCQs 2. Oral

			model, node model and process model)	PowerPoint and data show presentation	exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
4,5,6,7	16	A6,A2,A3,A5 B1,B2,B5 C2,C3,C1	Scenario 1: Network Implementation Scenario 2: Low level design Scenario 3: MPLS technology Scenario 4: Prediction and validation of network	2- Class discussion 3- Presentation of cases 4- Handouts	
8,9	8	A6,A2,A3,A5 B1,B2,B5 C2,C3,C1	SETUP(Simple Network, Busy network, One-server network, and Faster network)	5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	
9,10,11	12	A2,A3,A5,A6 B1,B2 C2,C3,C1	SETUP Wireless Network .		
12	4	A6,A2,A3,A5 B1,B2,B5 C2,C3,C1	Using routing protocol		
13,14,15	12	A2,A3,A5,A6 B1 ,B5 C2,C3,C1	ANALYSIS (Response Time of Simple Network vs. Busy network)		
16,17,18,19,20	20	A1,A3,A5 B1,B2,B5 C2,C3	CPU utilization of various servers in the Busy network		
21,22,23,24,25	20	A6,A2,A3,A5 B1,B2 C2,C3,C1	Different types of examples		
26,27,28,29,30	20	A3,A5,A1 B1,B2,B3 C2,C3,C1	Other types of computers network simulator		

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	Data Communications and Networking by McGraw-Hill Forouzan Networking Series
Main references (sources)	Data Communications and Networking by McGraw-Hill Forouzan Networking Series
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Control Engineering Fundamentals	
2. Course Code:	
CE 331	
3. Semester / Year:	
Third year (Annual)	
4. Description Preparation Date:	
18/01/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total):	
120 h/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Zahra Abbas Hassan Taiah Email: Zahra.Abbas@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. System analysis in the time domain by using differential equations in the Laplace transform 2. System analysis in the frequency domain 3. Working on the design of controllers designed using control theory which is PID 4. Study and analysis of different systems for different entries response 5. Study and analysis of the system stability
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop

4. Practical skills side and consolidate the principles necessary to carry out the
5. projects
6. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2	8	A1,A3,A4,B1,B5,C1	Open and closed loop systems	1- Whiteboard and PowerPoint and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
3,4,5	12	A2,A3,A6,B1,B3,B5,C3	Transfer function and mathematical modeling of control systems		
6,7	8	A1,A3,A5,B2,B3,B5,C1,C2	DC servo motor transfer function		
8	4	A1,A6,B1,B2,C1,C3	Block diagram representation		
9,10,11,12	16	A1,A6,B1,B2,B5,C1,C3	Time domain analysis of control systems		
13,14	8	A1,A3,A6,B1,C1	P-I-D controllers		
15,16	8	1A1,A5,A6,B2,B3,C3,C3	Routh's criterion and applications of Routh's criterion		
17,18,19,20	12	5A2,A3,B2,B3C1,C,	Root Locus		
21,22,23,24	16	3A1,A2,B1,B3C,	Bode plot		
25,26,27,28	16	5A2,A6,B1,B2C1,C,	Compensation		
29,30	8	1A1,A3,A5,B3,B5,C1,C,3	Different examples		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources	
Required textbooks (curricular books any)	Modern control engineering by Ogata
Main references (sources)	Control systems engineering by Nise
Recommended books and references (scientific journals, reports...)	Control systems by Bakshi Modern control systems by Dorf
A- Recommended books and references (scientific journals, reports...).	Control systems by Bakshi

Course Description Form

1. Course Name:	
Digital Communication	
2. Course Code:	
CE 321	
3. Semester / Year:	
Third year (Annual)	
4. Description Preparation Date:	
18/01/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total):	
120 h/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Maher Ali Ibrahim Email: maher.ali.ibrahim@alayen.edu.iq Name: Zahraa Abdel Mahdi Abdel Kazem Email: Zahraa.Abdel@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Knowledge of the terms and the concepts in the digital communications area. 2. Knowledge of the advantages and disadvantages of each type of digital communication types. 3. Knowledge of digital modulation. 4. Sending many digital signals at the same time and receiving them.
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the

