



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

Academic Program and Course Description Guide of Network Engineering & Cyber Security

2025-2026

Academic Program Description Form

University Name: Al-Iraqia University
College/Institute: College of Engineering
Scientific Department: Network Engineering Department
Academic/Professional Program: Bachelor of Science in Network Engineering
Final Degree Awarded: Bachelor of Science in Network Engineering
Academic System: Bologna Process (First, Second, and Third Levels);
Semester System (Fourth Level)
Description Preparation Date: 1 October 2025
File Completion Date: 27 May 2026

Signature:

Scientific Assistant: **Dr. Omar Hassan Hameed**
Deputy Dean for Scientific Affairs
College of Engineering

Date: 27-5-2026

Signature:

Head of Department: **Dr. Muthana Muthana**
رئيس قسم هندسة الشبكات والأمن السيبراني

Date: 27-5-2026

File Reviewed by: Director, Quality Assurance and University Performance

Division:

Ass. Prof. Dr. Ruqa Muthana

Date:

27/5/2026

Signature:

[Signature]



[Signature]

Dean's Approval

Prof. Dr. Muthana Muthana

Introduction

An academic program is a coordinated and structured package of courses, procedures, and learning experiences organized into a curriculum. Its primary purpose is to build and refine graduates' competencies so that they are prepared to meet labor-market requirements. The program is reviewed and evaluated annually through internal and external quality-assurance processes, including the External Examiner Program.

The academic program description provides a concise summary of the program's principal features and courses, and identifies the competencies students are expected to acquire in accordance with the program objectives. This description is a cornerstone of program accreditation and is prepared collaboratively by the academic staff under the supervision of the scientific committees in the relevant departments.

This second edition of the guide presents an updated academic program description that reflects recent developments in the Iraqi higher-education system. It covers the traditional annual and semester systems, as well as the academic program description adopted for programs operating under the Bologna Process pursuant to the Directorate of Studies letter No. T.M.3/2906 dated 3 May 2023.

In this context, the importance of preparing accurate academic program and course descriptions cannot be overstated, as they are essential to the effective delivery and continuous improvement of the educational process.

Concepts and Terminology

Academic Program Description: A concise statement of the program's vision, mission, and objectives, including an accurate description of the intended learning outcomes and the strategies used to achieve them.

Course Description: A concise summary of the course's principal characteristics and the learning outcomes students are expected to achieve. It demonstrates how students can make effective use of the available learning opportunities and is derived from the academic program description.

Program Vision: An ambitious and realistic view of the program's future, intended to be progressive, inspiring, motivating, and achievable.

Program Mission: A concise statement that identifies the objectives and activities required to achieve them and defines the program's development pathways and strategic direction.

Program Objectives: Measurable and observable statements describing what the academic program intends to achieve within a specified period.

Curriculum Structure: All courses included in the academic program under the approved learning system (semester, annual, or Bologna Process), whether classified as ministry, university, college, or department requirements, together with their credit units.

Learning Outcomes: An integrated set of knowledge, skills, and values acquired by students upon successful completion of the academic program. The learning outcomes of each course must be defined in a manner that supports achievement of the program objectives.

Teaching and Learning Strategies: Planned approaches used by faculty members to support student learning and achieve the intended learning outcomes. They encompass both classroom and extracurricular learning activities.

Program Vision

The Network Engineering Program aspires to be a distinguished academic program locally and regionally in computer networks, modern communications, cybersecurity, and information technology. It seeks to graduate innovative engineers who can design, implement, operate, secure, and develop advanced networked systems, contribute to scientific research, and serve society.

Program Mission

To prepare competent network engineers who meet the needs of the labor market, governmental institutions, and the private sector through high-quality education, practical training, scientific research, professional consultation, and the design and implementation of reliable and secure network solutions.

Program Objectives

1. Prepare graduates to practice network engineering in design, implementation, operation, security, research, development, and consulting.
2. Enable graduates to analyze complex engineering problems and develop sustainable, reliable, and secure network solutions.
3. Prepare graduates for leadership responsibilities, teamwork, effective communication, and ethical professional practice.
4. Encourage postgraduate study, applied research, innovation, and lifelong professional development.
5. Strengthen cooperation with industry, professional bodies, graduates, and the community to continually improve the program.

Graduate Outcomes

- GO1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- GO2. Apply engineering design to produce solutions that meet specified needs while considering health, safety, environmental, economic, social, cultural, and global factors.
- GO3. Develop and conduct appropriate experiments, analyze and interpret data, and use engineering judgment to draw sound conclusions.
- GO4. Communicate effectively with individuals, groups, the public, and different administrative levels in a manner appropriate to the context.
- GO5. Recognize ethical and professional responsibilities in engineering situations and make informed judgments that consider environmental, economic, and societal consequences.
- GO6. Recognize the continuing need to acquire new knowledge and select and apply appropriate learning strategies.
- GO7. Function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, manages risk, and creates a collaborative and inclusive environment.

Mapping of Graduate Outcomes to Program Educational Objectives

1, 2	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	GO1
1, 2	Apply engineering design to produce solutions that meet specified needs while considering health, safety, environmental, economic, social, cultural, and global factors.	GO2
1, 2	Develop and conduct appropriate experiments, analyze and interpret data, and use engineering judgment to draw sound conclusions.	GO3
3, 5	Communicate effectively with individuals, groups, the public, and different administrative levels in a manner appropriate to the context.	GO4
3, 5	Recognize ethical and professional responsibilities in engineering situations and make informed judgments that consider environmental, economic, and societal consequences.	GO5
4, 5	Recognize the continuing need to acquire new knowledge and select and apply appropriate learning strategies.	GO6
3, 5	Function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, manages risk, and creates a collaborative and inclusive environment.	GO7
GO7	Ability to work collaboratively as part of an integrated team with shared objectives and defined schedules, ensuring quality and timely completion of work.	4, 5, 6, 7, 8

Program Accreditation

Program Accreditation

The Department is completing the requirements for program accreditation by the Iraqi Council for Accreditation of Engineering Education (ICAEE). The curriculum, graduate outcomes, performance indicators, and continuous-improvement plans have been updated in accordance with accreditation requirements.

Other External Influences

Labor-market needs; practical and field visits; telecommunications and Internet-service companies; the Industrial Advisory Board; requirements of the Ministry of Higher Education and Scientific Research and engineering accreditation; and rapid developments in networking, cybersecurity, wireless systems, and cloud computing.

Program Structure

Program Component	Number of Courses	ECTS Credits	Percentage	Notes*
Institutional Requirements	7	15	7.8%	Core
College Requirements	11	38	20%	Core
Department Requirements	35	192	72.2%	Core
Summer Training	1	-	-	Core
Other				Core

* Notes may indicate whether a course is core or elective.

Program Description

Year / Level	Course Code	Course Title	Credit Hours	
			Theoretical	Practical / Tutorial
First / First Semester	MATH 1101	Mathematics I	2	1
First / First Semester	ELCA 1102	Electrical Circuit Analysis I	2	3
First / First Semester	LOCD 1103	Logic Circuit Design	2	3
First / First Semester	ENDR 1104	Engineering Drawing	1	3
First / First Semester	ELCD 1105	Electronic Circuit Design	4	4
First / First Semester	ENLA 1106	English Language	2	
First / Second Semester	MATH 1201	Mathematics II	2	1
First / Second Semester	ELCA 1202	Electrical Circuit Analysis II	2	3
First / Second Semester	DISD 1203	Digital System Design	2	3
First / Second Semester	TEWO 1204	Technical Workshop	1	3
First / Second Semester	COPR 1205	Computer Programming I	4	
First / Second Semester	ARLA 1206	Arabic Language	2	

Program Description				
Year / Level	Course Code	Course Title	Credit Hours	
			Theoretical	Practical / Tutorial
Second / First Semester	MATH 2101	Mathematics III	2	1
Second / First Semester	DIEL 2102	Digital Electronics	4	4
Second / First Semester	COAR 2103	Computer Architecture	4	
Second / First Semester	OBOP 2104	Object-Oriented Programming	2	3
Second / First Semester	COMM 2105	Communication Fundamentals I	2	3
Second / First Semester	HURI 2106	Human Rights	2	
Second / Second Semester	MATH 2201	Mathematics IV	2	1
Second / Second Semester	COMM 2202	Communication Fundamentals II	2	3
Second / Second Semester	DASY 2203	Database Systems	4	2
Second / Second Semester	CONE 2204	Computer Network I	2	3
Second / Second Semester	COPO 2205	Computer Programming II	2	2
Second / Second Semester	OPSA 2206	Operating Systems and Applications	2	
Third / First Semester	ADMA 3101	Advanced Mathematics I	2	1
Third / First Semester	MICR 3102	Microprocessor	4	2
Third / First Semester	OPCO 3103	Optical Communication	2	2
Third / First Semester	SISY 3104	Signals and Systems	2	
Third / First Semester	IMPR 3105	Image Processing	4	2
Third / First Semester	NEOS 3106	Network Operating Systems	2	
Third / Second Semester	ADMA 3201	Advanced Mathematics II	2	1
Third / Second Semester	DISP 3202	Digital Signal Processing	2	
Third / Second Semester	COEN 3203	Control Engineering	2	2
Third / Second Semester	ANPR 3204	Antenna and Propagation	2	2
Third / Second Semester	INTH 3205	Internet of Things	2	2
Third / Second Semester	CONE 3206	Computer Network II	2	2
Fourth / First Semester	NE-411	Soft Computing I	2	3
Fourth / First Semester	NE-412	Internet Programming	2	1

Program Description				
Year / Level	Course Code	Course Title	Credit Hours	
			Theoretical	Practical / Tutorial
Fourth / First Semester	NE-413	Parallel Processing	2	1
Fourth / First Semester	NE-414	Information Theory and Coding	2	1
Fourth / First Semester	NE-415	Network Protocols	4	3
Fourth / First Semester	NE-416	Queueing Theory and Systems	2	1
Fourth / Second Semester	NE-421	Soft Computing II	2	1
Fourth / Second Semester	NE-422	Mobile Communication	2	
Fourth / Second Semester	NE-423	Wireless Sensor Networks	2	1
Fourth / Second Semester	NE-424	Network Security	2	1
Fourth / Second Semester	NE-425	Network Management	2	1
Fourth / Second Semester	NE-426	Digital Communication	2	1

Expected Program Learning Outcomes	
Knowledge	
GO1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	GO1
GO2. Apply engineering design to produce solutions that meet specified needs while considering health, safety, environmental, economic, social, cultural, and global factors.	GO2
GO3. Develop and conduct appropriate experiments, analyze and interpret data, and use engineering judgment to draw sound conclusions.	GO3
Skills	
GO4. Communicate effectively with individuals, groups, the public, and different administrative levels in a manner appropriate to the context.	GO4
GO6. Recognize the continuing need to acquire new knowledge and select and apply appropriate learning strategies.	GO6
GO7. Function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, manages risk, and creates a collaborative and inclusive environment.	GO7
Values	

Expected Program Learning Outcomes	
GO5. Recognize ethical and professional responsibilities in engineering situations and make informed judgments that consider environmental, economic, and societal consequences.	GO5

Teaching and Learning Strategies
1. Interactive lectures and guided discussion. 2. Blended and e-learning. 3. Problem-based and project-based learning. 4. Laboratory practice, simulation, configuration, and troubleshooting. 5. Collaborative learning, seminars, technical reports, and field visits. 6. Summer training and capstone-style projects.

Assessment Methods
1. Quizzes and formative assessment. 2. Homework and technical reports. 3. Laboratory and performance assessment. 4. Mid-semester and final examinations. 5. Individual and team projects, presentations, portfolios, and rubric-based assessment.

Faculty							
Faculty Members							
Academic Rank		Name		General Specialization		Specific Specialization	
		Name	General	Specific		Permanent / Lecturer	
Professor	Muwafaq Shyaa Alwan	Mechanical Engineering	Refractory			Permanent	
Assistant Professor	Mudhafar Hussain Ali	Communication Engineering	Optical Communication Engineering				
Assistant Professor	Satea Hikmat Alnajjar	Electrical and Electronic Engineering	Communication Engineering				
Assistant Professor	Ali Salem Ali	Computer Science	Secure Networking				
Assistant Professor	Omar Hussein Salman	Computer Engineering	Computer Systems Engineering				
Lecturer	Omar Hassan Hameed	Mechanical Engineering	Mechanical Engineering				

Lecturer	Ammar Mzeal Shanta	Physical Education	Physical Education and Sports Sciences				
Lecturer	Ali Mahmood Jasim	Electrical Engineering	Electrical Engineering				
Lecturer	Ghassan Akram Abed	Computer Engineering	Networks Engineering				
Lecturer	Omar Raad Kadhim	Electrical Engineering	Electronic and Communication Engineering			Permanent	
Lecturer	Ahmed Sabah Noori	Electrical and Electronic Engineering	Communication Engineering				
Lecturer	Noor Foud Kadhim	Genetic Engineering	Biotechnology				
Lecturer	Zainab Abbas Fadil	Computer Engineering	Computer Engineering				
Lecturer	Amjed Razzaq Hussein Al-Abbas	Electrical and Computer Engineering	Optical Networks and Communications				
Lecturer	Mahmood Jalal Ahmad	Electrical and Electronic Engineering	Communication Engineering				
Lecturer	Russul Dhiaa AbdulJabar	Computer Science	Computer Science				
Assistant Professor	Zahraa Khudhair Taha	Electrical Engineering	Electronics and Communications				
Assistant Professor	Arwa Amir Moosa	Laser Engineering	Optoelectronics				
		Name	General	Specific		Permanent / Lecturer	
Lecturer	Othman Atta Ismael	Electrical and Electronic Engineering	Communication Engineering			Permanent	

Lecturer	Rami Raad Saadi	Mathematics	Mathematical Sciences				
Assistant Lecturer	Shaima'a Bader Yass	Mathematics	Applied Mathematics				
Assistant Lecturer	Samar Kareem Ibrahim	Electrical Engineering	Optoelectronics Engineering				
Assistant Lecturer	Sura Nasser Maryoush	Computer Science	Computer Science and Networks				
Assistant Lecturer	Aya Ayad Hussein	Computer Engineering	Networks Engineering				
Assistant Lecturer	Ali Adnan Hussein	Electrical and Electronic Engineering	Communication Engineering				
Assistant Lecturer	Mazin Nabih Ali	Materials Engineering	Materials Engineering				
Assistant Lecturer	Israa Majeed Ali	Information Engineering	Information and Communication Engineering				

Professional Development

Orientation for new faculty members includes institutional values, departmental policies, research ethics, quality standards, innovative teaching methods, and mentoring. Annual professional-development plans cover effective teaching, modern educational technology, assessment of learning outcomes, research and publication, academic leadership, professional certification, and cooperation with industry.

Professional Development for Faculty Members

1. Provide specialized training in effective teaching strategies and modern educational technology.
2. Conduct workshops for exchanging experience and applying good teaching practices in the classroom.
3. Periodically evaluate faculty performance and learning outcomes to improve the educational process.
4. Encourage participation in continuing professional-development programs, seminars, workshops, and academic conferences.
5. Support scientific research and publication to enhance academic competence.
6. Provide opportunities for communication and cooperation in areas of shared interest.
7. Offer qualification programs to develop academic-management and leadership skills.

Annual Faculty Professional-Development Plan

An annual plan is prepared to equip faculty members with contemporary skills, knowledge, and techniques related to teaching, scientific research, administrative and leadership responsibilities, and community service. The plan aims to strengthen integrated professional performance and includes: (1) development of teaching and learning strategies; (2) assessment of learning outcomes; (3) faculty professional development; and (4) development of e-learning processes.

Admission Criteria

Morning study: admission through centralized admission in accordance with current Ministry regulations; minimum average 87%, maximum age 25 years, and 50 seats. Evening study: direct application; minimum average 77%, no specified age limit, and 50 seats. All requirements remain subject to the regulations in force.

Principal Sources of Information about the Program

1. Ministry of Higher Education and Scientific Research regulations and quality standards.
2. Iraqi Council for Accreditation of Engineering Education guides.
3. IEEE Computer Engineering and Communications bodies of knowledge.
4. Cisco Networking Academy and relevant professional standards.
5. Departmental scientific and quality-assurance committee documents.
6. Local and international university programs and industry feedback.

