Ministry of Higher Education and Scientific Research
Scientific Supervision and Evaluation Authority

Department of Quality Assurance and Academic Accreditation
Department of Accreditation

Academic Program Specification

2026-2025

Academic Program Specification Template

University Name: Al-Farabi University

College / Institute: College of Engineering

Academic Department: Department of Computer Engineering

Academic or Professional Program: Bachelor's Degree in Computer Engineering

Final Degree Certificate: Bachelor's Degree in Computer Engineering

Academic System: Bologna Process + Annual System

Date of Preparation of the Program Description:

Date of Completion of the Form:

Signature

Name of the Head of Department

18/8/2026

Date

Signature

Prof. Dr. Bahjat R. Shahin

Name of the Assistant Head of Department for Scientific Affairs

Date 18/8/2026

Approval of the Dean

Date 31/8/2026

Reviewed by the Quality Assurance Division

Quality Assurance and University Performance Division

31/8/2026

1. Program Vision
To achieve leadership and excellence in engineering education and applied scientific research in the fields of computer engineering, in line with technological and global advancements, while actively contributing to building a knowledge-based society and addressing the requirements of sustainable development

1. Program Mission
To equip students with a solid knowledge base and fundamental scientific and mathematical theories underpinning computer engineering, while developing their skills in designing, developing, and analyzing intelligent systems and software. The program seeks to systematically integrate theoretical foundations with advanced practical applications to provide society and the technology sector with qualified engineers who possess competitive future-oriented skills

1. Program Objectives
1- To graduate engineers capable of designing, analyzing, and developing computer systems and networks, with a strong emphasis on practical and applied aspects. **2- To continuously develop and update the curriculum in line with scientific advancements across various fields of specialization and the requirements of the labor market, through the use of modern teaching methods and equipment, while adhering to quality assurance and academic accreditation standards.** **3- To establish productive academic relationships with Computer Engineering departments at various universities by organizing seminars, scientific conferences, and workshops in collaboration with other colleges, government institutions, and the private sector, with the aim of addressing challenges and contributing to the development of their operations.** **4- To prepare and qualify highly competent engineering professionals with advanced levels of understanding, knowledge, and professional skills, capable of designing, analyzing, developing, and implementing computer systems** **5- To motivate and encourage students to embrace the concept of self- . development, foster self-motivation, and pursue the acquisition and understanding of**

the knowledge and skills necessary for success in their future professional endeavors

6. **To cover a broad range of Computer Engineering fields, including integrated circuit design, system software, computer networks, intelligent systems, artificial intelligence, and operating systems.**
7. **To foster a culture of scientific research among students and faculty members, with the aim of deepening knowledge and contributing to the resolution of societal and industrial challenges.**
8. **To ensure continuous monitoring and evaluation to meet academic accreditation requirements and enhance contributions to sustainable development projects.**

Learning Outcomes

The educational program learning outcomes in the field of engineering, as established by the **Iraqi Council for Engineering Education**, require graduates to be able to:

GO1: The ability to identify, define, formulate, and solve engineering problems by applying principles of science, mathematics, and engineering.

GO2: The ability to develop new engineering designs that meet various needs, including health and safety, environmental, economic, and social considerations.

GO3: The ability to conduct appropriate experiments and analyses with a high level of quality, analyze and interpret the resulting data, and apply sound engineering judgment to draw accurate and valid conclusions.

GO4: The ability to communicate effectively through various means with individuals, groups, the public, and different administrative levels, depending on the requirements and circumstances.

GO5: An understanding of ethical and professional responsibilities within engineering contexts, while taking into consideration environmental, economic, and social consequences.

GO6: The ability to engage in continuous learning and continuously develop professional knowledge and skills.

GO7: The ability to work collaboratively as part of an integrated team toward common objectives and within specified schedules, ensuring the quality of work and adherence to deadlines.

Alignment of Learning Outcomes with the Educational Objectives of the Program

Alignment with the Program Educational Objectives	Learning Outcome (GOs)	Code
1,2,5	**The ability to identify, define, formulate, and solve engineering problems by applying principles of science, mathematics, and engineering.**	GO1
1,2,6	**The ability to develop new engineering designs that meet diverse needs, including health and safety, environmental, economic, and social considerations.**	GO2
2,6,8	**The ability to conduct appropriate experiments and analyses with a high level of quality, analyze and interpret the resulting data, and apply sound engineering judgment to draw accurate and valid conclusions.**	GO3
3,8	**The ability to communicate effectively through various means with individuals, groups, the public, and different administrative levels, depending on the requirements and circumstances.**	GO4
5,7	**The ability to recognize ethical and professional responsibilities in engineering contexts, while considering environmental, economic, and social consequences.**	GO5
4,5,6,7	**The ability to engage in continuous learning and continuously develop professional knowledge and skills.**	GO6
4,5,6,7,8	**The ability to work effectively as part of an integrated team toward common objectives and within defined timelines, ensuring the quality of work and adherence to deadlines.**	GO7

1. Program Accreditation
Has the Program Obtained Program Accreditation? If So, From Which Accrediting Body? The program has not yet obtained program accreditation. However, an application for program accreditation has been submitted through a **Readiness Review** prepared in accordance with the requirements of the **Iraqi Council for Accreditation of Engineering Education (ICAEE)**, as part of the process toward obtaining formal accreditation.

1. Other External Influences
Is There a Sponsoring Organization for the Program? The program is subject to the requirements of the national standards of the **Iraqi Council for Accreditation of Engineering Education (ICAEE)**.

1. Program Structure				
Remarks*	**Percentage**	**Credit Unit**	**Number of Courses**	**Program Structure**
Compulsory	**7%**	**13**	**7**	**Institutional Requirements**
Compulsory	**4%**	**8**	**2**	**College Requirements**
Compulsory or Elective	**89%**	**159**	**28**	**Department Requirements**
Compulsory	**–**	**–**	**1**	**Summer Training**
				Others

- **Remarks may indicate whether the course is compulsory or elective.**

1. Program Description				
Credit Hours		**Course Name**	**Course Code**	**Year / Level**
Practical	**Theoretical**			
-	3	**Mathematics I**	**COE101**	**Level One / First Semester**
2	2	**Introduction to Computer Engineering**	**COE102**	
2	3	**Programming Methodology**	**COE103**	
2	3	**Electrical Circuits**	**COE104**	
2	3	**Boolean Algebra**	**COE105**	
-	2	**Democracy and Human Rights**	**UOB104**	

-	2	English Languages	UOB102	
-	3	Mathematics II	COE115	Level One / Second Semester
2	3	Logic Circuit Design	COE107	
2	3	Computer Programming	COE108	
2	3	Electrical Circuits and Systems	COE109	
2	3	Semiconductor Physics	COE110	
-	2	Arabic Language I	UOB101	
2	3	Microprocessor I	COE201	Level Two / Third Semester
-	3	Engineering Mathematics	COE225	
2	3	Digital Circuit Design	COE203	
2	3	Object-Oriented Programming (OOP)	COE204	
-	2	Arabic Language II	UOB201	
-	2	Crimes of the Ba'ath Regime in Iraq	UOB105	
2	3	Digital Systems Design	COE205	Level Two / Fourth Semester
-	3	Engineering Analysis	COE206	
2	3	Data Structures and Algorithms	COE207	
2	3	Computer Architecture I	COE208	
2	3	Electronic Circuits	COE209	
-	2	English Language II	UOB202	
2	3	Communication Systems	COE301	Level Three / Fifth Semester
-	3	Digital Signal Processing (DSP)	COE302	
2	3	Computer Networks I	COE303	