- expertise to help develop
4. Practical skills side and consolidate the principles necessary to carry out the projects
 5. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	A1,A3,A6,B2, B4,C4	Introduction to digital communication	1- Whiteboard and PowerPoint and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
2	4	A1,A2,A3,B1, B2,C1,C2	Signal types, General block diagram of digital communication		
3	4	A2,A3,A6,B2, B4,C2	Advantage and disadvantage of digital modulation, digital coding		
4,5	8	A4,A6,B3,B4, C2	Sampling theorem, Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM)		
6	4	A1,A6,B1,B3, C1,C4	Pulse width and Pulse Position Modulation (PWM & PPM)		
7	4	A1,A2,A4,B1, B3, C2	S/N in analog pulse modulation		
8,9	8	,4A1,A3,B3,B1C	Pulse Code Modulation (PCM), Noise Consideration in PCM, Limitation and Modifications of PCM, Differential PCM		
10,11	8	,1A1,A3,A4,B1B4,C	Delta Modulation (DM), Delta-		

			Segma Modulation.		
12- 14	12	,3A2,A3,A4,B 2B4,C	Inter-symbol Interference (ISI), Pulse Shaping to reduce ISI, Equalizer, Adaptive Equalizer, Matched Filter.		
15-20	24	,2A2,A3,B1,B 2C1,C	Baseband modulation (Digital Modulation), Amplitude Shift Keying (ASK) [Modulation and demodulation]. Frequency Shift Keying (FSK) [Modulation and demodulation], Phase Shift Keying (PSK) [Modulation, Coherent and Noncoherent Detection], Differential PSK.		
21,22	8	,4A4,A6,B2,B 4C1,C	Error performance of Binary System.		
23,24	8	,1A2,A4,A6,B 4B2,B4,C2,C	Quadrature Phase Shift Keying (QPSK), Offset QPSK, Minimum Shift Keying		
25-30	24	,1A1,A2,A3,B 2B2,C1,C	Quadrature Amplitude Modulation (QAM), Multilevel Modulation		

			Techniques M-ary PSK, M-ary QAM, Bandwidth Efficiency and power Spectra of modulated Signal, Carrier Recovery and Clock Recovery		
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11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books any)	Sarkar N., Elements of Digital Communications, first edition, 2003
Main references (sources)	Haykin S., Introduction to Analog and Digital Communications, second edition, 2007.
Recommended books and references (scientific journals, reports...)	Haykin S., Introduction to Analog and Digital Communications, second edition, 2007.
A- Recommended books and references (scientific journals, reports...).	Haykin S., Introduction to Analog and Digital Communications, second edition, 2007.

Course Description Form

1. Course Name:	
Digital Signal Processing	
2. Course Code:	
CE 323	
3. Semester / Year:	
Annual	
4. Description Preparation Date:	
18/01/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total):	
120 h/6	
7. Course administrator's name (mention all, if more than one name)	
Name: Ahmed Abu Bakr Muhammad Taher Email: Ahmed.AbuBakr@alayen.edu.iq Name: Narges Adel Yasser Email: Narges.Adel@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. To teach students the concepts of discrete-time signals, including mathematical representations, properties, frequency content, and aliasing. 2. To teach students the concepts of linear time-invariant discrete-time systems, including representations, properties, convolution relationship, and analysis techniques based on Fourier and Z transforms. 3. To introduce the concepts of filter design.
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the

- expertise to help develop
4. Practical skills side and consolidate the principles necessary to carry out the
 5. projects
 6. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1,2,3	12	A1,A2,A5,B1,B2,C1	Introduction to digital signal processing: Basic elements of DSP, DSP vs. ASP, application of DSP, Continuous time signals vs. discrete time signals	1- Whiteboard and PowerPoint and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
4,5,6	12	A1,A2,A3,B2,B5,C3	Discrete time signals and sequences		
7,8,9	12	A4,A5,B2,B5,C1,C3	Standard of discrete time signals (sequences): Unit sample sequence, Unit step sequence, Unit ramp sequence, Exponential sequence		
10,11,12	12	A3,A4,B4,B5,C2	(Classification of discrete time signals) System properties: Static and dynamic system, shift invariant and shift variant system, Causal and noncausal system, linear and nonlinear system, stable and unstable system.		
13,14	8	A3,A5,B2,B4,C3	Convolution: Direct form method, graphical method, slide rule method		
15,16	8	A3,A4,A5,B4,C1,C2	Correlation of discrete time sequence:		