Program Development Plan

1. Periodically analyze labor-market and stakeholder needs.
2. Update courses in routing, switching, cybersecurity, cloud computing, IoT, wireless systems, and artificial intelligence.
3. Expand modern laboratories, simulation platforms, and industry-standard equipment.
4. Strengthen practical projects, professional certification pathways, summer training, and industry partnerships.
5. Assess graduate outcomes using performance indicators and rubrics and implement documented improvement actions.

Program Skills Matrix										
Year/Level	Course Code	Course Title	Core/Elective	Knowledge			Skills			Value s
				GO1	GO2	GO3	GO5	GO6	GO7	
1	MATH 1101	Mathematics I	Core	✓				✓		
1	ELCA 1102	Electrical Circuit Analysis I	Core	✓	✓	✓		✓		
1	LOCD 1103	Logic Circuit Design	Core	✓	✓	✓		✓		
1	ENDR 1104	Engineering Drawing	Core	✓	✓			✓		
1	ELCD 1105	Electronic Circuit Design	Core	✓	✓	✓		✓		
1	ENLA 1106	English Language	Core	✓				✓		
1	MATH 1201	Mathematics II	Core	✓				✓		
1	ELCA 1202	Electrical Circuit Analysis II	Core	✓	✓	✓		✓		
1	DISD 1203	Digital System Design	Core	✓	✓			✓		
1	TEWO 1204	Technical Workshop	Core	✓		✓		✓	✓	
1	COPR 1205	Computer Programming I	Core	✓		✓		✓	✓	
1	ARLA 1206	Arabic Language	Core	✓				✓		
2	MATH 2101	Mathematics III	Core	✓				✓		
2	DIEL 2102	Digital Electronics	Core	✓		✓		✓		
2	COAR 2103	Computer Architecture	Core	✓	✓			✓		
2	OBOP 2104	Object-Oriented Programming	Core	✓		✓		✓	✓	
2	COMM 2105	Communication Fundamentals I	Core	✓	✓	✓		✓		
2	HURI 2106	Human Rights	Core	✓			✓	✓		
2	MATH 2201	Mathematics IV	Core	✓				✓		
2	COMM 2202	Communication Fundamentals II	Core	✓	✓	✓		✓		
2	DASY 2203	Database Systems	Core	✓				✓		
2	CONE 2204	Computer Network I	Core	✓	✓	✓		✓	✓	
2	COPO 2205	Computer Programming II	Core	✓		✓		✓	✓	
2	OPSA 2206	Operating Systems and Applications	Core	✓				✓		
3	ADMA 3101	Advanced Mathematics I	Core	✓				✓		

Program Skills Matrix										
Year/Level	Course Code	Course Title	Core/Elective	Knowledge			Skills			Value s
				GO1	GO2	GO3	GO5	GO6	GO7	
3	MICR 3102	Microprocessor	Core	✓		✓		✓		
3	OPCO 3103	Optical Communication	Core	✓	✓	✓		✓		
3	SISY 3104	Signals and Systems	Core	✓				✓		
3	IMPR 3105	Image Processing	Core	✓		✓		✓		
3	NEOS 3106	Network Operating Systems	Core	✓	✓	✓		✓	✓	
3	ADMA 3201	Advanced Mathematics II	Core	✓				✓		
3	DISP 3202	Digital Signal Processing	Core	✓		✓		✓		
3	COEN 3203	Control Engineering	Core	✓				✓		
3	ANPR 3204	Antenna and Propagation	Core	✓	✓			✓		
3	INTH 3205	Internet of Things	Core	✓	✓			✓	✓	
3	CONE 3206	Computer Network II	Core	✓	✓	✓		✓	✓	
4	NE-411	Soft Computing I	Core	✓				✓	✓	
4	NE-412	Internet Programming	Core	✓		✓		✓	✓	
4	NE-413	Parallel Processing	Core	✓		✓		✓		
4	NE-414	Information Theory and Coding	Core	✓				✓		
4	NE-415	Network Protocols	Core	✓	✓	✓		✓	✓	
4	NE-416	Queueing Theory and Systems	Core	✓				✓		
4	NE-421	Soft Computing II	Core	✓				✓	✓	
4	NE-422	Mobile Communication	Core	✓	✓	✓		✓		
4	NE-423	Wireless Sensor Networks	Core	✓	✓	✓		✓	✓	
4	NE-424	Network Security	Core	✓	✓	✓	✓	✓	✓	
4	NE-425	Network Management	Core	✓	✓	✓	✓	✓	✓	
4	NE-426	Digital Communication	Core	✓	✓	✓		✓		

**Course Descriptions for the Network Engineering Department
2025-2026**

First Year / First Semester Mathematics I

Course Name: Mathematics I					
Course Code: MATH 1101					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4.00 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Hiba Ali Salman Email: - hiba.a.salman@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. Make students able to analyze engineering problems and formulate mathematical models to solve them. 2. Understand mathematical concepts in engineering as apply matrix techniques to problems in engineering 3. Expressing linear transforms in other forms, such as matrix equations and vector equations. 4. Distinguishing between homogeneous and nonhomogeneous systems. 5. Apply systems of linear equations to problems in networking 6. Use the characteristic polynomial to find all eigenvalues and eigenvectors 7. In engineering, by domain and range one can used to design and optimize systems. 8. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Matrices: introduction, operation	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Matrix determination	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Inverse Matrices	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Solving a system of linear equations by Cramer's rule	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Solving a system of linear equations by inverse method	Interactive lecture and guided	Quiz and assignment

Course Name: Mathematics I					
				application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Eigen value and Eigen vector	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	(Mid-term Exam)	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Real Numbers, Intervals, Functions:graphs , domain and range	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Limit and continuity	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Differentiation	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Chain rule, implicit Differentiation	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Rules of integration, Definite and indefinite integrals	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	trigonometric functions: derivations, integrations	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	natural logarithm , exponential ex : properties, derivations, integrations	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	ax , $logau$: properties, derivations, integrations	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Calculus By Thomas Yes Recommended Texts CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS ,STEPHEN DAVIS yes		
Main references (sources)			Calculus By Thomas Yes Recommended Texts CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS ,STEPHEN DAVIS yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Electrical Circuit Analysis I

Course Name: Electrical Circuit Analysis I					
Course Code: ELCA 1102					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - ا.م.د. اروى عامر موسى-					
Email: - arwa.amir@aliraqia.edu.iq					
Course Objectives					
Course Objectives		1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. Module Learning Outcomes مخرجات التعلم للمادة الدراسية 1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of at			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	•Electric charge, current, voltage, and power. •Ohm's law.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Power and Energy.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Series dc Circuits, Kirchhoff's Voltage Law.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Voltage Division in a Series Circuit.	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Electrical Circuit Analysis I					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Parallel dc Circuits, Kirchhoff's Current Law.	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Current Divider Rule.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Mid-Exam, Voltage Sources in Parallel.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Open and Short Circuits, Series-Parallel Circuits.	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Mesh Analysis.	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Nodal Analysis.	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Star to delta Conversions.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Delta to star Conversions	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Thévenin's Theorem.	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Norton's Theorem.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Review and revision	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition. Yes Recommended Texts DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents. No		
Main references (sources)			INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition. Yes Recommended Texts DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents. No		
Recommended books and references (scientific journals,			Relevant peer-reviewed books, standards, journal articles, and technical		

Course Name: Electrical Circuit Analysis I	
reports, etc.)	reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Logic Circuit Design

Course Name: Logic Circuit Design					
Course Code: LOCD 1103					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Othman Atta Ismael Email: - othman.atta@aliraqia.edu.iq					
Course Objectives					
Course Objectives		This course provides a systematic foundation in Logic Circuit Design and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	INTRODUCTORY CONCEPTS 1.1 Digital and Analog Quantities 1.2 Binary Digits, Logic Levels, and Digital Waveforms 1.3 Basic Logic Functions	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	1.4 Combinational and Sequential Logic Functions 1.5 Introduction to Number Systems 1.6 Fixed-Function Logic Devices	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	NUMBER SYSTEMS, OPERATIONS, AND CODES 2.1 Decimal Numbers 2.2 Binary Numbers 2.3 Decimal-to-Binary Conversion 2.4 Binary Arithmetic 2.5 Complements of Binary Numbers	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	2.6 Signed Numbers 2.7 Arithmetic Operations with Signed Numbers 2.8 Hexadecimal Numbers 2.9 Octal Numbers 2.10 Binary Coded Decimal (BCD)	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2 laboratory	A2, B2, C2	LOGIC GATES 3.1 The Inverter 3.2 The AND Gate 3.3 The OR Gate	Interactive lecture and guided	Quiz and assignment

Course Name: Logic Circuit Design					
	hours, 1 tutorial hour(s)			application	
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	3.4 The NAND Gate 3.5 The NOR Gate 3.6 The Exclusive-OR and Exclusive-NOR Gates 5 Page	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	3.7 Fixed-Function Logic Gates	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	BOOLEAN ALGEBRA AND LOGIC SIMPLIFICATION 4.1 Boolean Operations and Expressions 4.2 Laws and Rules of Boolean Algebra 4.3 DeMorgan's Theorems	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	4.4 Boolean Analysis of Logic Circuits 4.5 Logic Simplification Using Boolean Algebra	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	4.6 Standard Forms of Boolean Expressions 4.7 Boolean Expressions and Truth Tables	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	4.8 The Karnaugh Map 4.9 Karnaugh Map SOP Minimization 4.10 Karnaugh Map POS Minimization	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	COMBINATIONAL LOGIC ANALYSIS 5.1 Basic Combinational Logic Circuits	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	5.2 Implementing Combinational Logic	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	5.3 The Universal Property of NAND and NOR gates 5.4 Combinational Logic Using NAND and NOR Gates	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	5.5 Pulse Waveform Operation	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015 yes Recommended Texts		
Main references (sources)			Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015 yes Recommended Texts		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			APPENDIX:		

Engineering Drawing

Course Name: Engineering Drawing					
Course Code: ENDR 1104					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Assistant Lecturer Mustafa Mohammed Jawad Abed Email: - mustafa.m.jawad@aliraqia.edu.iq					
Course Objectives					
Course Objectives		1. The aim of this module is to provide students with a comprehensive understanding of engineering drawing principles and techniques. It aims to develop their skills in creating and interpreting technical drawings, which are essential in the field of engineering. The module also aims to enhance students' spatial visualization abilities and their understanding of the relationship between 2D representations and 3D objects. 2. Describing the AutoCAD program and Its icons, knowing what’s new in AutoCAD version. 3. The students will have skills to use that’s program and drawing any things (2D). 4. Reading plans of projects . 5. How to make show for them projects . 6. Auto desk AutoCAD software pr			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Principle of engineering drawing	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Sketching techniques and line types & Scaling, dimensioning, and labeling	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Principles of orthographic projection	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Multiview drawings in orthographic projection	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Sectional views and conventions	Interactive lecture and guided application	Quiz and assignment

Course Name: Engineering Drawing					
Week 6	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Introduction to isometric projections	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Isometric drawing techniques and isometric scales	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Isometric views of objects and assemblies Extracting 2D Drawings from Isometric drawing	Interactive lecture and guided application	Mid-semester examination
Week 9	1 theoretical hours, 3 laboratory hours	A3, B3, C3	Mid exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	1 theoretical hours, 3 laboratory hours	A3, B3, C3	1- Introduction - Theory lectures on history of AutoCAD program, what's new versions ,how to install program. 2- Explanation the main window for program, how to arrange it before start work.	Interactive lecture and guided application	Quiz and assignment
Week 11	1 theoretical hours, 3 laboratory hours	A3, B3, C3	how to use file icon from the window(open,new,save ,save as,export,merge ,drawing properties .draw orders(line and construction line with types of lines (hidden and center lines)) and modify (erase,move,copy) Orthogonally ,snaps, grid, scal	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	1 theoretical hours, 3 laboratory hours	A3, B3, C3	Draw Arcs,polyline,circles and rectangle Draw Ellipses ,trim and extend orders , rotate and mirror.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	1 theoretical hours, 3 laboratory hours	A4, B4, C4	term Exam + tutorial. And Application of previous orders. Layer order (how to change color,name,type and thickness of line by layer)	Interactive lecture and guided application	Quiz and assignment
Week 14	1 theoretical hours, 3 laboratory hours	A4, B4, C4	Explanation of construction and architectural plans and types of lines.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	1 theoretical hours, 3 laboratory hours	A4, B4, C4	Explanation of construction and architectural plans and types of lines(showing examples) and Application of previous orders.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1-Manual of engineering drawing - Simmons C.H., Maguire D. E. 2-Autodesk AutoCAD 2021: Learn CAD With Ease (For Beginners) Hardcover – February 20, 2021 by Madhumita Kshirsagar. no Recommended Texts 1-Giesecke, Frederick Ernest, et al. Technical drawing with engineering graphics. Vol. 15. Prentice Hall, 2016. 2-French, Thomas Ewing, and Charles J.		
Main references (sources)			1-Manual of engineering drawing - Simmons C.H., Maguire D. E. 2-Autodesk AutoCAD 2021: Learn CAD With Ease (For Beginners) Hardcover – February 20, 2021 by Madhumita Kshirsagar. no Recommended Texts 1-Giesecke, Frederick Ernest, et al. Technical drawing with engineering graphics. Vol. 15. Prentice Hall, 2016. 2-French, Thomas Ewing, and Charles J.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.autodesk.com/		

Electronic Circuit Design

Course Name: Electronic Circuit Design					
Course Code: ELCD 1105					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
8 hours per week / 200 hours of student workload / 8 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Assistant Lecturer Mustafa Mohammed Jawad Abed Email: - mustafa.m.jawad@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Electronic Circuit Design and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 4 laboratory hours	A1, B1, C1	Introduction 1-1 Atomic structure & electronic state (orbit, energy and valence) of electron. 1-2 semiconductors, conductors and isolators. 1-3 effects of temperature on depletion layer and P-N junction.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 4 laboratory hours	A1, B1, C1	Characteristics of Diode 2-1 forward and reverse bias and its relations. 2-2 the diode operation and its conditions. 2-3 Zener region in terms of voltage and power dissipations	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 4 laboratory hours	A1, B1, C1	Specifications of diode 3-1 diode capacitance 3-2 reverse recovery time 3-3 diode measuring and testing.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 4 laboratory hours	A1, B1, C1	Diode applications 4-1 load line analysis 4-2 series diode configuration 4-3 parallel & series configurations 4-4 half – wave rectifier and peak reverse voltage 4-5 full wave rectifier and related circuits (biased, diode clippers and clampe	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Electronic Circuit Design					
Week 5	4 theoretical hours, 4 laboratory hours	A2, B2, C2	DC & AC resistance	Interactive lecture and guided application	Quiz and assignment
Week 6	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Midterm + Introduction to transistor structure and its operations. Module Evaluation تقييم المادة الدراسية Time/Number Weight (Marks) Week Due Relevant Learning Outcome Formative assessment Quizzes 3 30% (30) 3,5,12 LO #2,3 and 6 Assignmen	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Mid-semester examination and review	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Configuration of transistor: bias configuration of a common- base bias configuration of a common-emitter bias configuration of a common- collector	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 4 laboratory hours	A3, B3, C3	Course applications and guided exercises	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 4 laboratory hours	A3, B3, C3	Course applications and guided exercises	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 4 laboratory hours	A3, B3, C3	Transistor amplifications, The operation of transistor and its limitations.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 4 laboratory hours	A3, B3, C3	Voltage divider, emitter stabilize and voltage feedback, and DC biasing circuit and its characteristics	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 4 laboratory hours	A4, B4, C4	Common- base and emitter follower configurations, Saturation level of transistor, Transistor switching configuration.	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 4 laboratory hours	A4, B4, C4	JFET characteristic	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 4 laboratory hours	A4, B4, C4	JFET biasing	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed. yes		
Main references (sources)			"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed. yes		
Recommended books and references (scientific journals, reports, etc.)			" Electronic Devices", By Floyd. 9th ed. yes		
Electronic References and Websites			(PDF) Electronic device and circuit theory 11th edition By Robert L. Boylestad Viktor Reznov - Academia.edu		