2	3	Operating Systems	COE304	
2	3	Mathematical Modeling and Simulation	COE305	
2	3	Microprocessor II	COE306	
-	3	Artificial Intelligence and Its Applications	COE307	Level Three / Sixth Semester
-	3	Project Development and Engineering Ethics	COE308	
2	3	Data base	COE309	
	3	Image Processing	COE310	
2	3	Computer Networks II	COE311	
2	3	Mathematical Modeling and Control Systems	COE312	
2	3	Internet Technology	COE 401	The Fourth
-	3	Computer Architecture II	COE 402	
2	3	Embedded Systems	COE 403	
-	3	Computer Security	COE 404	
-	3	Robotics and Artificial Intelligence	COE 405	
-	3	Computer Vision and Pattern Recognition	COE 406	
2	2	Engineering Project	COE 407	
-	2	English Language	GS 408	

1. Expected Program Learning Outcomes	
Knowledge	
Ability to identify, define, formulate, and solve engineering problems by applying principles of science, mathematics, and engineering.	Learning Outcomes – GO1
Ability to develop innovative engineering designs that	Learning Outcomes –

meet diverse needs, taking into consideration health and safety, environmental, economic, and social factors.	**GO2**
Ability to conduct appropriate experiments and analyses to a high standard of quality, analyze and interpret the resulting data, and apply sound engineering judgment to draw accurate and valid conclusions.	**Learning Outcomes – GO3**
Skills	
Ability to communicate effectively through various means with individuals, groups, the public, and different levels of management, in accordance with the requirements and circumstances of each situation.	**Learning Outcomes – GO4**
Ability to engage in lifelong learning to continuously develop and enhance professional knowledge.	**Learning Outcomes – GO6**
Ability to work effectively as part of a multidisciplinary team toward shared objectives and within defined timelines, ensuring high-quality work and adherence to deadlines.	**Learning Outcomes – GO7**
Values	
Ability to recognize and uphold ethical and professional responsibilities in engineering contexts, while taking into consideration environmental, economic, and social consequences.	**Learning Outcomes – GO5**

1. Teaching and Learning Strategies
1. **Flipped Classroom:** Students review lectures and learning materials through videos or digital content at home, while classroom sessions are devoted to discussion, problem-solving, and practical application. 2. **E-Learning:** The use of online platforms and digital applications to provide access to course content and facilitate interaction between students and the instructor. 3. **Blended Learning:** Integrating face-to-face instruction with online learning to enhance flexibility, accessibility, and learning effectiveness. 4. **Problem-Based Learning (PBL):** Presenting students with real-world problems and encouraging them to investigate, analyze, and develop appropriate solutions. 5. **Project-Based Learning (PjBL):** Students complete comprehensive projects that integrate theoretical knowledge with practical application and develop their problem-solving and project-management skills. 6. **Multimedia Learning:** Using multimedia resources, including videos, animations, interactive graphics, and digital simulations, to enhance students' understanding of course concepts. 7. **Adaptive Learning:** Using intelligent learning systems that adapt educational

content and learning activities according to students' individual levels, needs, progress, and learning pace.

8. **Online Collaborative Learning:** Facilitating teamwork and collaborative learning through digital tools, such as online forums, discussion boards, and virtual discussion rooms.
9. **Digital Inquiry-Based Learning:** Encouraging students to conduct online research, collect and analyze relevant data, and use the findings to construct knowledge and develop evidence-based conclusions.

1. Assessment Methods

1. **Formative Assessment:** Continuous assessment throughout the learning process through short questions, classroom activities, discussions, and ongoing feedback.
2. **Summative Assessment:** Assessment conducted at the end of a unit or academic term through comprehensive projects, examinations, and other formal assessments.
3. **Portfolio Assessment:** Collecting and reviewing students' work over a specified period to monitor their progress, development, and achievement.
4. **Performance Assessment:** Evaluating students through practical tasks, such as experiments, oral presentations, demonstrations, and problem-solving activities.
5. **Self-Assessment:** Enabling students to evaluate their own learning and performance according to clearly defined criteria and standards.
6. **Peer Assessment:** Students evaluate and provide constructive feedback on the work and performance of their peers based on established criteria.
7. **E-Assessment:** Using digital platforms, online tools, and interactive electronic tests to assess students' knowledge, skills, and learning outcomes.
8. **Rubric-Based Assessment:** Using clearly defined assessment rubrics and performance criteria to evaluate students' level of achievement objectively and consistently.
9. **Adaptive Assessment:** Using assessment systems in which questions and tasks are adjusted according to the individual student's level of knowledge and performance.
10. **Project-Based Assessment:** Evaluating students based on the completion of comprehensive projects that integrate theoretical knowledge with practical application.

1. Teaching Staff							
Faculty Members							
Specific Requirements/Skills (if any)		**Teaching Staff Composition**		**Specialization**		**Academic Rank**	
		Lecturer	**Permanent Staff**	**Specific**	**General**		
			✓	**Artificial Intelligence**	**Computer Science**	**Mazen Sameer Ali Mohsen**	**Prof. Dr.**
			✓	**Artificial Intelligence**	**Computer Engineering**	**Al-Muntather Mahmoud Abdulwahid Mutasher**	**Assist. Lecturer**
			✓		**Computer Science**	**Farah Raad Fadhil Fayyad**	**Assist. Lecturer**
		✓			**Control and Systems Engineering**	**Qusay Shihab Ahmed**	**Assist. Prof. Dr.**
			✓		**Computer Science**	**Shams Abdulrahman Shukr Mahmoud**	**Assist. Lecturer**
			✓	network	**Communications Engineering**	**Sara Khairallah Mahdi Aboud**	**Assist. Lecturer**
			✓		**Computer Engineering Technologies**	**Huda Ali Mahdi Saleh**	**Assist. Lecturer**
			✓		**Computer Science**	**Yusra Abdulrazzaq Surour**	**Assist. Lecturer**
			✓	**Artificial Intelligence**	**Computer Science**	**Huda Muwaffaq Kadhim**	**Assist. Lecturer**
			✓		Control and Systems Engineering	**Sināa Ghani Qadouri**	**Assist. Lecturer**
			✓	network	**Computer Science**	**Istabraq Abdulrahman**	**Assist. Lecturer**
			✓		**Physics Sciences**	**Rami Majid Al-Hajj**	**Assist. Prof.**

							Dr.
			✓		**Mathematical Sciences**	**Hussein Ali**	**Assist. Lecturer**
			✓		**English Language**	**Mahmoud Mawloud**	**Assist. Prof. .Dr**
			✓	**Nuclear Physics**	**Physics Sciences**	**Khalid Hadi**	**Prof. Dr.**
			✓		**Arabic Language**	**Fatima Abbas Salman**	**Assist. Lecturer**