			Cross correlation and auto correlation		
17,18	8	4A2,A5,B1,B1C,	Frequency domain representation: Find Frequency response		
19,20,21	12	2A3,A4,A5,B3B5,C,	Discrete Fourier transform (DFT), Linear convolution using DFT, Invers Discrete Fourier transform (IDFT)		
22,23,24	12	1A1,A2,A5,B1B2,C,	Fast Fourier Transform (FFT): Butterfly computation, Invers Fast Fourier transform (IFFT)		
25,26,27	12	1A1,A3,A5,B2B52,C,	Introduction to Z transform: Definition of Z transform and ROC, Properties of Z transform, Inverse Z transform, application of Z transform (pole& zero plot, causality and stability of Z transform, solution of difference equation using Z transform		
28,29,30	12	1A2,A5,B2,C	Realization of digital filter: Basic FIR filter structure, direct form of FIR structure, Cascaded form of FIR structure, Basic IIR filter structure, direct form of IIR structure, Cascaded form of IIR form of IIR structure, Parallel structure		

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30

Total assessment		100% (100 Marks)	
12. Learning and Teaching Resources			
Required textbooks (curricular books, if any)		John G. Proakis , Dimitris K Manolakis Digital signal processing: principles algorithms and applications. Pearson; 4 edition (April 7, 2006).	
Main references (sources)		Hayes, Monson H. Digital signal processing Tata McGraw-Hill edition 2009	
Recommended books and references (scientific journals, reports...)		Hayes, Monson H. Digital signal processing Tata McGraw-Hill edition 2009	
A- Recommended books and references (scientific journals, reports...).		Hayes, Monson H. Digital signal processing Tata McGraw-Hill edition 2009	

Course Description Form

1. Course Name:	
Real-Time System Design	
2. Course Code:	
CE 322	
3. Semester / Year:	
Third year (Yearly)	
4. Description Preparation Date:	
18/01/2025	
5. Available Attendance Forms:	
Compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
120hr/4Unit	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Murtaja Natiq Email: Murtaja.N@alayen.edu.iq	
8. Course Objectives	
Course Objectives	1. Introduce the student to the concept of Real Time systems Design 2. To know major distinction between systems and real-time systems 3. To know major distinction between systems and real-time systems 4. To introduce the students to the components of real-time systems 5. Familiarize the students with the problem of clock-speed and the need for matching ccts. 6. To learn on how to think in terms of peripheral interface devices (PIDs). 7. Learn how to do Input/output pin expansion.
9. Teaching and Learning Strategies	
Strategy	1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the 5. projects

6. Discussions during lectures.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st, 2nd,	8	A1,A2,A4 B1,B2,B5 C1,C2,C4	Definition of RTSSystems RTS RTS c/c	1- Whiteboard and PowerPoint and data show presentation 2- Class discussion 3- Presentation of cases 4- Handouts 5- Visual aids: Utilize visual aids such as pictures, charts, graphs, diagrams	• Short MCQs • Oral exam and direct questions in the class • Midterm exam • Electronic exams on the electronic platform • Final exam
3rd	4	A6,A1,A4 B2,B4,B5 C1,C2	Signals:types interpretations		
4th	4	A1,A4,A6 B1,B2,B4 C2,C4	Sensors and transducers		
5th,6th,7th, 8th,	16	A1,A2,A3 B1,B4,B5 C1,C2	A/D converters:principles circuits designs		
9th,10th,11th, 12th,	16	A2,A4,A6 B1,B4,B5 C4	D/Aconverters:Principles circuits designs		
13th,14th, 15th, 16th	16	A4,A1,A6 B1,B2,B5 C1,C2	Input Output Expansion Tri-state buffers Output Latching Pseudo-code circuit design in/out		
17th, 18th	8	A1,A2,A4 B1,B2,B5 C4	PIDs:The need for PIDs Designs using PIDs (general principle)		
19th, 20th	8	A2,A5,A4 B1,B2,B5 C4	8155 PID internal structure commands designs		
21st, 22nd, 23rd	12	A1,A2,A4 B1,B2,B5 C1,C2,C4	Timers, Prog-timers		
24th, 25th	8	A1,A2,A4 B1,B2,B5 C1	Interrupts		
26th ,27th	8	A2,A4,B6 B1,B2,B5 C1,C2,C4	DMA		
28th, 29th, 30	12	A1,A2,A4 B1,B2,B5 C1,C2,C4	Serial I/O		

11. Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	TIME SYSTEMS BY: John A. Stankovic, 2002
Main references (sources)	Practical Introduction to RTS for undergraduate engineers. BY: Douglas W. Harder. 2014.
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	https://www.ces.tech

Course Description Form

1. Course Name:					
Engineering Analysis					
2. Course Code:					
CE 341					
3. Semester / Year:					
Third year (Yearly)					
4. Description Preparation Date:					
18/01/2025					
5. Available Attendance Forms:					
Compulsory					
6. Number of Credit Hours (Total) / Number of Units (Total)					
120 Hours /4 Unit					
7. Course administrator's name (mention all, if more than one name)					
Name: Dr. Ahmed Najem Email: Ahmed.Najim@alayen.edu.iq					
8. Course Objectives					
Course Objectives		1. Solving complex mathematical equations in several ways. 2. Knowledge the process of converting mathematical function from the time domain to the frequency domain and vice versa 3. Understanding how to analyze and solve complex functions 4. Understanding how to solve derivatives with different analytical methods. 5. Understand how to solve matrices and learn about the applications of matrices in the engineering field			
9. Teaching and Learning Strategies					
Strategy		1. Academic lectures: providing a solid foundation upon which to develop 2. cognitive balance for students 3. Practical laboratory, which provides each student the expertise to help develop 4. Practical skills side and consolidate the principles necessary to carry out the projects 5. Discussions during lectures.			
10. Course Structure					
Week	Hours	Required	Unit or	Learning	Evaluation

		Learning Outcomes	subject name	method	method
1 st , 2 nd , 3 th , 4 th , 5 th , 6 th , 7 th	28	A1,A2,A4 B2,B5 C1,C2,C4	Laplace transform, applications, properties and theories	Theoretical lecture and laboratory	1. Short MCQs 2. Oral exam and direct questions in the class 3. Midterm exam 4. Electronic exams on the electronic platform 5. Final exam
8 th , 9 th , 10 th , 11 th , 12 th , 13 th , 14 th	28	A5,A6,A4 B1,B5,B3 C1	Z - transformation Costume, characteristics, theories, applications	Theoretical lecture and laboratory	
15 th , 16 th , 17 th , 18 th , 19 th	20	A2,A3,A4,A6 B1,B2,B3 C2, C4	Solving mathematical equations using probability, knowing the operations of counting numbers in different ways.	Theoretical lecture and laboratory	
20 th , 21 th , 22 th , 23 th	16	A2,A3 B1,B2,B5 C2, C4,C1	Numerical calculation	Theoretical lecture and laboratory	
24 th , 25 th	8	A1,A4,A6 B1,B5,B3 C1, C4	Solving nonlinear equations	Theoretical lecture and laboratory	
26 th , 27 th , 28 th	12	A2,A3,A4 B1,B2,B5 C2, C4,C1	Numerical solutions For derivation equations	Theoretical lecture and laboratory	
29 th , 30 th	8	A4,A6 B1,B2,B3 C2, C4	Matrices	Theoretical lecture and laboratory	

11.Course Evaluation

		Time/Number	Weight (Marks)	Week Due
Formative assessment	Semester 1 Quizzes	2	25% (25)	5, 10
	Semester 1 Quizzes	2	25% (25)	17, 25
	Projects / Lab.	1	10% (10)	Continuous
	Final Exam	3hr	40% (40)	30
Total assessment			100% (100 Marks)	

12.Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Higher Engineering Mathematics by Dr. B.S. Grewal, 44 th Edition,
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	2017.
Main references (sources)	An introduction to Numerical analysis, David F. Mayers, 2003.
Recommended books and references (scientific journals, reports...)	1. Advanced Engineering Mathematics, 10th Edition, Erwin Kreyszig, John Wiley & Sons, Ins, 2011. 2. Advanced 'Engineering Mathematics, 5th Edition Peter V. O Neil, Thomson Brooks /Cole, 2005. 3. Numerical Methods for Scientists and Engineers, R. W. Hmming, 2th Edition, 1986
Electronic References, Websites	• www.ocw.mit.edu  www.math.uiowa.edu