English Language

Course Name: English Language					
Course Code: ENLA 1106					
Semester / Year: First Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Email: -					
Course Objectives					
Course Objectives	This course provides a systematic foundation in English Language and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Grammar (1) - tenses (present , past , future) , question , questions word , Everyday English (social expression)	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	Grammar (2) :Present tenses(present simple , present continuous (have and have got) Everyday English (Making conversation)	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Grammar(3) Past tenses (past simple , past continuous) Vocabulary (Regular and Irregular verbs) , Adverbs Everyday English (Saying when)	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	Grammar (4): Quantity , articles Everyday English (Can you come for dinner , Requests	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	Grammar (5) : Verbs patterns , future forms Vocabulary : Phrasal verb (literal , Idiomatic) Everyday English (Expressing doubt and certainty)	Interactive lecture and guided application	Quiz and assignment

Course Name: English Language					
Week 6	2 theoretical hours	A2, B2, C2	Grammar(6) : Comparative and superlative adjective Everyday English : What's on	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Grammar(7) : Present perfect , Indefinite past , ever and never Everyday English : Agree with me go together , prepositions , word with two meaning	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Vocabulary :Synonyms , Antonyms : word endings , word stress , right word , wrong word , verbs with similar meaning , adjective and noun	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	Writing practice: narrative or descriptive essays	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Speaking: speaking a technical report , a seminar , Team work activities (discussion and conversation) Seminar skills	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	5	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	Grammar review: passive voice and relative clauses.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	Error analysis and correction exercises	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	Translation: a technical report from English to Arabic and from Arabic to English. Network engineering terms.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	Preparatory week before the final Exam	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			New Headway Oxford Elementary, Pre-intermediate, and Intermediate Yes		
Main references (sources)			New Headway Oxford Elementary, Pre-intermediate, and Intermediate Yes		
Recommended books and references (scientific journals, reports, etc.)			"English File" by Oxford University Press and "New Headway" by Liz and John Soars Yes		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

First Year / Second Semester Mathematics II

Course Name: Mathematics II					
Course Code: MATH 1201					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Hiba Ali Salman Email: - hiba.a.salman@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application. Module Learning Outcomes مخرجات			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Fundamental Concepts of complex numbers.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Complex numbers properties- power and roots	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to Inverse Trigonometric function and their differentiation	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Inverse Trigonometric function Integration	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Introduction to Hyperbolic Trigonometric functions and their differentiation	Interactive lecture and guided	Quiz and assignment

Course Name: Mathematics II					
				application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Hyperbolic Trigonometric functions integration	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-term Exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Methods of integration – Integration by Part and integration using Partial fraction method	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Methods of integration – Integration using substitution	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Integration applications – Area under curve and Area between two curves	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Integration applications – Area between two curves	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Integration applications – Volume of solid using Disk and Washer methods	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Introduction to polar coordinates and its properties	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Integral applications using polar coordinates – Area and length of curve (PART1) 5	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Integral applications using polar coordinates – Area and length of curve (PART2)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017. Yes Recommended Texts Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014. yes		
Main references (sources)			Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017. Yes Recommended Texts Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014. yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.coursera.org/learn/calculus I		

Electrical Circuit Analysis II

Course Name: Electrical Circuit Analysis II					
Course Code: ELCA 1202					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 150 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Arwa Amir Moosa Email: - arwa.amir@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The module aims to: 1. To provide a comprehensive understanding of alternating current (AC), including its principles, characteristics, and waveform representation, as well as the significance of RMS value and average value in AC circuits. 2. To develop proficiency in working with phasor quantities, including their definition, representation in polar and rectangular forms, and the ability to perform arithmetic operations such as multiplication, division, addition, and subtraction. 3. To analyze resonance circuits, both in series and parallel configurations, in order to determine conditions for resonance, calculate key parameters such as current, voltage, impedance, phase angle, and frequency			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Definition and characteristics of alternating current. • Generation and waveform representation of AC.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Relationships and definitions of RMS value, average value, and their significance. • Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Definition of phasor quantities. • Representation of phasors in polar and rectangular forms. • Calculation of phase angle.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	• Operations on phasor quantities including multiplication, division, addition, and subtraction. • Series AC circuits: voltage division, current division, and impedance calculations.	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Electrical Circuit Analysis II					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Parallel AC circuits: current division, voltage division, and admittance calculations. 6 • Series-parallel combinations of AC circuits	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Power calculations in AC circuits with different components (resistors, inductors, capacitors).	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Nodal analysis and mesh analysis for AC circuits.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	• Mid-Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Superposition theorem for AC circuits	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Thevenin and Norton equivalent circuits for AC circuits	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Definition and conditions for resonance. • Series and parallel resonance circuits.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	• Calculation of current, voltage, impedance, phase angle, and frequency at resonance.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Mid-Exam	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Determining bandwidth and quality factor.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	• Review and revision	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition. Yes Recommended Texts AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents. No		
Main references (sources)			INTRODUCTORY CIRCUIT ANALYSIS, Robert L. Boylestad, Eleven Edition. Yes Recommended Texts AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents. No		
Recommended books and references (scientific journals,			Relevant peer-reviewed books, standards, journal articles, and technical		

Course Name: Electrical Circuit Analysis II	
reports, etc.)	reports.
Electronic References and Websites	http://www.dissidents.com/resources/ACElectricalCircuitAnalysis.pdf No

Digital System Design

Course Name: Digital System Design					
Course Code: DISD 1203					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Othman Atta Ismael Email: - othman.atta@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Digital System Design and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	FUNCTIONS OF COMBINATIONAL LOGIC 6.1 Half and Full Adders 6.2 Parallel Binary Adders	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	6.3 Ripple Carry and Look-Ahead Carry Adders 6.4 Half and Full Subtractor	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	6.5 Comparators 6.6 Decoders 6.7 Encoders 6.8 Code Converters	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	6.9 Multiplexers (Data Selectors) 6.10 Demultiplexers	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	LATCHES, FLIP-FLOPS, AND TIMERS 7.1 Latches 7.2 Flip-Flops 7.3 Flip-Flop Operating Characteristics	Interactive lecture and guided application	Quiz and assignment

Course Name: Digital System Design					
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	7.4 Flip-Flop Applications	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	7.5 One-Shots	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	SHIFT REGISTERS 8.1 Shift Register Operations 8.2 Types of Shift Register Data I/Os	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	8.3 Bidirectional Shift Registers	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	8.4 Shift Register Counters 5 Page	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	COUNTERS 9.1 Finite State Machines	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	9.2 Asynchronous Counters	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	9.3 Synchronous Counters	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	9.4 Up/Down Synchronous Counters 9.5 Design of Synchronous Counters	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	9.6 Cascaded Counters 9.7 Counter Applications	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015 Recommended Texts		
Main references (sources)			Thomas L. Floyd, "Digital Fundamentals", Eleventh Edition Global Edition, Pearson Education Limited 2015 Recommended Texts		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			6 Page APPENDIX:		

Technical Workshop

Course Name: Technical Workshop					
Course Code: TEWO 1204					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Aws Abdulillah hussein Email: - Aws.a.hussein@aliraqia.edu.iq					
Course Objectives					
Course Objectives		A. Introduce students the basics of electrical and electronic devices, tools and circuits. B. Introduce students the basics of joining; welding and soldering processes. C. Introduce students to the basics of the electrical device and circuits with improving the skills that deal with methods of measurement and standardization. D. Introduce students to the basics of transformers, types and design. E. Introduce students to the basics of capacitors include the charging and dis charging circuits and the methods of test. F. Introduce students to the industrial electrical and skill of using tools and design of electrical circuits and control panels. G. Introduce students to the basics of the weldin			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Introduction to the basics occupational Safety and importance and understanding the rules of Electrical Safety Principles.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Understanding the principles of resistors and ohms law and design circuits.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Understanding the principles of capacitors and the methods of test.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	1 theoretical hours, 3 laboratory hours	A1, B1, C1	Design and supplying charging and dis-charging circuits with required data.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Understanding and learning all about AVO meter and how it's used.	Interactive lecture and guided application	Quiz and assignment

Course Name: Technical Workshop					
Week 6	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Understanding the principles of transformer and the methods of test.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Design and supplying the rectification circuits.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	1 theoretical hours, 3 laboratory hours	A2, B2, C2	Introduction to; Semiconductors, diode, power diode, zener diode, LED diode; learning about every means	Interactive lecture and guided application	Mid-semester examination
Week 9	1 theoretical hours, 3 laboratory hours	A3, B3, C3	Testing all diode types and designing circuits	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	1 theoretical hours, 3 laboratory hours	A3, B3, C3	practical work	Interactive lecture and guided application	Quiz and assignment
Week 11	1 theoretical hours, 3 laboratory hours	A3, B3, C3	practical work	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	1 theoretical hours, 3 laboratory hours	A3, B3, C3	practical work	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	1 theoretical hours, 3 laboratory hours	A4, B4, C4	practical work of welding process	Interactive lecture and guided application	Quiz and assignment
Week 14	1 theoretical hours, 3 laboratory hours	A4, B4, C4	Work on small mini projects such as design a mini power supply	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	1 theoretical hours, 3 laboratory hours	A4, B4, C4	Preparing a report about all subjects including a practical work	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Technical workshop (Materials & Devices) authored by Mazin N. Ali, 2016. Electrical & Electronics Engineering, Amrita School of Engineering, 2014 Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010 yes Recommended Texts Engineering Workshop Data. A Book of Reference containing Data, Formulae, Tables, hints and Recipes relating to all Phase		
Main references (sources)			Technical workshop (Materials & Devices) authored by Mazin N. Ali, 2016. Electrical & Electronics Engineering, Amrita School of Engineering, 2014 Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010 yes Recommended Texts Engineering Workshop Data. A Book of Reference containing Data, Formulae, Tables, hints and Recipes relating to all Phase		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.slideshare.net/JosephKonnully/workshop-practise		

Computer Programming I

Course Name: Computer Programming I					
Course Code: COPR 1205					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 200 hours of student workload / 8 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - م.د.محمد عبد المنعم احمد صالح -					
Email: - mohammed.abdalmunam@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. To learn how to write inline functions for efficiency and performance. 2. To learn the syntax and semantics of the C++ programming language. 3. To learn how to overload functions and operators in C++. 4. To learn how functions implement. 5. To present different computer languages and learn c++ 6. To learn elements of code writing. 7. To write and execute programs with the programming language C++. 8. To deep study programming, develop algorithmic thinking and then add technological knowledge regarding the C++ language. 9. To learn how Iteration and recursion work. 10. To understand the precedence of operators in c++. 11. To write, understand, compile and debug C++ pr				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours	A1, B1, C1	Computers and their uses/ Hardware/Software, Fundamentals of Compute , Programming languages/How to use/ run programs. 5	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours	A1, B1, C1	Design and representation of algorithms/ implementation / testing and verification/ program documentation.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours	A1, B1, C1	Introduction. Basic overview of C++, General structural, variable, libraries.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours	A1, B1, C1	input and output/ data types.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours	A2, B2, C2	arithmetic and logical operators, precedence of operators.	Interactive lecture and guided	Quiz and assignment

Course Name: Computer Programming I					
				application	
Week 6	4 theoretical hours	A2, B2, C2	,7 C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours	A2, B2, C2	Mid-semester examination and review	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours	A2, B2, C2	Switch-case statements, nested switch-case statement.	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours	A3, B3, C3	Counter controlled and sentinel controlled repetition. For loop.	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours	A3, B3, C3	The do-while and while loops.	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours	A3, B3, C3	Skipping loop iterations break and continue, Labels and goto statement, nested loops.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours	A3, B3, C3	Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours	A4, B4, C4	Two-dimensional array creation, initialization and processing.	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours	A4, B4, C4	Functions in C++ / new function creation return values and call, Formal parameters call by value and call by reference/ Math and other standard library functions.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours	A4, B4, C4	Mid-term Exam.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1. Mastering c++ by sorhan sami & oqeli saleh 2002. 2. Cay S. Horstmann, Computing Concepts with C++ Essentials, 3rd edition, John Wiley, 2003 Yes Recommended Texts Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007. Yes		
Main references (sources)			1. Mastering c++ by sorhan sami & oqeli saleh 2002. 2. Cay S. Horstmann, Computing Concepts with C++ Essentials, 3rd edition, John Wiley, 2003 Yes Recommended Texts Lesley Anne Robertson, Computing concepts with C++ essentials, 5th Ed. 2007. Yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.youtube.com/watch?v=vLnPwxZdW4Y https://www.youtube.com/watch?v=WIH97Ko1xHo&list=PLF8OvnCBI EY1W54Am_lA9uXK1_gAyExMmP		

Arabic Language

Course Name: Arabic Language					
Course Code: ARLA 1206					
Semester / Year: First Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - انوار قتيبة يحيى - Email: - anwar.q.yahya@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Arabic Language and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	مقدمة عن عالمات الترقيم والتعرف على أنواعها	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	همزة القطع والوصل ، (كتابة أنواع الهمزة) همزة المتوسطة ، همزة المتطرفة	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	التنوين ، والشدة ، (مكمالات ضوابط الكتابة) المدة والتعرف على أنواع الأخطاء اللغوية	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	موضوع العدد وطريقة كتابته	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	الخط العربي وأنواعه	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours	A2, B2, C2	اسم الفاعل ، اسم المفعول ، اسما (المشتقات) الزمان والمكان ، اسم الالة	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Arabic Language					
Week 7	2 theoretical hours	A2, B2, C2	الفعل وأنواعه	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	4الفاعل والمفعول به	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	أنواع المفاعيل امتحان مد	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	المبتدأ والخبر	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	المتنى والجمع وأنواعه	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	الفرق بين التاء والهاء	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	التذكير والتأنيث وأنواعها	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	المعلقات	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	مراجعة للطالب قبل المتحان النهائي	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			الوجيز في اللغة العربية ، محي هالل سرحان ، شرح قطر الندى وبل الصدى،البن هشام النصاري ، الجرومية ابي عدهللا محمد الصنهاجي المالء والترقيم في الكتابة العربية ، عبد Yesالعليم ابراهيم ، اللغة العربية لغير المختصين ،مصطفى جطل وصالح كزاراة		
Main references (sources)			الوجيز في اللغة العربية ، محي هالل سرحان ، شرح قطر الندى وبل الصدى،البن هشام النصاري ، الجرومية ابي عدهللا محمد الصنهاجي المالء والترقيم في الكتابة العربية ، عبد Yesالعليم ابراهيم ، اللغة العربية لغير المختصين ،مصطفى جطل وصالح كزاراة		
Recommended books and references (scientific journals, reports, etc.)			جامع الدروس العربية ، مصطفى الغياني،معاني النحو ، فاضل السامرائي دراسة في قواعد Noعبد الجواد الطيب، موسوعة الشامل في الكتابة والمالء ،موسى حسن الهديب .المالء د		
Electronic References and Websites			1. https://shamela.ws/ 2. https://waqfeya.net/		

LEVEL TWO

Second Year / First Semester Mathematics III

Course Name: Mathematics III					
Course Code: MATH 2101					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4.00 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - شيماء بدر ياس					
Email: - shaimaa.bader@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. Partial derivatives are useful in analyzing surfaces for maximum and minimum points and give rise to partial differential equations in next stage. 2. Learn basics of vectors for many engineering quantities, such as forces, displacements, velocities, and accelerations, will need to be represented as vectors for analysis. 3. The major applications of multiple integrals in engineering is the determination of properties of plane, and whenever an area or a volume under a 2D curve (a surface) needs to be measured 4. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes • impart the knowledge of sequences a				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Fourier series - introduction.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Half range Fourier series	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Partial derivatives	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Chain rule	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial	A2, B2, C2	Maxima, minima, and saddle points	Interactive lecture and	Quiz and assignment

Course Name: Mathematics III					
	hour(s)			guided application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Vectors: Introduction	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Vectors: properties, dot product	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Vectors: cross product	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	(Mid-term Exam)	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Equations of lines and planes in space	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Vector function	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Multiple Integrals: Double Integrals	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Double Integrals using polar coordinate	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Triple integrals	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Taylor and Maclaurin series	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Calculus By Thomas Yes Recommended Texts CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS , STEPHEN DAVIS yes		
Main references (sources)			Calculus By Thomas Yes Recommended Texts CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS , STEPHEN DAVIS yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Digital Electronics