Professional Development

Orientation for New Faculty Members

1. **Teaching courses in accordance with academic specialization:** Faculty members should be assigned courses that align with their academic qualifications and areas of specialization.
2. **Commitment to teaching schedules and working hours:** Faculty members are expected to adhere to designated teaching schedules, office hours, and assigned academic duties.
3. **Continuous scholarly and professional development:** Faculty members should actively contribute to academic and research activities within their areas of specialization, including publications, conferences, seminars, research projects, and other scholarly activities.
4. **Analysis of student achievement:** Faculty members should analyze students' pass and failure rates in the courses they teach and use the results to identify areas for improvement in teaching and learning.
5. **Enhancement of qualifications and professional training:** Faculty members are encouraged to continuously develop their academic qualifications, professional competencies, and training in ways that support their academic and career development.
6. **Participation in relevant training courses:** Faculty members should attend appropriate professional development courses, including those offered by the **Continuing Education Center**.
7. **Laboratory training:** Faculty members responsible for practical or laboratory

courses should complete relevant training sessions in the laboratory department before commencing practical instruction with students.

Professional Development for Faculty Members

This annual plan is based on a strategic vision aimed at empowering faculty members and enhancing their competitive capabilities through an integrated set of contemporary programs and systematic mechanisms. The plan seeks to equip faculty members with advanced knowledge, specialized skills, and modern technologies necessary to enhance academic and institutional performance. This professional development enables faculty members to effectively fulfill their diverse professional roles in teaching and the learning environment, scientific research and innovation, administrative and leadership responsibilities, as well as community engagement and sustainable development.

To achieve these objectives, the academic and professional development framework of the plan is structured around four main areas:

Area One: Updating Teaching and Learning Strategies

This area focuses on adopting modern, student-centered teaching methodologies, such as **Project-Based Learning** and **Flipped Learning**, and developing interactive learning environments that foster students' critical thinking, creativity, and innovation.

Area Two: Developing Learning Outcomes Assessment Systems

This area focuses on enhancing academic measurement and assessment tools and developing objective assessment instruments, such as **Rubrics**, to accurately and effectively measure the achievement of the intended learning outcomes (**ILOs**) at both the program and course levels.

Area Three: Continuous Professional Development for Faculty Members

This area aims to strengthen the individual and institutional capacities of academic staff through specialized workshops and training programs in areas such as **scientific research, international publication, leadership skills, and university administration**, thereby promoting academic excellence and professional growth.

Area Four: Advancing and Developing the E-Learning System

This area addresses the digital transformation of higher education by integrating digital learning technologies, managing smart learning platforms, and utilizing **artificial intelligence tools and interactive technologies** to facilitate the educational process and enhance blended learning.

1. Admission Criteria

Admission to the **Bachelor's Degree Program in Computer Engineering** is centrally administered by the Iraqi Ministry of Higher Education and Scientific Research and is subject to the following minimum requirements:

1. Applicants must hold an **Iraqi secondary school certificate or an equivalent qualification** and must achieve the minimum grade required for admission to engineering colleges.
2. Admission is **centrally regulated and administered by the Ministry of Higher Education and Scientific Research** in accordance with the applicable national admission regulations.
3. Students are allocated among the **eight engineering departments of Al-Farabi University's College of Engineering**, including the Department of Computer Engineering, based on departmental capacity, applicants' academic performance, preferences, and applicable admission criteria. The admission capacity of the Department of Computer Engineering over the past three academic years has ranged from **116 to 229 students**.
4. The number of admitted students is limited to the **available seats**, as determined by the College Council in accordance with the College's available human, academic, and physical resources.
5. Applicants must submit all **required documents and supporting materials within the specified admission period**.
6. Applicants who have graduated from a secondary education system outside Iraq must have completed **twelve years of recognized primary and secondary education** at an accredited institution. They are also required to provide an **equivalency certificate issued by the Iraqi Ministry of Education**.

Admission to the **Computer Engineering Department is highly competitive**. As outlined above, applicants are admitted through a comprehensive evaluation process based on their academic records and applicable admission criteria, subject to the maximum number of new students authorized for the department for each academic year.

1. Key Sources of Information about the Program

1. **The official website of the university and the college.**
2. **The Department of Computer Engineering webpage** on the College's official website.
3. **The College of Engineering Academic Guide** and the **Computer Engineering Department Guide**.
4. **The Academic Program and Course Description Guide**, together with the **Learning Management System (LMS)** and related e-learning resources.
5. **Official documents and publications provided by the committees of the Department of Computer Engineering.**
6. **Administrative records and files maintained by the Computer Engineering Department.**

1. Program Development Plan

First: Strategic Planning and Development of the Academic Identity

- **Developing the Strategic Direction:** Formulating and regularly updating the program's vision, mission, and strategic objectives in alignment with current trends in higher education and the institution's strategic vision.
- **Conducting a Market Gap Analysis:** Conducting periodic surveys and studies of labor market requirements and analyzing performance evaluation questionnaires administered to students, graduates, and employers to ensure the program remains flexible and responsive to emerging developments and market needs.

Second: Program Development and Modernization (Curricula and Study Plans)

- **Reviewing and Updating Curricula:** Conducting periodic reviews of study plans and updating the academic and scientific content of courses to ensure their relevance and currency.
- **Introducing Advanced Technical Courses:** Incorporating specialized courses that address the requirements of the Fourth Industrial Revolution, such as **Artificial Intelligence (AI), the Internet of Things (IoT), and Cybersecurity**.
- **Developing the Laboratory Environment:** Upgrading and equipping scientific laboratories with modern technologies and advanced equipment to strengthen students' practical and applied skills.

Third: Updating Teaching and Learning Strategies and Assessment Systems

- **Adopting Active Learning Methodologies:** Implementing modern, student-centered teaching strategies, such as **Flipped Learning** and **Project-Based Learning (PBL)**.
- **Integrating Digital Technologies:** Employing specialized software and digital simulation systems in the educational process to facilitate the visualization and understanding of complex concepts.

- **Developing the Assessment and Evaluation System:** Moving toward **Performance-Based Assessment**, adopting academic **Portfolios**, and expanding the use of electronic examinations to ensure fairness, reliability, and objectivity in assessment.

Fourth: Capacity Building and Continuous Professional Development

- **Professional Development of Faculty Members:** Designing and implementing continuous training programs for faculty members to enhance their pedagogical, academic, technical, and professional competencies.
- **Strengthening Scientific Research:** Supporting research activities, promoting international scholarly publication, and encouraging academic exchange programs and research partnerships with international universities.

Fifth: Strategic Partnerships and Engagement with the Business Sector

- **Establishing Academic and Professional Partnerships:** Developing memoranda of understanding (MoUs) and strategic partnerships with leading technology companies and relevant professional institutions.
- **Enhancing Internship Programs and Innovation Hubs:** Strengthening structured summer internship programs for students and establishing university-based business incubators to support innovation and entrepreneurship and provide a stimulating environment for graduation projects.