Course Name: Digital Electronics					
Course Code: DIEL 2102					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
8 hours per week / 200 hours of student workload / 8 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Omar Raad Kadhim Israa Majeed Ali Email: - omarraad@aliraqia.edu.iq israa.m-alobaigy@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Digital Electronics and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 4 laboratory hours	A1, B1, C1	introduction analog system, and operational amplifier Non-inverting OP-AMP. & Inverting OP-AMP.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 4 laboratory hours	A1, B1, C1	basic element of op amp Voltage follower. & Voltage adder.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 4 laboratory hours	A1, B1, C1	Integrator , Differentiator .and Difference Amp	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 4 laboratory hours	A1, B1, C1	A/D convertors. & Simultaneous ADC. Counter type ADC.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Continuous ADC. Successive approximation ADC. & Variable resistor network.	Interactive lecture and guided application	Quiz and assignment

Course Name: Digital Electronics					
Week 6	4 theoretical hours, 4 laboratory hours	A2, B2, C2	D/A Convertor, Resistive divider DAC. & Binary ladder DAC, DAC accuracy and resolution	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Mid Exam, Mealy machine Design.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 4 laboratory hours	A2, B2, C2	Moore. Machine Design.	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 4 laboratory hours	A3, B3, C3	ASM charts. & the Principle components of an ASM chart	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 4 laboratory hours	A3, B3, C3	Conversion of a state diagram to ASM chart. 5	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 4 laboratory hours	A3, B3, C3	CMOS, TTL, ECL. & Propagation delay. & Switching speed limitations and Power dissipation.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 4 laboratory hours	A3, B3, C3	PLD advantages. & ROM as PLD. & PLA and PAL. & SPLD. & CPLD.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 4 laboratory hours	A4, B4, C4	FPGA. & GAL. HAL.	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 4 laboratory hours	A4, B4, C4	The main features to VHDL. Design Units. & Structural modeling	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 4 laboratory hours	A4, B4, C4	Data flow modeling. & Behavioral modeling. & Mixed style of modeling.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Digital Design Author : Morris Mano Edition & Year Public: Prentice Hall, 4 thEd., 2006 Yes		
Main references (sources)			Digital Design Author : Morris Mano Edition & Year Public: Prentice Hall, 4 thEd., 2006 Yes		
Recommended books and references (scientific journals, reports, etc.)			"Digital Design: Principles and Practices" by John F. Wakerly Yes		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Computer Architecture

Course Name: Computer Architecture					
Course Code: COAR 2103					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - عمر رعد كاظم					
Email: - omarraad@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Computer Architecture and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours	A1, B1, C1	• Introduction: organization and architecture structure and function.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours	A1, B1, C1	• Computer function and interconnection (II): interconnection structure, bus interconnection, PCI	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours	A1, B1, C1	• Memory Organization: • Concept of RAM/ROM, basic cell of RAM	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours	A1, B1, C1	• Associative memory, Cache memory organization	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours	A2, B2, C2	• Virtual memory organization	Interactive lecture and guided application	Quiz and assignment
Week 6	4 theoretical hours	A2, B2, C2	• I/O Organization	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Computer Architecture					
Week 7	4 theoretical hours	A2, B2, C2	• Introduction to Peripherals & their interfacing	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours	A2, B2, C2	• Strobe based and handshake-based communication, DMA based data transfer, I/O processor	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours	A3, B3, C3	• CPU structure: processor organization , register organization CPU function : instruction cycle , instruction pipelining	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours	A3, B3, C3	• Parallel Processing	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours	A3, B3, C3	• Characteristics of Multiple Processors • Interconnection structure and arbitration	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours	A3, B3, C3	• Inter-process communication and synchronization	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours	A4, B4, C4	• Multi-core Computers	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours	A4, B4, C4	• Hardware and software performance	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours	A4, B4, C4	• Multi-core organization	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• Computer Organization and Architecture: Designing for Performance • Morris Mano" Computer System Architecture",Third edition • Joseph D. Dumas"Computer Architecture Fundamentals and Principles of Computer Design" CRC Press, 2006. • Miles J. Murdocca," Principles of Computer Architecture" ,Prentice Hall,1999		
Main references (sources)			• Computer Organization and Architecture: Designing for Performance • Morris Mano" Computer System Architecture",Third edition • Joseph D. Dumas"Computer Architecture Fundamentals and Principles of Computer Design" CRC Press, 2006. • Miles J. Murdocca," Principles of Computer Architecture" ,Prentice Hall,1999		
Recommended books and references (scientific journals, reports, etc.)			• Miles J. Murdocca, Vincent P. Heuring," Computer Architecture and organization :An integrated Approach", Wiley, 2012 • Subrata Ghoshal, " Computer Architecture and organization From 8085 to Core 2Duo and beyond", Glyph International Pvt. Ltd,2011 • William Stallings " Computer Organization and Architecture Designing for Performance", 8th Edition,		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Object-Oriented Programming

Course Name: Object-Oriented Programming					
Course Code: OBOP 2104					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Sura Nasser Maryoush Email: - sura.n.maryoush@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. To develop programming skills and understanding of advanced concepts of programming. 2. To implementing programs by using classes and objects 3. To understand the concepts of object oriented programming 4. To be able to increase the efficiency of the programs by using OOP concepts 5. To be able to decrease the number of code lines by using the concept on inheritance 6. Create functions and classes that can deal with different data types with the same code by using templates. 7. To handle exceptions dealing with streams and files. 8. To understand the concept and the types of data structures Module Learning Outcomes 1. Creating simple programs using classes an				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Review of C++ basics, pointers, pointer arithmetic, array of pointers, pointer to pointer, passing pointer to a function	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Structures, array of structures, structure within structure, unions, enumeration	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to OOP, OOP concepts, Classes, objects.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Constructor, member initialization list, constructor overloading, destructor, scope resolution operator, constant and static members	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Object-Oriented Programming					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Friend function and friend class	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Inheritance concept, types of Inheritance, single Inheritance, multiple Inheritance, multilevel Inheritance, heirarchical Inheritance, hybrid Inheritance.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Mid term + Access control and Inheritance, overriding methods, polymorphism and virtual functions	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Operator overloading, overloading unary operators , overloading binary operators	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Templates, function templates, class templates	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Errors and Exceptions.	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Standard Template Library (STL), containers, algorithms, iterators	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Streams, stream classes, predefined stream objects, stream errors, error status bits	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Disk file I/O with streams, formatted I/O files, writing data, reading data, detecting the end of file and closing files	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Introuction to data structures, linked list, stack	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Queue , trees, graphs	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or ISBN-13: 978- 0321714114 • Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13: 978-0321563842 (advanced) Yes Recommended Texts Robert Lafore, Object-Ori		
Main references (sources)			• Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or		

Course Name: Object-Oriented Programming	
	ISBN-13: 978- 0321714114 • Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13: 978-0321563842 (advanced) Yes Recommended Texts Robert Lafore, Object-Ori
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	www.cpptutorial.com

Communication Fundamentals I

Course Name: Communication Fundamentals I					
Course Code: COMM 2105					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 125 hours of student workload / 5 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Zahraa Khduair Taha Email: - zahraa.khduair@aliraqia.edu.iq					
Course Objectives					
Course Objectives		1. Understanding Communication Systems: The subject aims to provide a fundamental understanding of analog communication systems. Students learn about the key components, concepts, and principals involved in the transmission and reception of signals in communication systems. 2. Signal Representation and Analysis: The subject focuses on the study of different signal representations, including continuous-time signals. Students learn to analyze signals using techniques such as Fourier transform. 3. Analog Communication Systems: The subject covers the principles and techniques used in analog communication systems. Students learn about modulation techniques, such as amplitude modulation (AM), freq			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Introduction - Introduction to Communication Systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Elements of a Communication System and Mode of operations	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Fundamental Limitations and Modulation and Coding	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Review of Signal Classifications and Transmission of Signals through Linear Systems	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Communication Fundamentals I					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Linear modulation strategies that constitute the amplitude modulation family: Amplitude Modulation (AM)	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Double Sideband-Suppressed Carrier (DSB-SC): modulation and demodulation techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Single Sideband (SSB): modulation and demodulation techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	superheterodyne receiver	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Mid-term Exam (from	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Angle Modulation concepts and the Relationship between PM and FM Waves:	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Narrow-Band Frequency Modulation and Wide-Band Frequency Modulation	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Transmission Bandwidth of FM Waves and Generation of FM Waves	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Demodulation of FM Signals	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Commercial FM transmitter (PART 1)	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Commercial FM transmitter (PART 2)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002 Yes Recommended Texts S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007 yes		
Main references (sources)			F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002 Yes Recommended Texts S.S. Haykin, Communication Systems, Wiley,		

Course Name: Communication Fundamentals I	
	2001.B Behrouz A. Forouzan, Data communications and networking, 4th ed, 2007 yes
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	https://www.coursera.org/learn/ analog communication fundamentals

Human Rights

Course Name: Human Rights					
Course Code: HURI 2106					
Semester / Year: Second Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - عمار مزعل شنته -					
Email: - amar.mizeal@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Human Rights and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	مدخل عام الى مفهوم /مقدمة عن حقوق الانسان حقوق الانسان	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	(انواع حقوق الانسان)فئات	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	حقوق الانسان في الحضارات القديمة والشرائع السماوية	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	حقوق الانسان في حضارة وادي الرافدين	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	حقوق الانسان في السالم	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours	A2, B2, C2	تطور فكرة حماية حقوق الانسان في العصر الحديث	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Human Rights					
Week 7	2 theoretical hours	A2, B2, C2	المجتمع الدولي وحقوق الإنسان المعاصر	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	واجبات الإنسان والبنود الواردة على ممارسة حقوق الإنسان	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	امتحان مد	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	التعرف على أهمية معالجات وانعكاسات الفساد الإداري	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	تمكين وحقوق المرأة	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	التعرف على المنظمات والهيئة الدولية المعنية بالدفاع عن حقوق الإنسان	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	أخالفات المهنة	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	قانون ضبط الطلبة في مؤسسات وزارة التعليم العالي والبحث العلمي	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	مراجعة للطلاب قبل الـ امتحان النهائي	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Yes المواثيق الدولية لحقوق الإنسان - الكتاب المنهجي في الكلية -		
Main references (sources)			Yes المواثيق الدولية لحقوق الإنسان - الكتاب المنهجي في الكلية -		
Recommended books and references (scientific journals, reports, etc.)			10 بموجب قرار الهيئة العامة للأمم المتحدة المؤرخ في 1948 الإعلان العالمي لحقوق الإنسان - No المواد - الديباجة - المالحق 1948 كانون الأول ديسمبر عام		
Electronic References and Websites			1. https://g.co/kgs/p8YcVm		

Second Year / Second Semester Mathematics IV

Course Name: Mathematics IV					
Course Code: MATH 2201					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - شيماء بدر ياس					
Email: - shaimaa.bader@aliraqia.edu.iq					
Course Objectives					
Course Objectives	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application. Module Learning Outcomes مخرجات				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Ordinary differential equation – first order- variable separable	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Ordinary differential equation – first order- homogenous	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Ordinary differential equation – first order- Exact	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Ordinary differential equation – first order - Linear	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial	A2, B2, C2	Ordinary differential equation – second order – undetermined	Interactive lecture and	Quiz and assignment

Course Name: Mathematics IV					
	hour(s)		coefficient	guided application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Ordinary differential equation – second order – variation of parameter	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Ordinary differential equation – higher order	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-term Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Laplace transform - properties	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Inverse Laplace transform	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Solving Ordinary differential equation using Laplace transform	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Z - transform	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Z - transform properties	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Inverse Z - transform	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Inverse Z – transform (PART2)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017. Yes Recommended Texts Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014. yes		
Main references (sources)			Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017. Yes Recommended Texts Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014. yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.coursera.org/learn/calculus1		

Communication Fundamentals II

Course Name: Communication Fundamentals II					
Course Code: COMM 2202					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 125 hours of student workload / 5 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Zahraa Khduair Taha Email: - zahraa.khduair@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. understanding of the Concept of data compression, entropy, and compressibility 2. know different types of coding 3. how can perform text/ image code Module Learning Outcomes 1. مخرجات التعلم للمادة الدراسية Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying signal coding and theory. 2. Determine the appropriate compression method for a given signal/data. 3. Realize the compression according to the lossy/ lossless requirements. 4. Understanding of image/text coding Indicative Contents المحتويات الإرشادية Indicative content includes the following. Concept of data compression Entropy and compressibility Shannon and Huffman				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Concept of data compression	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Entropy and compressibility	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Shannon and Huffman codes	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	arithmetic coding 4	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Communication Fundamentals II					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Sequence coding.	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Prediction.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Mid-term Exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	quantisation and its optimisation.	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Vector quantization	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Signal spaces	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Wavelet transforms	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Bit assignment and coding efficiency.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Image/sound/video coding	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Text coding (part1)	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Text coding (part2)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Signal Coding and Processing, 2nd edition, 2012 Yes Recommended Texts Multimedia Signal Coding and Transmission No		
Main references (sources)			Signal Coding and Processing, 2nd edition, 2012 Yes Recommended Texts Multimedia Signal Coding and Transmission No		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.coursera.org/learn/coding5		

Database Systems

Course Name: Database Systems					
Course Code: DASY 2203					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
6 hours per week / 175 hours of student workload / 7 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Sura Nasser Maryoush Email: - sura.n.maryoush@aliraqia.edu.iq					
Course Objectives					
Course Objectives		1. To understand the different issues involved in the design and implementation of a database system 2. To study the physical and logical database design, and data models. 3. To understand the basic concepts of relational data model 4. To understand and use SQL with relational databases 5. To be able to retrieve specific data from a database by using queries and subqueries . 6. To manipulate data by using SQL. 7. To Be able to understand and create E/R diagrams 8. To understand and implement database applications 9. To Be able to normalize databases and tables 10. To understand indexing and hashing methods Module Learning Outcomes مخرجات التعلم للمادة الدراسية 1. Understand the importance of			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to databases, file systems, databases, DBMS, levels of abstraction	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Data models, relational data model, schema and schema diagram.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Relational algebra and calculus.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to SQL , Basic SQL commands	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours, 2 laboratory hours	A2, B2, C2	simple Queries from single and multiple relation, natural join	Interactive lecture and guided application	Quiz and assignment

Course Name: Database Systems					
Week 6	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Additional basic operations, set operations, Null values in SQL	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Mid exam + Aggregation functions	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Aggregation functions with grouping in SQL, Having clause with grouping	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 2 laboratory hours	A3, B3, C3	nested subqueries in SQL, set membership, set comparison, subqueries in the From Clause	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Modification on the database commands , views in SQL.	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Integrity constraints, authorization in SQL	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Database application development, connectors.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Entity – Relationship data model, mapping cardinalities, E/R diagram representation	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Database Normalization, 1NF, 2NF, 3NF	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Indexing and Hashing	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• "Database System Concepts ", Abraham Silberschatz, Henry F. Korth,S. Sudarshan, 7th edition 2020 , ISBN 978-0-07-802215-9 • • "Fundamentals Of Database Systems", ramez elmasri, shamkant b. navathe, seventh edition, 2016, ISBN-13: 978-0-13-397077-7 No Recommended Texts "Database Management Systems", Raghu Ramakrishnan, third edition, 2003 No		
Main references (sources)			• "Database System Concepts ", Abraham Silberschatz, Henry F. Korth,S. Sudarshan, 7th edition 2020 , ISBN 978-0-07-802215-9 • • "Fundamentals Of Database Systems", ramez elmasri, shamkant b. navathe, seventh edition, 2016, ISBN-13: 978-0-13-397077-7 No Recommended Texts "Database Management Systems", Raghu Ramakrishnan, third edition, 2003 No		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			www.mysql.com https://www.w3shool.com 6		