Sixth: Infrastructure and Digital Transformation

- **Upgrading Educational Facilities:** Continuously modernizing the infrastructure of laboratories, classrooms, and other educational facilities to meet the evolving needs of the program.
- **Integrating Smart Learning Environments:** Developing and enhancing e-learning platforms to support **blended and virtual learning** and facilitate the effective integration of digital technologies into the educational process.

Seventh: Governance, Quality Assurance, and Continuous Improvement

- **Academic Alignment and Accreditation:** Aligning the program's intended learning outcomes with **national and international academic accreditation standards** and relevant quality assurance requirements.
- **Periodic Monitoring and Follow-Up:** Preparing periodic monitoring reports and conducting self-evaluation processes to ensure sustainable quality and the effective implementation of **Continuous Improvement** mechanisms.

Program Skills Matrix									
Values	**Skills**			**Knowledge**			**Core or Elective**	**Course Title**	**Course Code**	**Academic Year / Level**
GO5	GO7	GO6	GO4	GO3	GO2	GO1				
						✓	Core	Mathematics I	COE101	Level One / First Semester
	✓				✓	✓	Core	Fundamentals of Computer Systems	COE102	
		✓				✓	Core	Computer Programming Methodology	COE103	
				✓	✓	✓	Core	Electrical Circuits	COE104	
				✓			Core	Fundamentals of Digital Systems	COE105	
✓			✓				Core	Human Rights	UOB104	
			✓				Core	English Language	UOB102	
✓			✓				Core	Arabic Language	UOB101	First Year / Second

			✓			✓	Core	Mathematics 2	COE 115	Semester
	✓			✓	✓		Core	Digital Logic Circuit Design	COE 107	
	✓		✓	✓		✓	Core	Computer Programming	COE108	
	✓	✓			✓		Core	Electrical Circuits and Systems	COE109	
		✓		✓		✓	Core	Semiconductor Physics	COE 110	
✓		✓		✓	✓		Core	Microprocessor 1	COE201	Second Year / Third Semester
				✓	✓	✓	Core	Engineering Mathematics	COE225	
			✓	✓			Core	Digital Circuit Design	COE203	
			✓			✓	Core	Object-Oriented Programming (OOP)	COE204	
✓		✓					Core	Arabic Language 2	UOB201	

✓			✓				Core	Crimes of the Ba'ath Regime in Iraq	UOB105	
	✓	✓	✓		✓		Core	Digital Systems Design	COE205	Second Year / Fourth Semester
		✓			✓	✓	Core	Engineering Analytics	COE206	
✓			✓			✓	Core	Data Structures and Algorithms	COE207	
✓			✓		✓	✓	Core	Computer Architecture I	COE208	
							Core	Electronic Circuits	COE209	
✓		✓					Core	English Language II	UOB202	
	✓		✓		✓		Core	Communications	COE 301	Third Year / Fifth Semester
		✓		✓	✓	✓	Core	Digital Signal Processing (DSP)	COE 302	
	✓				✓		Core	Computer Networks I	COE 303	

				✓	✓		**Core**	**Operating Systems**	**COE 304**	
✓			✓				**Elective**	**Mathematical Modeling and Simulation**	**COE 305**	
✓					✓		**Core**	**Microprocessors II**	**COE 306**	
✓					✓		**Core**	**Artificial Intelligence and Its Applications**	COE307	**Level Three / Sixth Semester**
✓					✓		**Core**	**Project Development and Ethics**	COE308	
✓					✓		**Core**	**Database Systems**	COE309	
✓					✓		**Core**	**Image Processing**	COE310	
✓					✓		**Core**	**Computer Networks II**	COE311	
✓					✓		**Core**	**Mathematical Modeling and Control Systems**	COE312	

	✓			✓		✓	Core	Internet Technology	COE 401	الرابعة
✓		✓					Core	Computer Architecture II	COE 402	
			✓		✓		Core	Embedded Systems	COE 403	
✓			✓				Core	Computer Security	COE 404	
✓	✓	✓		✓			Elective	Robotics and Artificial Intelligence	COE 405	
	✓		✓			✓	Elective	Computer Vision and Pattern Recognition	COE 406	
✓	✓	✓	✓				Core	Engineering Project	COE 407	
✓		✓					Core	English Language	GS 408	

First Level

Introduction to Computer Engineering Course Description Form

Module Information

Module Title	**INTRODUCTION TO COMPUTER ENGINEERING**	**Module Delivery**	
Module Type	**CORE LEARNING ACTIVITY**	**Lab**	
Module Code	**COE102**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	1	**Semester of Delivery**	1
Administering Department	Computer Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	rand.hazim	**e-mail**	rand.hazim@alfarabiuc.edu
Review Committee Approval		**Version Number**	

Relation With Other Modules

Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• This course is intended for first-class students. These students typically will know how a computer works, how to assemble and disassemble the computer, and how to troubleshoot hardware and software issues. • The students will enhance the capability of using computer skills in Microsoft Word, Excel, and PowerPoint, because of the wide uses of these applications in education, scientific research, and the preparation of research reports.

Module Learning Outcomes	Upon the completion of this course, the students will be able to: • 1) Understand the history and development of the computer system. • 2) Identify the purposes and operation of the power supply of the personal computer. • 3) Identify the CPU's names, purposes, and characteristics and how to Install and troubleshoot the CPU. And learn the internal structure and operation of the microprocessor. • 4) Identify the names, purposes, and characteristics of motherboard and adapter cards. and how to Install and troubleshoot the motherboard. And learn the development and structure of the motherboard. • 5) Identifying the BIOS and CMOS settings. And understand the purpose of the operating system and how to Install an operating system and MS applications. • 6) Identify the names, purposes, characteristics, and types of memory. And how to Install and troubleshoot memory. • 7) Identify the names, purposes, characteristics, and types of storage devices and how to install and troubleshoot the storage devices. • 8) Identify serial and parallel ports that have been standard on PCs since the beginning and the universal serial bus and IEEE 1394 or (FireWire) interfaces. • 9) Identify the purpose and components of laptops and other portable devices. and troubleshoot laptops. • 10) Identify the names, purposes, and characteristics of input and output devices and their operation. • 11) Learn the principles of networking, the basic networking concepts, and technologies.
Indicative Contents	- Explain the Basic Structure of the Computer and the interaction with I/O devices this includes Input devices, Output devices, I /O Ports, CPU, Memory, and Storage - Explain the role of the Operating system and software for computer work. - The principle of networking. - Portable Devices.
Learning and Teaching Strategies	
Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-class questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class conversations.