Computer Network I

Course Name: Computer Network I					
Course Code: CONE 2204					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أمجد رزاق حسين العباس - Email: - amjed.alabbas@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course covers various aspects of networking, including the introduction to networking, networking devices, networking protocols, different layers of the OSI model, network addressing, network security, troubleshooting, router configuration, home networking, and concludes with a networking capstone project and a final exam. Module Learning Outcomes مخرجات التعلم للمادة الدراسية The student will learn the basic and applied concepts of Computer Network with the following fundamentals: 1. Define and explain the concept of networking, including its historical development and importance in modern technology. 2. Identify and describe different types of networks, such as LANs, WANs, and MANs, a				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to Networking • What is networking? • The history of networking • The different types of networks	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Networking Devices • Routers: Functions and features 5 • Switches: Functions and features • Hubs: Functions and features	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Networking Protocols • The OSI model: Overview and its layers • The TCP/IP model: Overview and its layers	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	OSI Application Layer • Functionality and protocols of the OSI application layer • Detailed study of application layer protocols like HTTP, SMTP, FTP	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Computer Network I					
Week 5	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	OSI Transport Layer • Functionality and protocols of the OSI transport layer • Comparison of TCP and UDP protocols	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	OSI Network Layer and IP Addressing • Role and responsibilities of the OSI network layer • Introduction to IPv4 and IPv6 addressing	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Midterm Exam+ IP address allocation and subnetting techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Network Addressing (IPv4) • Assigning IPv4 classes • Subnetting and Variable Length Subnet Masking (VLSM)	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	OSI Datalink Layer • Functions and protocols associated with the OSI Datalink Layer	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	OSI Datalink and Physical Layer • Functions and protocols associated with the OSI Physical Layer • Overview of Ethernet cables and their categories (e.g., Cat5, Cat6) • Fiber optic cables and their advantages • Coaxial cables and their appl	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Networking Troubleshooting • Troubleshooting methodologies based on the OSI model • Troubleshooting TCP/IP-related issues • Network device troubleshooting techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Router Cisco Configuration Introduction to the Cisco command-line interface (CLI) and commands Configuration of interface ports on Cisco routers	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Router Cisco Configuration cont. Configuration of line ports (console, Telnet, SSH) Configuring static routes Setting up DHCP (Dynamic Host Configuration Protocol) and DNS (Domain Name System) protocols on routers	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Networking in the Home • Introduction to home networking devices (e.g., routers, switches, wireless access points) Configuration and setup of home networks • Implementation of home networking security measures (e.g., network encryption, pas	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Networking Capstone Project • Design and implementation of a comprehensive networking project, integrating concepts and skills learned throughout the course.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					

Course Name: Computer Network I	
Required textbooks (curricular books, if any)	Title: Networking: The Complete Reference Author: Todd Lammle No Recommended Texts Title: Cisco CCNA: Routing and Switching Study Guide Author: Wendell Odom No Recommended Texts Title: Network Security: A Beginner's Guide Author: Stuart McClure NO Recommended Texts Title: Cisco IOS Configuration Fundamentals Command Reference Organization: Cisco Sy
Main references (sources)	Title: Networking: The Complete Reference Author: Todd Lammle No Recommended Texts Title: Cisco CCNA: Routing and Switching Study Guide Author: Wendell Odom No Recommended Texts Title: Network Security: A Beginner's Guide Author: Stuart McClure NO Recommended Texts Title: Cisco IOS Configuration Fundamentals Command Reference Organization: Cisco Sy
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	https://www.cisco.com/

Computer Programming II

Course Name: Computer Programming II					
Course Code: COPO 2205					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أمجد رزاق حسين العباس - Email: - amjed.alabbas@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course is designed for those who are new to programming and want to learn the Python programming language. The course will cover the basics of Python programming including data types, flow control, functions, and modules. The course will also cover advanced topics such as object-oriented programming and working with external libraries. Module Learning Outcomes مخرجات التعلم للمادة الدراسية The students should be able to: 1. Understand the basic principles of computers. 2. Understand the basics of binary computation. 3. Understand the programming basics (operations, control structures, data types, etc.) 4. Readily use the Python programming language 5. Apply various data types and contro				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to Python • Relationship between computers and programs • Basic principles of computers • File systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to Python (continued) • Using the Python interpreter 4 • Introduction to binary computation • Input / Output	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Data types and control structures • Operators (unary, arithmetic, etc.) • Data types, variables, expressions, and statements • Assignment statements	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Data types and control structures (continued) • Strings and string operations • Control Structures: loops and decision	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2 laboratory	A2, B2, C2	Modularization and Classes • Standard modules • Packages • Defining Classes	Interactive lecture and guided	Quiz and assignment

Course Name: Computer Programming II					
	hours			application	
Week 6	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Modularization and Classes (continued) • Defining functions • Functions and arguments (signature)	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Exceptions and data structures • Data Structures (array, List, Dictionary)	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Exceptions and data structures (continued) • Error processing • Exception Raising and Handling	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Dictionaries and Sets	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Dictionaries and Sets	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Mid - exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Object-oriented design • Programming types • Object Oriented Programming	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Object-oriented design • Object Oriented Design • Inheritance and Polymorphism 5	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Inheritance	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Inheritance	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			"Starting Out with Python plus MyProgrammingLab with Pearson eText --Access Card Package (3rd (3rd Edition) Tony Gaddis ISBN-13: 978-0133862256" Yes Recommended Texts "Python Distilled" , David M. Beazley Yes		
Main references (sources)			"Starting Out with Python plus MyProgrammingLab with Pearson eText --Access Card Package (3rd (3rd Edition) Tony Gaddis ISBN-13: 978-0133862256" Yes Recommended Texts "Python Distilled" , David M. Beazley Yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			Introduction to Python Programming Coursera		

Operating Systems and Applications

Course Name: Operating Systems and Applications					
Course Code: OPSA 2206					
Semester / Year: Second Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 75 hours of student workload / 3 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أ. م. د. أحمد يونس يوسف - Email: - ahmedyounusyousuf@aliraqia.edu.iq					
Course Objectives					
Course Objectives	أهداف المادة الدراسية At the end of this course, the learner should be able to: 1. provide users with a convenient interface to use the computer system. 2. act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources. 3. manage the resources of a computer system. 4. To make the computer system convenient to use in an efficient manner. 5. hide the details of the hardware resources from the users. 6. provide users with a convenient interface to use the computer system. Module Learning Outcomes مخرجات التعلم للمادة الدراسية 1. Understanding Operating System Concepts: • Gain a solid understanding of operating system fundamentals, inc				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Introduction 1. What is an Operating System? 2. Functions of Operating Systems 3. Operating System Types 4. Windows OS 5. Linux OS	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	OS structures 1. Computer hardware properties 2. Disk subsystems	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Virtual memory management 6 1.Demand Paging (Advantages – Disadvantages) 2.Page Fault Service Time 3.Swapping 4.Thrashing 5.Performance in Virtual Memory 6.Frame Allocation 7. Paging Policies	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	CPU Scheduling algorithms 1.First Come First Serve (FCFS) 2.Shortest Job Next (SJN) 3.Priority Based Scheduling 4.Shortest Remaining Time 5.Round Robin Scheduling	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Operating Systems and Applications					
			6.Multiple-Level Queues Scheduling		
Week 5	2 theoretical hours	A2, B2, C2	File systems 1.Attributes 2.Types 3.Operations 4.FILE DIRECTORIES 5.SINGLE-LEVEL DIRECTORY 6.TWO-LEVEL DIRECTORY 7.TREE-STRUCTURED DIRECTORY 8.FILE ALLOCATION METHODS 9.Disk Free Space Management	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours	A2, B2, C2	Clouds & Virtualization 1.The Cloud Concept 2.Virtualization	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Disaster Recovery -DR 1.Introduction 2.Disasters Types 3.Disaster Recovery Planning 4.Alternative Work Sites	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Data Centers- DCs: 1.Introduction 2.General Structure Of DC 3.Basis DCs Standards 4.Networking Structure 5.Cabling Structures in DCs	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	Process concept in moldering OS 1.Need for Five-State Process Model 2.Execution of Process in Two-state Model 3.Possible State Transitions	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Multi-processes 1.Introduction 2.What is a Multiprocessing Operating System? 3.Types of Multiprocessing OS 4.Working of Operating System 5.Multiprogramming and Multiprocessing Operating System 7	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	Process synchronization 1.Critical section problem 2.Classical problem	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	Shell and Shell scripting 1.Introduction Operating system shells 2.Types of Shells in Operating Systems 3.Shell Scripting	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	Concurrent programming. 1.Introduction 2.Principles of Concurrency 3.Concurrency Mechanisms 4.Problems in Concurrency 5.Real-World Applications of Concurrency 6.Future Directions for Concurrency in Operating Systems	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	Secondary memory management and file systems 1.What Is Secondary Storage Management 2.What Are Secondary Storage Devices In Operating System 3.What Is the Function of Secondary Storage Management? 4.The Different Storage Devices for Your Co	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	Linux Kernel 1.Define Linux Kernel 2.What is Linux Operating System and Kernel 3.Figure	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					

Course Name: Operating Systems and Applications	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free. Yes 8 Recommended Texts Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commo
Main references (sources)	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free. Yes 8 Recommended Texts Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commo
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	https://books.google.iq/books/about/Operating_Systems.html?id=0a-ouwEACAAJ&redir_esc=y

LEVEL THREE

Third Year / First Semester Advanced Mathematics I

Course Name: Advanced Mathematics I					
Course Code: ADMA 3101					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أ.م.د. أحمد يونس يوسف					
Email: - ahmedyounusyousuf@aliraqia.edu.iq					
Course Objectives					
Course Objectives		1. Understanding Basic Probability Concepts: The primary aim is to help students understand the fundamental principles of probability. This includes the interpretation of probability, random variables, probability mass/density functions, cumulative distribution functions, expected values, variance, and other basic concepts. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 2. Probability Distributions: Engineers should understand various discrete and continuous probability distributions, their properties, and how they can be used to model various phenomena. Examples include Binomial, Poisson, Uniform, Normal, Exponential, and Gamma distributions. Reading pl			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to probability and statistics Sample space Events Experiment Basic counting principles: permutation	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Combination Mixed between permutation and combination	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Frequency distribution Frequency table Cumulative frequency Histogram O-gives	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Measures of Tendency Mean Median Mode	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial	A2, B2, C2	Measures of dispersion Range Average deviation Variance	Interactive lecture and	Quiz and assignment

Course Name: Advanced Mathematics I					
	hour(s)			guided application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Measures of dispersion Variance Standard deviation	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Probability Elementary probability	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Probability Conditional probability	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Mid exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Probability distribution Functions Discrete and continuous variables Probability distribution Function	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Expected and variance	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Distributions Binomial distribution Normal distribution	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Joint probability distribution Function Marginal Functions Independent variables	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Expected, covariance	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	correlation	Interactive lecture and guided application	Classroom/laboratory activities

Course Assessment

The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.

Learning and Teaching Resources

Required textbooks (curricular books, if any)	Probability and statistics for engineering and scientists By : Walpole and Myers yes Recommended Texts 1. Probability and statistics for engineers By : Miller and Freund's 2. Applied mathematics journals, schaum series in Probability and statistics no
Main references (sources)	Probability and statistics for engineering and scientists By : Walpole and Myers yes Recommended Texts 1. Probability and statistics for engineers By : Miller and Freund's 2. Applied mathematics journals, schaum series in Probability and statistics no
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Microprocessor

Course Name: Microprocessor					
Course Code: MICR 3102					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
6 hours per week / 200 hours of student workload / 8 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - م.د. محمد عبد المنعم احمد صالح -					
Email: - mohammed.abdalmunam@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. To become familiar with the architecture and pins configuration of 8086 μ P. 2. to understand the main differences between maximum and minimum modes of bus cycle 3. to understand the different addressing modes. 4. to provide practical hands on experience with assembly language programming 5. develop and test assembly language programs 6. get familiarize with interfacing of various peripheral devices with 8086 μ P using 8255A chip 7. to understand the concepts of interfacing with LEDs, DC motor, and analog to digital converter or digital to analog converter, Module Learning Outcomes مخرجات التعلم للمادة الدراسية 1. Describe the architecture and organization of 8086 μ P. 2. Illustrate the pins c				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to 8086 microprocessor , registers, flags.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 2 laboratory hours	A1, B1, C1	The 8086/8088Microprocessor Architecture and Pin-configuration, Minimum-Mode and Maximum-Mode System, Minimum-Mode Interface Signals, Maximum-Mode Interface,	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 2 laboratory hours	A1, B1, C1	System Clock, Bus Cycle and Time States, Two Basic Memory Operations for 8086 μ P	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 2 laboratory hours	A1, B1, C1	Software Model of 8086 μ P, Physical Address Generation, Addressing Modes of 8086 μ P, Unsigned and Signed Integer Numbers	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Microprocessor					
Week 5	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Instruction Set of 8086 μ P, Data Transfer Instructions, Addition and Subtraction Instructions, Multiplication and Division Instructions	Interactive lecture and guided application	Quiz and assignment
Week 6	4 theoretical hours, 2 laboratory hours	A2, B2, C2	CBW & CWD instructions, Logical Instructions, Shift Instructions, Rotate (ROL, ROR, RCL, and, RCR) Instructions	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Mid exam + Flags Control Instructions, Compare CMP and TEST Instructions, The TEST Instruction	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 2 laboratory hours	A2, B2, C2	Branch Instructions (Jump), Unconditional and Conditional Jump	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Interfacing of 8086, The 8086 microprocessors and memory or I/O interfaces relationship,	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Programmable Peripheral Interface 8255A, Read/Write and Control Logic, Group A and Group B Controls, Ports A, B, and C	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Delay in Programs, Software Delays.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 2 laboratory hours	A3, B3, C3	Interfacing 8-bit Peripherals to 16-bit Microprocessor	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Interfacing with LEDS, traffic lights	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Interfacing with DC motor	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 2 laboratory hours	A4, B4, C4	Analog to Digital Converter (ADC) and Digital to Analog convertor (DAC)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• The x86 microprocessors, Lyla B. Das, 2nd edition, pearson No Recommended Texts “Microprocessors and peripheral ICs”, S.K. San, No		
Main references (sources)			• The x86 microprocessors, Lyla B. Das, 2nd edition, pearson No Recommended Texts “Microprocessors and peripheral ICs”, S.K. San, No		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			6		

Optical Communication

Course Name: Optical Communication					
Course Code: OPCO 3103					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Samar Kareem Ibrahim Email: - samar.kareem90@gmail.com					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Optical Communication and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	INTRODUCTION 1.1 Historical development 1.2 The general system 1.3 Advantages of optical fiber communication	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	OPTICAL FIBER STRUCTURES AND LIGHT GUIDING PRINCIPLES 2.1 The Nature of Light 2.2 Basic Laws and Definitions of Optics	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1	2.3 Optical Fiber Configurations and Modes 2.4 Modes in Circular Waveguides	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours	A1, B1, C1	2.5 Single-Mode Fibers 2.6 Graded-Index (GI) Fibers	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2 laboratory hours	A2, B2, C2	2.7 Optical Fiber Materials 2.8 Photonic Crystal Fiber Concepts 2.9 Optical Fiber Cables	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory	A2, B2, C2	OPTICAL SIGNAL ATTENUATION AND DISPERSION 3.1 Fiber Attenuation	Interactive lecture and guided	Classroom/laboratory activities

Course Name: Optical Communication					
	hours			application	
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2	3.2 Optical Signal Dispersion Effects	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	3.3 Design and Characteristics of SMFs	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3	LIGHT SOURCES FOR FIBER LINKS 4.1 Basic Concepts of Semiconductor Physics 4.2 Principles of Light-Emitting Diodes (LEDs)	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	4.3 Principles of Laser Diodes 4.4 Output Linearity of Light Sources	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3	OPTICAL POWER COUPLING 5.1 Source-to-Fiber Power Coupling 5.2 Coupling Improvement with Lensing Schemes 6 Page	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	5.3 Losses Between Fiber Joints 6 PHOTODETECTION DEVICES 6.1 Operation of Photodiodes	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4	6.2 Noise Effects in Photodetectors 6.3 Response Times of Photodiodes	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	OPTICAL RECEIVER OPERATION 7.1 Basic Receiver Operation 7.2 Performance Characteristics of Digital Receivers	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	7.3 Principles of Eye Diagrams 7.4 Burst-Mode Receivers 7.5 Characteristics of Analog Receivers	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Gerd Keiser, "Fiber Optic Communications", Springer Nature Singapore Pte Ltd. 2021 Recommended Texts John M. Senior, "Optical Fiber Communications Principles and Practice", 3rd Edition, Pearson Education Limited 2009		
Main references (sources)			Gerd Keiser, "Fiber Optic Communications", Springer Nature Singapore Pte Ltd. 2021 Recommended Texts John M. Senior, "Optical Fiber Communications Principles and Practice", 3rd Edition, Pearson Education Limited 2009		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			7 Page APPENDIX:		