Student Workload (SWL)

Structured SWL (h/sem)	62	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	63	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	125		

Module Evaluation

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment					
Summative assessment	**Mid Exam**	1	10% (10)		
	Final Exam	3 hrs.	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	The Development of the Personal Computer
Week 2	Processor Types
Week 3	Memory (ROM, RAM)
Week 4	Motherboards and Bios
Week 5	External I/O Interface
Week 6	Laptop and Portable Devices
Week 7	Midterm Exam

Week 8	Windows: part 1
Week 9	Windows: part 2
Week 10	Microsoft Word
Week 11	Microsoft Excel
Week 12	Microsoft PowerPoint
Week 13	Network: part 1
Week 14	Network: part 2
Week 15	Microprocessor Structure

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Scott Mueller, "UPGRADING AND REPAIRING PCs", 20th edition, 2012.	
Recommended Texts	The Intel microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-bit extensions: architecture, programming, and interfacing / Barry B. Brey—8th ed.	
Websites		

English Language Course Description Form

Module Information

Module Title	English Language1	**Module Delivery**	
Module Type	Basic	☒ **Theory**	
Module Code	UOB102	**Lecture**	
ECTS Credits	2	**Lab**	
SWL (h/sem)	50	☐ **Tutorial**	
		Practical	
		☐ **Seminar**	

Module Level	UGx111	**Semester of Delivery**	1
Administering Department	Computer	**College**	Engineering
Module Leader	Hind Mohammed Abed	**e-mail**	hind.m@uobaghdad.edu.iq
Module Leader's Acad. Title	Asst. lect.	**Module Leader's Qualification**	Master of Arts in Linguistics
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	م.م نور الهدى كريم	**e-mail**	noralhadi.kariem@alfarabiuc.edu.iq
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

Prerequisite module	none	**Semester**	
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1- The integrated skills approach of the course develops the student's self-confidence t communicate and express themselves freely. 2- This academic programme aims at enhancing students' Linguistic skills, understanding the vocabularies and grammar of The language. This would help developing the students' skills and enriching their experience and make them able to communicate easily.
Module Learning Outcomes	A1) Figuring out information about vocabulary, pronunciation, usage, and grammar in reference texts, online resources, and English language dictionaries, (A2) Develop conversational skills for becoming a contributing participant in small group activities, large group discussions, and oral presentations, (A3) Understand texts using effective learning strategies for reading and vocabulary building,
Indicative Contents	Speaking, reading and writing

Learning and Teaching Strategies	
Strategies	In order to build the character of the college students in in their specialty and at the English language subject, and for enhancing the students' linguistic skills (reading, writing, speaking and listening) as well as developing such skills to enable them of practicing the language on daily basis ; number of strategies have been followed: - Textbook material. - Discussion and interaction during lectures - Reading passages and dialogues from different sources to develop their reading - and listening skills. - Easily and thoroughly explain lessons with the participation of students to ensure

	- their understanding and make them able to communicate with each other easily - without hesitation. Written quizzes help in developing the writing skills And nourish their thinking and expression abilities.

Student Workload (SWL)

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	
Unstructured SWL (h/sem)	27	**Unstructured SWL (h/w)**	
Total SWL (h/sem)	90		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	5, 10	1,2
	Assignments	2	10% (10)	2, 12	3,1
	Projects / Lab.	0	0	0	0
	composition	1	10% (10)	13	3,1
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	1,2
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Unit 1,2 conversation and writing skills measured
Week 2	Unit 3,4 plus writing composition

Week 3	Unit 5,6 plus reading activities
Week 4	Unit 7,8 reading and conversation activities
Week 5	Unit 9,10 conversation activities
Week 6	Unit 11 conversation activities
Week 7	Unit 12 conversation activities
Week 8	Unit 13 conversation activities
Week 9	Unit 14 conversation activities
Week 10	Different activities (reading, writing, conversation)
Week 11	Composition Writing
Week 12	Different activities (reading, writing, conversation)
Week 13	Presenting their projects + discussion
Week 14	Presenting their projects + discussion
Week 15	Different activities (reading, writing, conversation and Presenting their projects + discussion
Week 16	Different activities (reading, writing, conversation)

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	(1) New Headway Plus [Beginner] by John and Liz Soars, Oxford: Oxford University Press (2006) (hard cover or Pdf version), (2) Modern scientific articles from the news related to the students' specialty, and (3) Internet links and videos related to the topics discussed in General English and English for Specific Purposes lectures.	No
Recommended Texts	Morphy,A.J (1983) English Grammar in use. Cambridge:CUP, Collins English for Exams Reading for IELTS by Els Van Geyte and Rona Snelling (2019).	No
Websites	https://www.bbc.co.uk/learningenglish/ any websites for learning English on social media and podcasts.	

Course Description Form for Electrical Circuits

Module Information

Module Title	**ELECTRICAL CIRCUITS**	**Module Delivery**	
Module Type	**CORE**	Class Lecture + Lab.	
Module Code	**COE104**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	1	**Semester of Delivery**	1
Administering Department	computer	**College**	Engineering
Module Leader	Sara khairallah	**e-mail**	sara.khairallah@alfarabiuc.edu.iq
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	Sara khairallah	**e-mail**	sara.khairallah@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	COE101 Mathematics 1	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. **Understanding Basic Electrical Concepts**: To provide students with a comprehensive understanding of fundamental electrical concepts, including current, voltage, resistance, and conductance. 2. **Applying Ohm's Law and Kirchhoff's Laws**: To enable students to apply Ohm's Law and Kirchhoff's Laws in analyzing electrical circuits. 3. **Exploring Temperature Effects and Resistor Types**: To familiarize students with the effects of temperature on resistance and the various types of resistors and their applications. 4. **Analyzing Series and Parallel Circuits**: To develop students' ability to analyze and solve problems related to series and parallel circuits. 5. **Understanding Source Grouping and Conversion**: To teach students how to group and convert electrical sources and understand the role of dependent sources.

	6. **Mastering Circuit Analysis Techniques**: To provide in-depth knowledge and practical skills in using various circuit analysis methods, including branch current, mesh, and nodal analysis. 7. **Utilizing Superposition, Thevenin's, and Norton's Theorems**: To equip students with the ability to simplify and analyze complex circuits using superposition, Thevenin's, and Norton's theorems. 8. **Maximizing Power Transfer and Performing Transformations**: To understand the principles of maximum power transfer and perform Y-Δ and Δ-Y transformations. 9. **Introducing Circuit Simulation Tools**: To introduce students to modern software tools for circuit simulation and design, preparing them for practical applications in engineering.
Module Learning Outcomes	1. **Explain Basic Electrical Concepts.** 2. **Apply Ohm's Law and Kirchhoff's Laws.**: Utilize Ohm's Law and Kirchhoff's Laws to analyze and solve electrical circuit problems. 3. **Analyze the Effects of Temperature on Resistance**. 4. **Solve Series and Parallel Circuits**, **Interpret Open and Short Circuits**: Understand the effects of open and short circuits within electrical networks and their implications on circuit functionality. 5. **Perform Circuit Analysis Using Various Methods**: Apply branch current, mesh, and nodal analysis methods to determine currents, voltages, and other parameters in electrical circuits. 6. **Utilize Superposition, Thevenin's, and Norton's Theorems**: Simplify and analyze complex electrical circuits using superposition, Thevenin's, and Norton's theorems. 7. **Maximize Power Transfer and Perform Transformations**. 8. **Use Circuit Simulation Software**: Demonstrate proficiency in using modern software tools for circuit simulation and design, integrating theoretical knowledge with practical application.
Indicative Contents	**Basics of Electricity** ● Introduction to electric current ● Voltage difference and electromotive force (EMF) ● Resistance and resistivity: concepts and definitions ● Conductance and conductivity: relationships and calculations **Fundamental Laws and Concepts** ● Ohm's law: understanding and applications ● Linear resistance: properties and examples ● Non-linear resistance: characteristics and examples **Temperature and Resistors** ● Temperature effects on resistance: positive and negative temperature coefficients ● Types of resistors: fixed, variable, and special resistors ● Color coding of resistors: decoding and calculations