Signals and Systems

Course Name: Signals and Systems					
Course Code: SISY 3104					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 75 hours of student workload / 3 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Mahmood Jalal Ahmad Email: - mahmood.j.ahmad@aliraqia.edu.iq					
Course Objectives					
Course Objectives		• To develop the understanding of the basic ideas of the Signals & Systems encountered in engineering. • To understand the methods for characterizing and analyzing continuous-time signals and systems. • To learn the transform techniques (Fourier transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, Digital signal processing and Digital image processing. Module Learning Outcomes مخرجات التعلم للمادة الدراسية On completion of the course, student will be able to: 1. Express the concepts of signals and systems and their different types which can be used in a wide variety of disciplines in engineering. 2.			
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Fundamental Concepts of Signals & Systems - Introduction	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	Signals Classification	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Signals Operations & transformations	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	Classification of Systems - Interconnections of Systems 4	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	Linear Time Invariant Systems - Introduction	Interactive lecture and guided application	Quiz and assignment

Course Name: Signals and Systems					
Week 6	2 theoretical hours	A2, B2, C2	Properties of Continuous Time LTI System	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Signal convolution method - integral formula	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Mid-term Exam, Signal convolution	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	The Fourier Transform	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Properties of Continuous time Fourier Transform	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	Laplace Transformation	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	Filter Analysis and design (FIR & IIR)	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	Butterworth Analog Filters	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	Chebyshev Analog Filters	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	Analog Filters Examples	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Alan V. Oppenheim, Signals & Systems 2nd Edition, Pearson Education, 2008. Yes Recommended Texts Signals and Systems, Simon Haykin and Barry Van Veen, 2nd edition, Wiley 2005. yes		
Main references (sources)			Alan V. Oppenheim, Signals & Systems 2nd Edition, Pearson Education, 2008. Yes Recommended Texts Signals and Systems, Simon Haykin and Barry Van Veen, 2nd edition, Wiley 2005. yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.coursera.org/learn/signals-and-systems-fundamentals		

Image Processing

Course Name: Image Processing					
Course Code: IMPR 3105					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
6 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - ا.م.د. اروى عامر موسى - Email: - arwa.amir@aliraqia.edu.iq					
Course Objectives					
Course Objectives		This course provides a systematic foundation in Image Processing and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 2 laboratory hours	A1, B1, C1	• Fundamental Steps in Digital Image Processing. • Components Of an Image Processing System. • Image Sensing and Acquisition.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 2 laboratory hours	A1, B1, C1	• Image Sampling and Quantization. • Some Basic Relationships Between Pixels.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 2 laboratory hours	A1, B1, C1	• Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 2 laboratory hours	A1, B1, C1	• Spatial Domain methods: Basic grey level transformation – Histogram equalization.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours, 2 laboratory hours	A2, B2, C2	• Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters.	Interactive lecture and guided application	Quiz and assignment
Week 6	4 theoretical hours, 2 laboratory hours	A2, B2, C2	• Filtering In the Frequency Domain, Mid-Exam.	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Image Processing					
Week 7	4 theoretical hours, 2 laboratory hours	A2, B2, C2	• Image Restoration: Model of Image Degradation/restoration process – Noise models.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 2 laboratory hours	A2, B2, C2	• IMAGE SEGMENTATION AND REPRESENTATION: Edge detection – Thresholding - Region Based segmentation	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 2 laboratory hours	A3, B3, C3	• Morphological Image Processing: Dilation, Erosion.	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 2 laboratory hours	A3, B3, C3	• Morphological Image Processing: Opening, And Closing.	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 2 laboratory hours	A3, B3, C3	• Color Image Processing	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 2 laboratory hours	A3, B3, C3	• IMAGE COMPRESSION: Lossless compression: Variable length coding, LZW coding	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 2 laboratory hours	A4, B4, C4	• Computer vision applications: Autonomous vehicles, augmented reality, and surveillance systems.	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 2 laboratory hours	A4, B4, C4	• Applications of artificial intelligence in image processing.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 2 laboratory hours	A4, B4, C4	• Seminars (Student Work).	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Digital Image Processing, Rafael C. Gonzalez Third Edition Yes		
Main references (sources)			Digital Image Processing, Rafael C. Gonzalez Third Edition Yes		
Recommended books and references (scientific journals, reports, etc.)			Color Image Processing and Applications, K.N. Plataniotis and A.N. Venetsanopoulos, 2000 No		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Network Operating Systems

Course Name: Network Operating Systems					
Course Code: NEOS 3106					
Semester / Year: Third Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 75 hours of student workload / 3 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أ. م. د. أحمد يونس يوسف -					
Email: - ahmedyounusyousuf@aliraqia.edu.iq					
Course Objectives					
Course Objectives		أهداف المادة الدراسية At the end of the course the student knows the main technical problems and the related solution behind networking with reference to the Internet. The student can understand the functional principles of a network service and the related quality of service issues as well as the Internet protocol architecture and the main protocols. The student knows how to implement some basic network applications and can analyze protocol behavior, also, the learner should be able to: 1. Understand the concepts of Network Operating Systems – NOS 2. be able to identify and use main technologies related to the implementation of NOS components and comprehend related issues and new trends of			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Introduction 1. Defining Network Operating Systems 2. Types of NOSs 3. Characteristics Of NOSs 4. Components of NOSs 5. Usual working scenarios with NOSs 6. Unusual working scenarios for NOS 7. System Documentation	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	Distributed Systems 1. Defining Distributed systems 2. Type of Network – Base Operating Systems 3. Network Structure (LAN – WAN) 4. Communication Structure	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Processes & threads 1. Process Concept 2. Process Scheduling 3. Operations on Processes 4. Process and Threads 5. types of Threads 6. Multithreading Models	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	Preparing Working Environment and Installing Server 1. Preparing Working Environment 2. Installation Process 3. Installing	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Network Operating Systems					
			Server Hardware 4. SCSI Technique		
Week 5	2 theoretical hours	A2, B2, C2	RAID 1. Introduction 2. Basic Concepts of RAID 3. RAID Levels 4. Handling RAID Errors	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours	A2, B2, C2	Networking Environment for OS 1. Basic Principles of Computer Networks 2. Networks Typology 3. Layering Structure 4. Most Used Standards & Protocols	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Midterm + Resource allocation & deadlock 1. Resource Allocation Graph (RAG). 2. The Deadlock Problem 3. System Model 4. Deadlock Characterization 5. Methods for Handling Deadlocks 6. Deadlock Prevention 7. Deadlock Avoidance 8. Deadlock De	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Storage Area Networks – SANs 1. Network Storing Techniques 2. Network Area Storage – SAN 3. Fiber Channel Protocol – FCP 4. SAN over IP	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	Network Systems Security 1. Strategies of Building Secure Systems 2. Firewalls 3. OS Protection & Security 4. Intruders 5. Trusted Systems 6. Security in Distributed systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Processes and Process Synchronization models 1. Interposes communications. 2. Peterson solution	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	Message – and stream – Oriented communication 1. What is message and stream-oriented communication? 2. What is the difference between message and stream communication? 3. What are the different types of message-oriented communication?	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	I/O SYSTEMS 1. I/O Hardware 2. I/O port 3. I/O Devices 4. Polling 5. Interrupts 6. DMA 7. Buffering 8. Caching 9. Spooling	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	Distributed Middleware Common Object Request Broker Architecture (CORABA)	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	Memory management 1. Process Address Space (Symbolic addresses, Relative addresses, Physical addresses). 2. Static vs Dynamic Loading 3. Static vs Dynamic Linking 4. Swapping 5. Memory Allocation 6. Fragmentation (External fragmentation,	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	Backups 1. Data Repository 2. Storage Media 3. Selection & Extraction of Data 4. Backups Planning 5. Backups Solutions Using iSCSI Protocol in Backups	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					

Course Name: Network Operating Systems	
Required textbooks (curricular books, if any)	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free. Yes Recommended Texts Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commons
Main references (sources)	Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, (2018). Hard-copy and electronic editions are available; the PDF form is free. Yes Recommended Texts Jerome Saltzer, and M. Kaashoek. RES.6-004 Principles of Computer System Design: An Introduction. Spring 2009. Massachusetts Institute of Technology: MIT OpenCourseWare, License: Creative Commons
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Third Year / Second Semester Advanced Mathematics II

Course Name: Advanced Mathematics II					
Course Code: ADMA 3201					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 100 hours of student workload / 4 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أ.م.د. أحمد يونس يوسف					
Email: - ahmedyounusyousuf@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. Develop computational skills: Numerical analysis equips engineering students with skills to use and develop numerical methods, algorithms, and computational techniques for solving mathematical problems. This includes solving algebraic and transcendental equations, integration, differentiation, and differential equations, which are commonly encountered in engineering. 2. Understanding error analysis: Error analysis is crucial in numerical methods. Engineers need to understand the source of errors, how to minimize them, and how to estimate the error in a given solution. Understanding and managing numerical errors can make a significant difference in the reliability and accuracy of engineeri				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Literature review, errors , Roots finding (Bisection / Newton – Raphson) methods	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Roots finding (Secant / Fixed point) methods	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Curve Fitting : Introduction , Least square regression line	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Least square regression line : the best fit	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial	A2, B2, C2	Interpolation : Newton (Forwards , Backwards , divided differences)	Interactive lecture and	Quiz and assignment

Course Name: Advanced Mathematics II					
	hour(s)			guided application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Interpolation : Lagrange polynomial , Hermit interpolation	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Interpolation : Spline interpolation	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Numerical Differentiation	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Numerical Integration : (Trapezoidal , Simpson 1/3 , Simpson 3/8) rules	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Numerical Solutions of ODE's : Euler Method , Runge - Kutta Method	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Numerical Solutions of Linear Systems : Gauss – elimination	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Numerical Solutions of Linear Systems : Gauss – Seidel	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Numerical Solutions of Linear Systems : Jacobi method	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Term exam + tutorial	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1-Advanced engineering mathematics by Erwin Krizge yes Recommended Texts 1. Numerical methods by Babu Ram. 2. Applied mathematics journals, schaum series in numerical analysis no		
Main references (sources)			1-Advanced engineering mathematics by Erwin Krizge yes Recommended Texts 1. Numerical methods by Babu Ram. 2. Applied mathematics journals, schaum series in numerical analysis no		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Digital Signal Processing

Course Name: Digital Signal Processing					
Course Code: DISP 3202					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Mahmood Jalal Ahmad Email: - mahmood.j.ahmad@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The objective of this course is to develop an understanding of the basic ideas of the Digital Signal encountered in engineering. Focus will be on the methods for characterizing and analyzing Discrete-time signals and systems. Students will learn some transform techniques (Fourier transform, z-transform) that are useful for the understanding of Digital communication systems, Feedback control systems, Satellite and mobile communications, and Digital image processing. Module Learning Outcomes مخرجات التعلم لمادة الدراسية On completion of the course, student will be able to: 1. Understand the fundamentals of signal sampling. 2. Express the concepts of Discrete signals and systems and their dif			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Fundamental Concepts of Discrete Signals and Systems - Introduction	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	Sampling of continuous-time signals: the sampling theorem, Aliasing, Nyquist rate.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Discrete time signal types and operations on Discrete time signals.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	Discrete time system types and properties.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	Discrete time System Impulse response Evaluation	Interactive lecture and guided application	Quiz and assignment

Course Name: Digital Signal Processing					
Week 6	2 theoretical hours	A2, B2, C2	Discrete time System convolution (Graphical method, Table method, mathematical method) 4	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Mid-term Exam, Discrete time System convolution	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Introduction to Discrete Fourier transform and its properties	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	Discrete Fourier series (DFS)	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Fast Fourier Transform (FFT)	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	Introduction to Z-transform and its properties.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	Digital FIR Filter Analysis and design	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	Digital IIR Filter Analysis and design - Butterworth Analog Filters	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	Digital IIR Filter Analysis and design - Chebychev Analog Filters	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	Examples on Digital & Analog Filters	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall John G. Proakis, Dimitris K Manolakis., 1992. Yes Recommended Texts Discrete-Time Signal Processing by A. V. Oppenheim and R. W. Schaffer, 1999. yes		
Main references (sources)			Digital Signal Processing: Principles, Algorithms and Applications, Prentice Hall John G. Proakis, Dimitris K Manolakis., 1992. Yes Recommended Texts Discrete-Time Signal Processing by A. V. Oppenheim and R. W. Schaffer, 1999. yes		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.coursera.org/learn/ Digital signal processing		

Control Engineering

Course Name: Control Engineering					
Course Code: COEN 3203					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Israa Majeed Ali Email: - israa.m-alobaigy@aliraqia.edu.i					
Course Objectives					
Course Objectives	1. Introducing the basic principles, techniques and applications of modern control engineering. 2. Study methods for designing and analyzing modern control systems 3. To derive mathematical models of mechanical systems and electrical systems. 4. To predict the effects on the location of the closed-loop poles of varying the gain value in control systems. 5. To Design solutions based on modern control systems for realistic and engineering problems. 6. Use MATLAB to obtain responses of control systems to various inputs. Module Learning Outcomes 1. Introduction to control systems, includes examples and applications of control systems 2. State t				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction and examples of control systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Closed-Loop Versus Open-Loop Control systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Mathematical Modeling & Transfer Function	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Mathematical Modeling of Electrical Systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Mathematical Modeling of Mechanical Systems	Interactive lecture and guided application	Quiz and assignment

Course Name: Control Engineering					
Week 6	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Block Diagram Reduction	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Modeling in State Space	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Mid-exam & Modeling in State Space	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3	The Time Response Of First-Order Systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	The Time Response Of Second-Order Systems	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Transient and Steady-State Response Analyses	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Steady-State Errors	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Routh's Stability Criterion	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Root-Locus Plots	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Examples of Root-Locus Plots	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Modern Control Engineering" by Ogata K., 5th Edition. Control system engineering, N. S. Nise 6th edition. Yes Recommended Texts Linear Control System Analysis and Design By Dazzo 2nd ed. No		
Main references (sources)			Modern Control Engineering" by Ogata K., 5th Edition. Control system engineering, N. S. Nise 6th edition. Yes Recommended Texts Linear Control System Analysis and Design By Dazzo 2nd ed. No		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			https://www.mathworks.com/solutions/control-systems.html		

Antenna and Propagation

Course Name: Antenna and Propagation					
Course Code: ANPR 3204					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Ghassan Akram Abed Email: - ghassanakrem@yahoo.com					
Course Objectives					
Course Objectives	This course provides a systematic foundation in Antenna and Propagation and develops students' ability to analyze engineering problems, design appropriate solutions, implement them using modern tools, and evaluate performance in accordance with professional practice.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Introduction to Antenna and Propagation: Course overview, objectives, and expectations Basic concepts of electromagnetic waves 7 Introduction to antennas and their applications, types of antenna	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Radiation patterns of thin wire antenna Principles of antenna pattern and lobes, radiation intensity, directivity, gain (two dimension and three dimensions)	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1		Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours	A1, B1, C1	OMNI directional pattern Directional pattern antenna Antenna efficiency, bandwidth, polarization, input impedance, antenna and radiation efficiency, antenna equivalent area, Fraunhofer region and Fresnel region, antenna temperature.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2	A2, B2, C2		Interactive lecture and	Quiz and assignment

Course Name: Antenna and Propagation					
	laboratory hours			guided application	
Week 6	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Friis transmission equation Radar range equation Antenna Arrays Array configurations and radiation properties Array factors and pattern synthesis Beamforming techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2		Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Reflector antenna-microstrip antenna	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3		Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Electromagnetic wave propagation fundamentals, wave propagation in lossless medium, conductors and dielectric properties, wave propagation in conductor medium, wave propagation in good dielectric medium, wave propagation in good conductor m	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3		Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Depth of penetration, surface impedance, reflections and refractions of wave, wave length and phase velocity,	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4		Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Modes of wave propagations, sky wave and tropospheric modes, spectrum of EM wave and applications, ionospheric prorogation, propagation in variable index medium	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Fading wave, propagation over plane earth, Freznel zone.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Antenna Theory: Analysis and Design, Constantine A. Balanis Yes		
Main references (sources)			Antenna Theory: Analysis and Design, Constantine A. Balanis Yes		
Recommended books and references (scientific journals, reports, etc.)			Antennas and Wave Propagation, By G. S. N. Raju · 2006 No		
Electronic References and Websites			https://www.antenna-theory.com/		