	Basic Circuit Analysis ● Series circuits: properties, voltage and current distribution ● Parallel circuits: properties, voltage and current distribution ● Kirchhoff's voltage law (KVL): principles and applications ● Kirchhoff's current law (KCL): principles and applications **Open and Short Circuits** ● Definition and impact of open circuits in electrical networks ● Definition and impact of short circuits in electrical networks ● Practical examples and problem-solving **Source Grouping and Conversion** ● Grouping of electrical sources: series and parallel combinations ● Conversion of sources: from voltage to current sources and vice versa ● Dependent sources: types and applications **Circuit Analysis Methods** ● Branch current method: principles and applications ● Mesh analysis: formulation and solution of mesh equations ● Nodal analysis: formulation and solution of nodal equations ● Superposition theorem: principles and problem-solving **Theorems for Circuit Analysis** ● Thevenin's theorem: understanding and practical applications ● Norton's theorem: understanding and practical applications **Power Transfer and Transformations** ● Maximum power transfer theorem: principles and applications ● Y-Δ (Delta) transformation: techniques and problem-solving ● Δ-Y (Delta to Wye) transformation: techniques and problem-solving **Software Tools for Circuit Simulation** ● Introduction to circuit simulation software (e.g., SPICE, Multisim, or equivalent) ● Basic functions and features of simulation tools ● Practical exercises in circuit simulation and design
Learning and Teaching Strategies	
Strategies	1.Lectures: The module may include traditional lectures where the instructor presents the theoretical concepts, principles, and mathematical techniques related to mathematical modeling and electrical circuits. The lectures can provide a foundation for understanding the subject matter. 2. Interactive Discussions: Interactive discussions can be incorporated to encourage student participation and engagement. This can involve questioning

	and problem-solving activities related to mathematical modeling and electrical circuits. Discussions can help clarify concepts and stimulate critical thinking. 3. LAB Experiment. Sessions: Hands-on LAB.sessions can allow students to apply the theoretical knowledge to real-world scenarios. Students may work with electrical circuit components, measurement devices, and software tools for circuit simulation and analysis. LAB Experiment provide valuable experiential learning opportunities. 4. Computer-based Learning: Computer-based learning resources, such as online tutorials, interactive simulations, and educational software, can be used to supplement the learning process. These resources can assist students in visualizing electrical circuits, simulating their behavior, and exploring mathematical modeling concepts. 6. Group Projects: Collaborative group projects can encourage teamwork and the application of mathematical modeling principles to solve complex electrical circuit problems. Students can work together to design and analyze circuits, formulate mathematical models, and present their findings to the class. 7. Assessment Methods: Various assessment methods can be employed, including quizzes, tests, assignments, and project reports. These assessments can evaluate students' understanding of mathematical modeling and electrical circuits, their ability to apply the learned concepts, and their problem-solving skills. 8. Self-directed Learning: Encouraging students to engage in self-directed learning by exploring additional resources, conducting research, and practicing problems independently can further enhance their understanding and mastery of the subject matter.

Student Workload (SWL)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.267
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.067
Total SWL (h/sem)	125		

Module Evaluation

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3,7,11	LO #1-5
	Assignments	2	5% (5)	8,14	LO #1-8
	Lab.	7	20%(20)	1-15	LO #3, 4, 5, 6 ,7 and 8
Summative assessment	**Projects**	1	5% (5)	12	LO #3,4 ,5,6 and 8
	Mid Exam	1	10% (10)	15	LO # 1-4
	Final Exam	4 hr	50% (50)	16	LO #1-7
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Electric current, voltage difference, resistance and resistivity, conductance and conductivity
Week 2	Ohm's law, linear and non-linear resistance
Week 3	Temperature effect and coefficients of resistance, types of resistors, color coding of resistors
Week 4	Series and parallel circuits
Week 5	Kirchhoff's laws
Week 6	Effect of open and short circuits
Week 7	Grouping sources, conversion of sources, dependent sources
Week 8	Branch current method
Week 9	Mesh analysis
Week 10	nodal analysis
Week 11	Superposition
Week 12	Thevenin and Norton's theorems
Week 13	Maximum power transfer
Week 14	Y-D and D-Y transformation
Week 15	Introduction to software tools for circuit simulation and design
Week 16	Review and revision and Final examination preparation

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduction to Lab Equipment and Basic Measurements
Week 2	EXP 1: Ohm's Law and Basic Components
Week 3	cont.
Week 4	EXP 2:KVL
Week 5	EXP 3: KCL
Week 7	EXP 4: superposition
Week 8	EXP 5: Thevenin's and Norton's Theorems
Week 9	cont.
Week 10	EXP 6: Maximum power transfer
Week 11	cont.
Week 12	EXP 7: Circuit Simulation Tools

Week 13	cont.
Week 14	Final Project and Review
Week 15	Final Exam

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

	4-Fundamentals of Modern Electric Circuit Analysis and Filter Synthesis A Transfer Function Approach Second Edition© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023 5-Fundamentals of Electric Circuits Charles K. Alexander Professor Emeritus of Electrical Engineering and Computer Science Cleveland State University ,Matthew N. O. Sadiku Department of Electrical and Computer Engineering Prairie View A&M University Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education.	
Websites	1.MATLAB(www.mathworks.com/products/matlab.html 2. Simulink (www.mathworks.com/products/simulink.html) 3. CircuitLab (www.circuitlab.com) 4. Multisim Live (www.multisim.com/live/)	

Course Description Form for Programming Methodology

Module Information					
Module Title	**Programming Methodology**			**Module Delivery**	
Module Type	**CORE**			**Class lecture + Lab**	
Module Code	**COE103**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Computer		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D	
Module Tutor	Qusay shihab		**e-mail**	qusay.shihab@alfarabiuc.edu.iq	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	30/5/2024		**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• Providing students with confidence in their ability to write small useful programs. • Gaining essential programming skills like: code debugging, testing and algorithm development.
Module Learning Outcomes	By the end of this module, students will be able to: **1. Understand Interpreter and Integrated Development Environment (IDE)** ○ Describe what an interpreter does and what are the main differences between High Level Language and Machine Language. ○ Describe the main functions of IDE and use it to write simple codes in Python. **2. Understand and Use Variables and Data Types** ○ Store and manipulate values and variables in different data types. **3. Use I/O Instructions** ○ Display data to the user and read data from user. **4. Manipulate Data Using Operators** ○ Use mathematical and logical operators

	5. Control Execution Sequence Using IF Statement ○ Use IF statement to change sequence of execution of instructions. **6. Execute a Block of Code Multiple Times Using Loop** ○ Use for loop and while loop to execute a block of code multiple time according to a condition or values in a data structure. **7. Process Data in Lists** ○ Describe the concept of lists. ○ Access and modify data in lists.
Indicative Contents	• Interpreter and IDE • Variables and data types • Arithmetic and logical operators • If statement • String • Lists and Loops
Learning and Teaching Strategies	
Strategies	1) Lectures. 2) Homework and Assignments. 3) Tests and Exams. 4) In-Class Questions and Discussions. 5) In- and Out-Class oral conversations.