Internet of Things

Course Name: Internet of Things					
Course Code: INTH 3205					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Doaa Subhi Mohammed Email: - doaasubhimohammed@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The Internet is evolving to connect people to physical things and physical things to other physical things all in real time. It's becoming the Internet of Things (IoT). The course enables the student to understand the basics of the Internet of Things and protocols. It introduces some of the application areas where the Internet of Things can be applied. Students will learn about middleware for the Internet of Things. To understand the concepts of the Web of Things In addition, The Internet of Things (IoT) is the network of physical objects in which microprocessors and wireless radios are embedded to intelligently serve people in a collaborative manner. In the future, IoT is expected to revolu			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	• Class Overview • Fundamentals of IoT: ▪ Introduction, Definitions & Characteristics of IoT ▪ IoT Architectures ▪ Physical & Logical Design of IoT	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	• Fundamentals of IoT (continued): ▪ Enabling Technologies in IoT ▪ History of IoT ▪ About Things in IoT ▪ The Identifiers in IoT ▪ About the Internet in IoT ▪ IoT frameworks ▪ IoT and M2M.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1	• IoT simulation Enviroment : ▪ Definition, Types of Sensors and Actuators, Examples, and Working ▪ IoT Development Boards: ▪ Arduino IDE and Board Types ▪ Raspberri Pi Development Kit ▪ RFID Principles and components • Intro to Course Proj	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory	A1, B1, C1	• IoT Node configuration and data processing: • Wireless Sensor Networks: ▪ History and Context ▪	Interactive lecture and guided	Classroom/laboratory activities

Course Name: Internet of Things					
	hours		The node, Connecting nodes, Networking Nodes. • WSN and IoT. 5	application	
Week 5	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Project Proposal Presentations	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 2 laboratory hours	A2, B2, C2	• IoT Networking and Communications Basics • Protocol Standardization for IoT • Efforts • M2M and WSN Protocols • SCADA and RFID Protocols	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2	• IoT Networking and Communications Basics (continued) : • Protocols: • IEEE802.15.4 • BACnet • Modbus • KNX • Zigbee • Network layer • APS layer	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	IoT System Energy Consumption	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3	• IOT ARCHITECTURE • IoT Open-source architecture (OIC) • OIC Architecture & Design principles • IoT Devices and deployment models	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	• IOT ARCHITECTURE (continued) • IoTivity: An Open source IoT stack • Overview • IoTivity stack architecture • Resource model and Abstraction.	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Monthly exam 6	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Security in IoT	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4	IOT APPLICATIONS • IoT applications for the industry • Future Factory Concepts • Brownfield IoT	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	IOT APPLICATIONS (continued) • Smart Objects • Smart Applications • Study of existing IoT platforms /middleware • IoT- A, Hydra etc.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Presentations and Final Project Demonstrations	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			• Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013 Yes 7 • Olivier Hersent, David Boswarthick, and Omar Elloumi, — “The Internet of Things: Key Applications and Protocols”, WileyPublications • “RASPBerry PI ASSEMBLER”, Roger Ferrer Ibanez, Cambridge, Cambridge		
Main references (sources)			• Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013 Yes 7 • Olivier Hersent, David Boswarthick, and Omar Elloumi, — “The Internet of Things: Key Applications and Protocols”, WileyPublications • “RASPBerry PI ASSEMBLER”, Roger Ferrer		

Course Name: Internet of Things	
	Ibanez, Cambridge, Cambridge
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	https://www.coursera.org/specializations/iot

Computer Network II

Course Name: Computer Network II					
Course Code: CONE 3206					
Semester / Year: Third Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
4 hours per week / 150 hours of student workload / 6 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أمجد رزاق حسين العباس - Email: - amjed.alabbas@aliraqia.edu.iq					
Course Objectives					
Course Objectives		This course studies the standard models for the layered approach to communication in a network, and the main characteristics of data transmission across various physical link types. It considers how to design networks and protocols for diverse situations, analyses several application and support protocols from a distributed systems viewpoint, and identifies significant problem areas in networked communications Module Learning Outcomes مخرجات التعلم للمادة الدراسية 1. Giving students a clear picture of how network applications are the raison of the computer network. 2. Understand and describe the layered model. 3. Conceptual, implementation aspects of network application protocols, furthermor			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Computer Networks and the Internet, A Services Description , Network Edge, handshaking protocol.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Access Networks, Access in the Enterprise (and the Home): Ethernet and Wi-Fi, Wide-Area Wireless Access: 3G and LTE Protocol Layers and Their Service Models, layered Architecture, Encapsulation.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours	A1, B1, C1	The Network Core, Packet Switching, Store-and-Forward Transmission, Queuing Delays and Packet Loss, Circuit Switching.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours	A1, B1, C1	Multiplexing in Circuit-Switched Networks frequency-division multiplexing (FDM) and time-division multiplexing (TDM).	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2	A2, B2, C2	Packet Switching Versus Circuit Switching, Delay, Loss, and	Interactive lecture and	Quiz and assignment

Course Name: Computer Network II					
	laboratory hours		Throughput in Packet-Switched Networks, Delay in Packet-Switched Networks	guided application	
Week 6	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Types of Delay, Processing Delay, Queuing Delay, Transmission Delay, Propagation Delay, Queuing Delay and Packet Loss, Packet Loss, End-to-End Delay, Throughput in Computer Networks	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Midterm + Application-Layer Protocols, round-trip time (RTT) RTT , HTTP Message Format , HTTP Request Message HTTP Response Message , The Conditional GET and POST methods	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours	A2, B2, C2	Transport Services Provided by the Internet, TCP Services, UDP Services, Overview OF DNS. 5	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours	A3, B3, C3	User-Server Interaction: Cookies, Web and HTTP, Web Caching, Web Server, Web Proxy, Bottleneck between an institutional network and the Internet.	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Introduction and Transport-Layer Services, Relationship Between Transport and Network Layers, TCP Segment Structure, UDP Segment Structure, Principles of Reliable Data Transfer, Reliable Data Transfer over a Perfectly Reliable Channel: rdt1	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Relationship Between Transport and Network Layers, Connectionless Transport: UDP, Segment Structure, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol . Principles of Congestion Control	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours	A3, B3, C3	Network Service Models, Virtual Circuit and Datagram Networks, Datagram Networks, What's Inside a Router , The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IP Datagram Fragmentation, IPv4 and IPv6 Addresses	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours	A4, B4, C4	The Link Layer: Links, Access Networks, and LANs, The Services Provided by the Link Layer, Where Is the Link Layer Implemented?, Ethernet, Ethernet Frame Structure, Ethernet Technologies, Link-Layer Switches, Forwarding and Filtering, Switch	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Wireless and Mobile Networks Introduction, The 802.11 Architecture, Wireless Links and Network Characteristics, Code division multiple access (CDMA), The IEEE 802.11 Frame ,The 802.11 MAC Protocol	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours	A4, B4, C4	Wireless LANs, Dealing with Hidden Terminals: RTS and CTS, Cellular Network Architecture, 2G: Voice Connections to the Telephone Network, Radio Access Network, Mobility Management: Principles, Routing Calls to a Mobile User,	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Computer Network II					
			Handoffs in GSM		
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Computer Networking: A Top-Down Approach., this reference has been adopted for use at many hundreds of colleges and universities, translated into 14 languages, and used by over one hundred thousand students and practitioners worldwide. And it has been adopted as a source. Yes 6 Recommended Texts none		
Main references (sources)			Computer Networking: A Top-Down Approach., this reference has been adopted for use at many hundreds of colleges and universities, translated into 14 languages, and used by over one hundred thousand students and practitioners worldwide. And it has been adopted as a source. Yes 6 Recommended Texts none		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			Computer Networking: A Top-down Approach - James F. Kurose, Keith W. Ross - Google Books		

LEVEL FOUR

Fourth Year / First Semester Soft Computing I

Course Name: Soft Computing I					
Course Code: NE-411					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
5 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Yousif Hosain Dakhil Email: - yousif.h@aliraqia.edu.iq					
Course Objectives					
Course Objectives	The objectives of this course are to: - Introduce the basic principles, techniques and applications of soft computing. - Study the concepts and algorithms involved in neural networks. - Explain Artificial Neural Networks and its categories. - Design NN based solutions for real-world and engineering problems. - Apply and analyze various neural network architectures and learning rules.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to Soft Computing	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Concept exploration of Neural networks, Genetic algorithm and Fuzzy logic	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Biological and artificial neurons, classifications of artificial neural networks	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Types of NN Activation Functions and Neuron response calculation	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 2	A2, B2, C2	NN Learning Algorithms and Decision Boundary	Interactive lecture and	Quiz and assignment

Course Name: Soft Computing I					
	laboratory hours, 1 tutorial hour(s)			guided application	
Week 6	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Hebbian, Perceptron and Delta Learning Rules	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Back Propagation NN	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Mid-course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Hopfield Network	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Bidirectional Associative Memory (BAM) NN	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Adaline Neural Network	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Kohonen Network	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Self-organizing Network, Adaptive Resonance Theory (ART)	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Hybrid approaches (neural networks, fuzzy logic, genetic algorithms sets).	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Case Studies and applications	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1- Aliev,R.A, Aliev,R.R., Soft Computing and its Application, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4700-1 2- Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook, Springer, 1st Edition, 2018, ISBN-13 : 978-3319944623 3- S.N. Sivanandam& S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 20		
Main references (sources)			1- Aliev,R.A, Aliev,R.R., Soft Computing and its Application, World Scientific Publishing Co. Pte. Ltd., 2001, ISBN 981-02-4700-1 2- Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook, Springer, 1st Edition, 2018, ISBN-13 : 978-3319944623 3- S.N.		

Course Name: Soft Computing I	
	Sivanandam& S.N. Deepa, Principles of Soft Computing, Wiley Publications, 2nd Edition, 20
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Internet Programming

Course Name: Internet Programming					
Course Code: NE-412					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - حسن فلاح حسن					
Email: - Hassan.falah@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course provides students the opportunity to: 1. Present the student with basic web design knowledge. 2. Provide the student with techniques required to create interactive web applications. 3.Familiarize the student with how relational database servers, such as MySql and Oracle, can be used to power a web based application. 4. Introduce students to TCP/IP networking concepts and the creation of client/server applications. 5. Familiarize the student with the creation of Java applications and Applets.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to HTML : Introduction to Internet programming, HTML language, Description and running through IE, How to write codes in HTML?, Headings, titles. The body in HTML language, background colors, pages and breaks	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Lists & Tables in HTML language : Ordered list and unordered list, creating table, table attributes and features	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Images : Images , Combining paragraphs with table and images.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Forms in HTML I : Command buttons, Textboxes and text areas, Checkboxes and radio buttons.	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial	A2, B2, C2	Forms in HTML II : Select lists in Forms, combining Forms with	Interactive lecture and	Quiz and assignment

Course Name: Internet Programming					
	hour(s)		images and tables, Introduction to dynamic programming, client side versus server side	guided application	
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Client-Side Programming and Server-Side Programming : Client-Side Programming and Server- Side Programming, JavaScript, What is JavaScript, What JavaScript can do?, What JavaScript can't do?, The Script Tag, Handling older browsers, JavaScr	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Arithmetic Operators : Arithmetic operators, Comparison operators, Examples and solutions Control Structures (if statement, if-else statement), Loops (for loop), Functions, Function parameters	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Variable scope in JavaScript : Variable scope in JavaScript, Test-1 : JavaScript variables, loops and decisions. Arrays, creating, assignment and accessing array data, Document object in arrays, examples and solutions	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Window and Document objects : Window and Document objects, the window object, creating window, properties and methods: window.status, window.alert, window.confirm, window.prompt The location object, the history object, the document object,	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Forms and Form elements : Forms and Form elements, creating a form, form properties, text object, button object, checkbox object, Radio object, Select object, Passing form data to functions, Submitting forms, Strings, Math and Date, Example	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Images and dynamic HTML : Images and dynamic HTML, the image object, interchanging images, prechaching images, creating image rollover, Examples and solutions. The String object (in detail), Examples and solutions	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	The events: The event object, Event handler, Event properties, Window event-handler, layer event handler, mouse event handler, other event handlers	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Global functions: Global functions and statements, eval(), escape(), isNaN(), number(), parseFloat(), parseInt(), string(), unescape(), unwatch(), watch()	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Data-Entry : Data-Entry validation, isEmpty(), isNumber(), isInteger(), isPosInteger Test 3: Images, Strings, and Global functions String : The String object, Examples and solutions	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					

Course Name: Internet Programming	
Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The Complete Internet and World Wide Web Programming Training course Author : Harry M.Deitel, Paul J. Deitel, Tom Nieto ,Edition & Year public : Prentice Hall PTR,2000
Main references (sources)	The Complete Internet and World Wide Web Programming Training course Author : Harry M.Deitel, Paul J. Deitel, Tom Nieto ,Edition & Year public : Prentice Hall PTR,2000
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Parallel Processing

Course Name: Parallel Processing					
Course Code: NE-413					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - أمجد رزاق حسين العباس - Email: - amjed.alabbas@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course will center on making students experts in using various forms of commodity-based parallel processing. The lectures will focus on the architectural and implementation details, and algorithms and programming methods, needed to obtain good performance from these systems. Entering students are expected to be comfortable writing C programs and to have had some exposure to the basic concepts of computer architecture.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction, Parallel architectures	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Parallel algorithm design.	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Shared memory programming	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Message passing programming	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Combining MPI and OpenMP, Debugging MPI programs	Interactive lecture and guided application	Quiz and assignment

Course Name: Parallel Processing					
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Floyd's algorithm	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Performance analysis	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Matrix-vector multiplication	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Matrix multiplication, Finite difference methods	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Sorting	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Combinatorial search,	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	External memory sorting	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Heterogeneous architectures	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Load balancing	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Information Theory and Coding

Course Name: Information Theory and Coding					
Course Code: NE-414					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - م.م. دعاء صبحي -					
Email: - doaasubhimohammed@aliraqia.edu.iq					
Course Objectives					
Course Objectives		At the end of the course, the student will be able to understand the amount of information, entropy, channel capacity, source coding.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Random variables: discrete and continuous random variable.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Channel capacity e Mid-course Exam	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	.3 Shannon code, Shannon fano code and Huffman code. . .	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1		Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Information Theory and Coding practical applications	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Information Theory and Coding fundamentals	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Information Theory and Coding					
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Information Theory and Coding concepts and terminology	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Information Theory and Coding analysis methods	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Information Theory and Coding design techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Information Theory and Coding practical applications	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3		Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Information Theory and Coding concepts and terminology	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Information Theory and Coding analysis methods	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Information Theory and Coding design techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Information Theory and Coding practical applications	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Network Protocols

Course Name: Network Protocols					
Course Code: NE-415					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
7 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Dr. Satea hikmat alnajjar Email: - Dr.satea@aliraqia.edu.iq					
Course Objectives					
Course Objectives		At the completion of the course the student will be able to: Explain the basics of current computer networking protocols. Write simple programs for network communication.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Network Models and Network Architectures, Protocol Design Issues, Transmission and Multiplexing	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Design and Analysis of Link Level Protocols Protocol Functionality, Layering and Framework (SP3)	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	LAN Design, Architectures and Protocols (802.xx) LAN Implementation, Ethernet Switching	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A1, B1, C1	Internet Protocol (IP) Design, Internet Addressing IETF and the Internet Standards Process	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	WAN Protocols and Network Architecture IP Protocol Implementation, VLANs	Interactive lecture and guided application	Quiz and assignment