Student Workload (SWL)			
Structured SWL (h/sem)	64	**Structured SWL (h/w)**	4.3
Unstructured SWL (h/sem)	61	**Unstructured SWL (h/w)**	4.1
Total SWL (h/sem)	125		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to programming, problem solving
Week 2	Program Algorithm and Flowchart
Week 3	Visual Programming Using Scratch
Week 4	Python interpreter and IDE
Week 5	Python basic syntax
Week 6	Python data types: variables, assignments, and numerical types
Week 7	Python Input/Output
Week 8	Arithmetic and logical operators, precedence of operators
Week 9	If statement, nested if statement, if-else if ladder else
Week 10	String data type: simple string processing and string manipulation

Week 11	Python lists: traversing a list and list operations
Week 12	Loops: while statement and for statement
Week 13	Python 2D lists
Week 14	Python nested loops
Week 15	Python Casting
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Visual Programming Using Scratch
Week 2	Python interpreter and IDE
Week 3	Python turtle
Week 4	Variables and data types
Week 5	Python Print and Input
Week 6	Arithmetic and logical operators, precedence of operators
Week 7	IF…ELIF…ELSE STATEMENT
Week 8	Python simple string processing and string manipulation
Week 9	Python list traversing and operations
Week 10	Python for statement
Week 11	Python while statement
Week 12	Python loops: break and continue
Week 13	Python 2D lists
Week 14	Python nested loops
Week 15	Python Casting
Week 16	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts	• Brian Heinold, A Practical Introduction to Python Programming, 2012 • Ben Stephenson, The Python Workbook: A Brief Introduction with Exercises and Solutions, 2014	No
Websites	https://www.w3schools.com/python/	

Boolean Algebra Course Description Form

Module Information

Module Title	**BOOLEAN ALGEBRA**	**Module Delivery**	
Module Type	**SUPPORT**	**Class Lecture + Lab**	
Module Code	**COE105**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Computer Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	fatima.abdulkadir	**e-mail**	fatima.abdulkadir@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	

Relation With Other Modules

Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• Understanding of Boolean variables, operators (AND, OR, NOT), and their properties. • Learn how to express and simplify Boolean functions. • Apply laws and theorems (e.g., De Morgan's Theorems) to simplify Boolean expressions. • Use Karnaugh maps for simplifying Boolean expressions and designing combinational logic circuits. • Design and analyze combinational logic circuits based on Boolean expressions. • Use Boolean algebra and Karnaugh maps to minimize the number of gates and inputs required for a given logic function.

Module Learning Outcomes	● Clearly define and explain Boolean variables, operators, and fundamental concepts of Boolean algebra. ● Demonstrate knowledge of key Boolean laws and theorems, such as De Morgan's Theorems. ● Apply Boolean algebra techniques to simplify complex Boolean expressions and functions. ● Utilize Karnaugh maps to visually simplify Boolean expressions and to design efficient combinational logic circuits. ● Design and implement digital circuits using basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR) based on Boolean expressions. ● Analyze and design combinational logic circuits to perform specified tasks or functions. ● Apply Boolean algebra techniques and Karnaugh maps to minimize the number of logic gates and inputs in digital circuit designs. ● Develop optimized circuit designs that improve performance and reduce cost.
Indicative Contents	

Learning and Teaching Strategies

Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-class questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class conversations.

Student Workload (SWL)

Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3
Total SWL (h/sem)	125		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Number system
Week 2	Arithmetic Operations
Week 3	Digital Codes, Code Conversion
Week 4	Logic Gates
Week 5	Boolean algebra
Week 6	The Karnaugh Map
Week 7	Implementation of Logic Circuit
Week 8	Midterm Exam
Week 9	Basic Adders
Week 10	Arithmetic circuits
Week 11	Comparators
Week 12, 13	Decoders and encoders, case studies: Seven Segment decoder
Week 14, 15	Multiplexers and De-multiplexers

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Verification of Logic Gates.
Week 2	Implementation of Universal Gates (NAND & NOR).
Week 3	Design of Half Adder.
Week 4	Design of Full Adder.
Week 5	Design of Half Subtractor.
Week 6, 7	Design of Full Subtractor.
Week 8, 9	Design and Implementation of Multiplexer (MUX).
Week 10, 11	Design and Implementation of Demultiplexer (DEMUX).
Week 12, 13	XOR Gate as a Parity Checker.
Week 14, 15	Design of 4-bit Binary Adder.

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts	Fundamentals of logic design, 5th edition, Roth, 2004, Thomson learning, Inc. o Digital electronics, 5th edition, Bignell, 2007, Thomson learning, Inc. o Digital logic design, 4th edition, Holdsworth, 2002, Elsevier. o Digital systems,10th edition, Tocci, 2007,pearson prentice hall o Digital fundamentals, 10th edition, Floyd, 2009, Pearson prentice hall. o Digital design, 4th edition, Mano, 2007, Pearson prentice hall o Digital principles and applications, Tata McGrow-Hill,1985 Malveno/leach	
Websites		

Mathematics Course Description Form

Module Information					
Module Title	Mathematics 1			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE101				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	م.م هند سعد		**e-mail**	Hind.saad@alfarabiuc.edu	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Module			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**General Objectives of Teaching Mathematics** • **Overall Educational Aim:** To prepare individuals for both public and private life, enabling them to contribute positively to their community while developing their personal capabilities. • **General Objective:** To enhance students' proficiency in mathematics in particular and improve their overall engagement and performance in the educational process. • To develop students' abilities in **deduction, generalization, and the application of mathematical reasoning and logic**. • To enable students to understand fundamental mathematical concepts, such as **relations, functions, trigonometric functions, differentiation, integration, and probability**. • To develop students' understanding of **mathematical proofs and their underlying logical principles**.