Course Name: Network Protocols					
Week 6	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Internetworking and Routing	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Transport Layer Protocol Design TCP/UDP Analysis and Implementation	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A2, B2, C2	Application Protocols: Email, FTP, Telnet and HTTP	Interactive lecture and guided application	Mid-semester examination
Week 9	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Network Security –I	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Network Security –II Wireless Networks	Interactive lecture and guided application	Quiz and assignment
Week 11	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	Broadband Network Design Issues Internet Backbone Network Architecture	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A3, B3, C3	IP Telephony and Internet Video H.323 and SIP	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Network Management Functions and Protocols Network Quality of Service (QoS)	Interactive lecture and guided application	Quiz and assignment
Week 14	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Network Models and Network Architectures, Protocol Design Issues, Transmission and Multiplexing	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	4 theoretical hours, 2 laboratory hours, 1 tutorial hour(s)	A4, B4, C4	Design and Analysis of Link Level Protocols Protocol Functionality, Layering and Framework (SP3)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Queueing Theory and Systems

Course Name: Queueing Theory and Systems					
Course Code: NE-416					
Semester / Year: Fourth Year / First Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Mays Afif Majeed Email: - mays.a.mjeed@aliraqia.edu.iq					
Course Objectives					
Course Objectives	This course aims to prepare students with a good mathematical background in order to formally analyze the performance of various designs in computer systems and networks. Being able to analyze a design before it is physically implemented, or even after the implemented system starts its operation, has been proved to be an important ability for system designers. As computer systems and networks can be modeled as queueing systems, queueing theory serves as the key for performance analysis work.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction to IP traffic, TCP/IP architecture model, Aspect of IP modeling, Quality of Service	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Classical Traffic Theory – I Kendall notations, Kolmogorov Equation, transition process, Markov system M/M/n	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Classical Traffic Theory – II Transition process, Markov system M/M/n	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Special traffic models, Loss system M/M/∞	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Renewal Processes	Interactive lecture and guided application	Quiz and assignment

Course Name: Queueing Theory and Systems					
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	General Poisson Arrival and Serving Systems M/G/n	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	General Serving Systems GI/G/n	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Network Models, Jackson's Network, Riemann Solvers	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Mathematical Modeling of IP-based Traffic, Scale-free Traffic Observation, Self-Similar Processes,	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Models for Time Sensitive Traffic	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Fractional Levy Motion in IP-based Network Traffic	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Performance of IP: Waiting Queues and Optimization - I	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Classical Traffic Theory – I Kendall notations, Kolmogorov Equation, transition process, Markov system M/M/n	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Queueing in Multifractal Traffic – I	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Queueing in Multifractal Traffic - II	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Fourth Year / Second Semester Soft Computing II

Course Name: Soft Computing II					
Course Code: NE-421					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - م . م يوسف حسين داخل					
Email: - yousif.h@aliraqia.edu.iq					
Course Objectives					
Course Objectives	The objectives of this course are to: - Study the concepts and algorithms involved in evolutionary computation (Genetic algorithm and Genetic Programming) and fuzzy logic. - Apply genetic algorithms to provide solutions to real world problems. - Identify crisp and fuzzy sets theories. - Introduce fuzzy systems and its applications. - Apply Fuzzy rules in the design process of various fuzzy systems. - Describe soft computing techniques and their roles in building intelligent machines.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Soft Computing Core Components – A Review	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Genetic Algorithms (GA) concept and algorithm	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Chromosome encoding and selection techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	GA operators and their types	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Applied Examples using GA	Interactive lecture and guided application	Quiz and assignment

Course Name: Soft Computing II					
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Genetic Programming	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Concepts of fuzzy logic	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Basic elements of fuzzy system	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Universe of discourse, and crisp and fuzzy sets definitions	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Types of fuzzy membership functions	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Fuzzy Relations	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Fuzzy Projections and decompositions	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Fuzzy Rules and Algorithm	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Case studies and applications	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			1- J. Fodor and R. Fuller (Eds.). Advances in Soft Computing, Intelligent Robotics and Control. Springer, 2014 2- F. O. Karray and C. W. Silva. Soft Computing and Intelligent Systems Design: Theory, Tools and Applications. 1st Edition Addison-Wesley, 2004. 3- Alan Casey, Soft Computing: Developments, Methods and Applications, Nova Science Publisher		
Main references (sources)			1- J. Fodor and R. Fuller (Eds.). Advances in Soft Computing, Intelligent Robotics and Control. Springer, 2014 2- F. O. Karray and C. W. Silva. Soft Computing and Intelligent Systems Design: Theory, Tools and Applications. 1st Edition Addison-Wesley, 2004. 3- Alan Casey, Soft Computing: Developments, Methods and Applications, Nova Science Publisher		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Mobile Communication

Course Name: Mobile Communication					
Course Code: NE-422					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
2 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Israa Majeed Ali Email: - israa.m-alobaigy@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The primary objectives of this course are to: - Understand the fundamentals of wireless communications. - Define the types of cellular systems and cellular wireless networks. - Identify the requirements and limitations of 2G, 2.5G and 3G wireless mobile communication. - Design the architecture of various wireless telecommunication systems. - Analyze (TDMA/FDMA/CDMA) system according to the complexity, installation cost, speed of transmission, channel properties etc.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours	A1, B1, C1	Analog Communication Systems – A review	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours	A1, B1, C1	Digital Communication Systems – A review	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours	A1, B1, C1	Wireless Transmission: Signals and antennas types	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours	A1, B1, C1	Wireless Transmission: Signals propagation and multiplexing techniques	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours	A2, B2, C2	Cellular Systems	Interactive lecture and guided application	Quiz and assignment

Course Name: Mobile Communication					
Week 6	2 theoretical hours	A2, B2, C2	Types and characteristics of cellular systems handoff	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours	A2, B2, C2	Cellular Wireless Networks	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours	A3, B3, C3	GSM-architecture (2G)	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours	A3, B3, C3	Mobility management and handover security	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours	A3, B3, C3	GSM and SMS	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours	A3, B3, C3	VoIP service for Mobile Networks	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours	A4, B4, C4	GPRS (2.5G) Architecture and procedures	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours	A4, B4, C4	UMTS (3G) system architecture and UMTS radio	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours	A4, B4, C4	UTRA Network (UTRAN)	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Schiller, Mobile Communication, 2003		
Main references (sources)			Schiller, Mobile Communication, 2003		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Wireless Sensor Networks

Course Name: Wireless Sensor Networks					
Course Code: NE-423					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Doaa Subhi Mohammed Email: - doaasubhimohammed@aliraqia.edu.iq					
Course Objectives					
Course Objectives		The primary objectives of this course are to: - Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of wireless sensor networks, - Get in-depth hands-on experience in designing and developing a real operational embedded network system, and - Design and develop foundational systems software, sensor-actuator-controller algorithms and network protocols.			
Teaching and Learning Strategies					
Strategy		A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.			
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction : WSN and Applications	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	The FireFly platform, LAB	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Sensor Platforms and Tools	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Sensors, physical Layer 1 LAB	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Physical Layer-2, Medium Access Control	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Routing, Clock Synchronization	Interactive lecture and guided	Classroom/laboratory activities

Course Name: Wireless Sensor Networks					
				application	
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Power Management, Sensor Operating Systems	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Security	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Topology Control	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Programming abstractions.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Data Dissemination	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Storage	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Mobility and Distributed Control	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Sensor Network Simulation	Interactive lecture and guided application	Classroom/laboratory activities

Course Assessment

The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.

Learning and Teaching Resources

Required textbooks (curricular books, if any)	Edgar H. Callaway Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols", Auerbach, ISBN 0849318238, 360 pages, 2003
Main references (sources)	Edgar H. Callaway Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols", Auerbach, ISBN 0849318238, 360 pages, 2003
Recommended books and references (scientific journals, reports, etc.)	Relevant peer-reviewed books, standards, journal articles, and technical reports.
Electronic References and Websites	IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.

Network Security

Course Name: Network Security					
Course Code: NE-424					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - Dr. Satea hikmat alnajjar Email: - Dr.satea@aliraqia.edu.iq					
Course Objectives					
Course Objectives	1. Understand security concepts, Ethics in Network Security. 2. Understand security threats, and the security services and mechanisms to counter them. 3. Comprehend and apply relevant cryptographic techniques 4.Comprehend security services and mechanisms in the network protocol stack 5. Comprehend and apply authentication services and mechanisms 6. Comprehend and apply relevant protocol like SSL, SSH etc. 7.Comprehend and apply email security services and mechanisms 8. Comprehend and apply web security services and mechanisms 9. Comprehend computer and network access control				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction: computer security, network security, internet security, the OSI security architecture, security attacks, Security Services, Mechanisms, Model for network security.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Authentication Applications, Kerberos, Kerberos Realms, X.509 Authentication Service, X.509 Certificates	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	public key infrastructure, CA Hierarchy, Certificate Revocation, Certificate Extensions	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Electronic Mail Security, Pretty Good Privacy (PGP), PGP Operation, and Compression,	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	PGP Session Keys, PGP Key Rings, S/MIME (Secure/Multipurpose Internet Mail Extensions), S/MIME Certificate Processing, Certificate	Interactive lecture and guided application	Quiz and assignment

Course Name: Network Security					
			Authorities		
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	IP security, IPSec, IPSec Architecture, Authentication Header (AH), Encapsulating Security Payload (ESP)	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	combining security associations, Key management, Oakley, ISAKMP,	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Web security, SSL Architecture, SSL Record Protocol, SSL Handshake Protocol, TLS (Transport Layer Security), Secure Electronic Transactions (SET), Payment Gateway Authorization	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Intrusion, intrusion techniques, intrusion detection, rule based intrusion detection, distributed intrusion detection	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	password management, honey pots, managing passwords.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Malicious software, types, structure,	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	E-mail viruses, virus countermeasures, antivirus technology, denial of service.	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Firewall, design principles, packet filters, stateful packet filters, gateway, proxy, bastion host, configuration, trusted systems.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Reference model, IT security evaluating.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Network Management

Course Name: Network Management					
Course Code: NE-425					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - يوسف حسين داخل					
Email: - yousif.h@aliraqia.edu.iq					
Course Objectives					
Course Objectives	: Given the ever growing difficulty of managing networks it is important for individuals interested in network administration to obtain the ability to develop tools that can assist with common network management tasks, or extend upon existing management solutions to meet organizational needs not being adequately addressed. The primary purpose of this course is to provide students with fundamental network management principles, and to teach them introductory programming techniques for use with solving common network management problems. Week No. Topics 1 Introduction : Introduction to Network Management, Documenting the network, & Managing Network Users. 2 Active Directory 1: Creating New Use				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction : Introduction to Network Management, Documenting the network, & Managing Network Users.	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Active Directory 1: Creating New Users, Setting Users Properties, resetting User Passwords, Enabling & Disabling User accounts	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Active Directory 2 : Deleting Users, Working with Groups, Creating a Logon Script.	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Network Storage : Permissions, Shares, & File server role	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Network Storage : Bottleneck definition, Common Network Bottlenecks, Tuning the Network for the most Compulsive way.	Interactive lecture and guided application	Quiz and assignment

Course Name: Network Management					
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Network Performance Monitoring : Monitoring Network Performance, Creating Performance logs, & Performance tips.	Interactive lecture and guided application	Classroom/laboratory activities
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Solving Network Problems : Network Connection checking, error messages, & event logging.	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-Course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Data Backup 1: Data Backup, Tapes & tape drives, Backup Software, & Types of Backup. Data Backup 1: Local & Network Backups, Backup Security	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Securing Network : Security Approaches, Physical Security, Securing User accounts.	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Network Hardening I : Firewall types, Built in firewall in OS, & Virus Protection.	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Network Hardening II : Virus Protection.	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Network Mistakes : Important files deletion, Safe Server Backup, Wireless AP.	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Networking with Linux : Linus Distributions, installation, GNOME, User Accounts Management, User Configuration.	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Networking with MAC : Macintosh Network,	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Network Management: Concepts and Practice, A Hands-On Approach, J. Richard Burke, Prentice Hall, May 2003, ISBN-13: 978-0130329509 Subject : Networks Management Theoretical Hrs. per week: 2 Code : NE-425 Applied Hrs. per week : 0 Year : Fourth Tutorial Hrs. per week : 1 Semester: Second Total Hrs. per week : 3		
Main references (sources)			Network Management: Concepts and Practice, A Hands-On Approach, J. Richard Burke, Prentice Hall, May 2003, ISBN-13: 978-0130329509 Subject : Networks Management Theoretical Hrs. per week: 2 Code : NE-425 Applied Hrs. per week : 0 Year : Fourth Tutorial Hrs. per week : 1 Semester: Second Total Hrs. per week : 3		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		

Digital Communication

Course Name: Digital Communication					
Course Code: NE-426					
Semester / Year: Fourth Year / Second Semester \ 2025-2026					
Description Preparation Date: 01/10/2025					
Available Attendance Forms: In-person classroom and laboratory attendance					
Number of Credit Hours (Total) / Number of Units (Total)					
3 hours per week / 50 hours of student workload / 2 ECTS credits					
Course administrator's name (mention all, if more than one name)					
Name: - م.م. اسراء مجيد علي -					
Email: - israa.m-alobaigy@aliraqia.edu.iq					
Course Objectives					
Course Objectives	The content of "Digital Communication Systems" represents the basic knowledge necessary for sampling, encoding, transmitting, receiving, decoding and conversion of digital information using today's digital communication technologies.				
Teaching and Learning Strategies					
Strategy	A. Cognitive objectives: Understand the course principles, models, terminology, and their relationships; analyze engineering problems and select appropriate methods. B. Skills objectives: Use relevant tools, software, and laboratory equipment; design, implement, test, and document engineering solutions. Teaching uses interactive lectures, guided problem solving, problem- and project-based learning, laboratory exercises, assignments, quizzes, and collaborative work.				
Course Structure					
Course Structure: Academic Year 2025-2026					
Week	Hours	Required Learning Outcomes	Unit / Topic Title	Teaching Method	Assessment Method
Week 1	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Introduction, preliminaries, complex baseband representation	Interactive lecture and guided application	Classroom/laboratory activities
Week 2	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Random processes, linear modulation, differential modulation	Interactive lecture and guided application	Classroom/laboratory activities
Week 3	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Gaussian basics, hypothesis testing	Interactive lecture and guided application	Classroom/laboratory activities
Week 4	2 theoretical hours, 1 tutorial hour(s)	A1, B1, C1	Signal space concepts	Interactive lecture and guided application	Classroom/laboratory activities
Week 5	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Optimal detection, performance analysis	Interactive lecture and guided application	Quiz and assignment
Week 6	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Performance analysis, link budget analysis	Interactive lecture and guided application	Classroom/laboratory activities

Course Name: Digital Communication					
Week 7	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Receiver requirements, parameter estimation	Interactive lecture and guided application	Classroom/laboratory activities
Week 8	2 theoretical hours, 1 tutorial hour(s)	A2, B2, C2	Mid-course Exam	Interactive lecture and guided application	Mid-semester examination
Week 9	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Non-coherent communication, performance analysis	Interactive lecture and guided application	Classroom/laboratory activities
Week 10	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Channel capacity, Shannon theory	Interactive lecture and guided application	Quiz and assignment
Week 11	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Channel capacity, optimization	Interactive lecture and guided application	Classroom/laboratory activities
Week 12	2 theoretical hours, 1 tutorial hour(s)	A3, B3, C3	Introduction to coding, block codes, convolutional codes	Interactive lecture and guided application	Classroom/laboratory activities
Week 13	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Viterbi decoding, performance analysis	Interactive lecture and guided application	Quiz and assignment
Week 14	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Industry lecture, TBA [Handouts]	Interactive lecture and guided application	Classroom/laboratory activities
Week 15	2 theoretical hours, 1 tutorial hour(s)	A4, B4, C4	Course summary and recap.	Interactive lecture and guided application	Classroom/laboratory activities
Course Assessment					
The final grade is distributed across quizzes, assignments, classroom and laboratory activities, projects, the mid-semester examination, and the final examination in alignment with the intended learning outcomes.					
Learning and Teaching Resources					
Required textbooks (curricular books, if any)			Department-approved textbooks and course notes.		
Main references (sources)			Department-approved textbooks and course notes.		
Recommended books and references (scientific journals, reports, etc.)			Relevant peer-reviewed books, standards, journal articles, and technical reports.		
Electronic References and Websites			IEEE Xplore, ScienceDirect, Cisco Networking Academy, and department-approved digital learning resources.		