	• To introduce students to selected mathematical structures and systems, such as **groups and matrices**. • To foster students' appreciation of mathematics and familiarize them with its **important applications in everyday life**. • To demonstrate the practical applications of **geometrical concepts, principles, and laws**, highlighting the significance of mathematics in solving practical and real-world problems.
Module Learning Outcomes	**Knowledge and Understanding** 1. **The course content has been restructured and organized in a more logical and coherent manner**, in alignment with the curriculum, in order to provide clear, useful, and engaging calculus material for the next generation of engineers and scientists. 2. **The course introduces the fundamental transcendental functions**, which are subsequently integrated throughout the following chapters through a variety of examples and exercises to reinforce students' understanding and application of these functions. 3. **To enable students to understand and use the mathematical language required to apply calculus concepts** to a wide range of applications in science and engineering.
Indicative Contents	

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

Student Workload (SWL)			
Structured SWL (h/sem)	60	**Structured SWL (h/w)**	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	5.8
Total SWL (h/sem)	**175**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Determinates, Matrix, properties, operations
Week 2	Review of functions
Week 3	Limits
Week 4	Continuity
Week 5	Derivatives: Differentiation Rules
Week 6	Derivatives of Trigonometric Functions
Week 7	Derivatives of Inverse Functions and Logarithms
Week 8	Inverse Trigonometric Functions
Week 9	Related Rates
Week 10	Applications of Derivatives: Extreme Values of Functions, The Mean Value Theorem
Week 11	Monotonic Functions and the First Derivative Test
Week 12	Concavity and Curve Sketching
Week 13	Indeterminate Forms and L'Hôpital's Rule
Week 14	Applied Optimization
Week 15	Applied Optimization
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Weir, M., Hass and Giordano. (2008). Thomas' Calculus. Eleventh Edition, Pearson-Addison-Weesley.	Y
Recommended Texts	Howard, A. et. Al. (2008). Calculus. McGraw-Hill	Y
Websites		

Course Description Form for Computer Programming

Module Information

Module Title	**Computer Programming**	**Module Delivery**	
Module Type	**CORE**	**Class lecture + Lab**	
Module Code	**COE108**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		

Module Level	1	**Semester of Delivery**	2
Administering Department	Computer	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D
Module Tutor		**e-mail**	
Peer Reviewer Name	qusay.shihab	**e-mail**	qusay.shihab@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules

Prerequisite module	**COE103**	**Semester**	1.1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• Learning how to use functions in programming. • Learning how to use Modules to solve real-life and scientific problems. • Gaining knowledge of essential OOP concepts like: class, inheritance, and data encapsulation.
Module Learning Outcomes	By the end of this module, students will be able to: **8. Understand and Use Standard Data Structures** o Learn to use Tuples, Sets, and Dictionaries **9. Process Text Files** o Read from and write to a text file **10. Understand and Use Functions** o Describe why functions are used. o Use functions to solve problems.

	○ Learn passing argument to functions, returning values from functions, and using recursive functions. **11. Understand and Use Modules** ○ Understand what a module is. ○ Learn how to use modules or parts of modules. **12. Use Modules in Various Applications** ○ Learn using widely used modules like: os, pandas, selenium, BeautifulSoup, JSON, and Matplotlib in various applications. **13. Get Essential Knowledge About OOP** ○ Get knowledge of essential OOP concepts like: class, inheritance, and data encapsulation
Indicative Contents	• Standard Data Structures • Files • Functions and Recursive Functions • Modules • Classes
Learning and Teaching Strategies	
Strategies	6) Lectures. 7) Homework and Assignments. 8) Tests and Exams. 9) In-Class Questions and Discussions. 10) In- and Out-Class oral conversations.

Student Workload (SWL)			
Structured SWL (h/sem)	79	**Structured SWL (h/w)**	5.3
Unstructured SWL (h/sem)	46	**Unstructured SWL (h/w)**	3.1
Total SWL (h/sem)	125		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Review to Python Programming
Week 2	Python standard data structures: Tuples, Sets, and Dictionaries
Week 3	Python text files: reading from and writing to a file
Week 4	Python function creation, return values and calls
Week 5	Function arbitrary arguments, passing lists to a function, and recursive functions
Week 6	Python module: os
Week 7	Python module: pandas
Week 8	Python module: selenium
Week 9	Python module: BeautifulSoup

Week 10	Python module: JSON
Week 11	Python module: Matplotlib
Week 12	Applications of Python Modules: Excel manipulation
Week 13	Applications of Python Modules: using API's
Week 14	Applications of Python Modules: web scraping
Week 15	Python classes and OOP: classes, objects, attributes, and methods.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Review to Python Programming
Week 2	Python standard data structures: Tuples, Sets, and Dictionaries
Week 3	Python text files: reading from and writing to a file
Week 4	Python function creation, return values and calls
Week 5	Function arbitrary arguments, passing lists to a function, and recursive functions
Week 6	Python module: os
Week 7	Python module: pandas
Week 8	Python module: selenium
Week 9	Python module: BeautifulSoup
Week 10	Python module: JSON
Week 11	Python module: Matplotlib
Week 12	Applications of Python Modules: Excel manipulation
Week 13	Applications of Python Modules: using API's
Week 14	Applications of Python Modules: web scraping
Week 15	Python classes and OOP: classes, objects, attributes, and methods.
Week 16	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts	• Brian Heinold, A Practical Introduction to Python Programming, 2012 • Ben Stephenson, The Python Workbook: A Brief Introduction with Exercises and Solutions, 2014	No
Websites	https://www.w3schools.com/python/	

Mathematics II Course Description Form

Module Informatio					
Module Title	Mathematics 2			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE115				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Husain ali		**e-mail**	Husain.ali@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives
أهداف المادة الدراسية

General Objectives of Teaching Mathematics II

- **Overall Educational Aim:** To prepare students for both academic and professional life by developing their intellectual abilities and equipping them with the knowledge and skills necessary to contribute effectively to their community and personal development.
- **General Objective:** To enhance students' proficiency in mathematics and strengthen their overall learning capabilities through the systematic study and application of mathematical concepts.
- To develop students' abilities in **deductive reasoning, generalization, analytical thinking, and the effective use of mathematical logic**.
- To enable students to understand and apply fundamental mathematical concepts, including **relations, functions, trigonometric functions, differentiation, integration, and probability**.
- To develop students' understanding of **mathematical proofs and their underlying logical principles**.
- To familiarize students with selected mathematical structures and systems, such as **groups and matrices**, and to develop their ability to apply these concepts appropriately.
- To foster students' **appreciation of mathematics** and enhance their

	awareness of its importance and applications in everyday life, science, and engineering. • To demonstrate the **practical applications of geometrical concepts, principles, and laws**, emphasizing the role of mathematics in analyzing and solving practical and real-world problems.
Module Learning Outcomes	**General Objectives of Teaching Mathematics** **Overall Educational Aim:** To prepare students for academic, professional, and everyday life by developing their intellectual abilities and equipping them with the knowledge and skills necessary to contribute effectively to themselves and their community. **General Objective:** To enhance students' proficiency in mathematics in particular and improve their overall learning and academic performance. **The course aims to:** 1. Develop students' abilities in **deductive reasoning, generalization, analytical thinking, and the effective use of mathematical logic**. 2. Enable students to understand and apply fundamental mathematical concepts, including **relations, functions, trigonometric functions, differentiation, integration, and probability**. 3. Develop students' understanding of **mathematical proofs and their underlying logical principles**. 4. Familiarize students with selected mathematical structures and systems, such as **groups and matrices**. 5. Foster students' **appreciation of mathematics** and enhance their awareness of its importance and applications in everyday life. 6. Enable students to recognize the **practical applications of mathematical concepts, geometrical principles, and laws**, demonstrating the importance of mathematics in science, engineering, and real-world problem-solving.
Indicative Contents	

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

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Integrals: Area and Estimating with Finite Sums, Sigma Notation and Limits of Finite Sums
Week 2	The Definite Integral, The Fundamental Theorem of Calculus
Week 3	Indefinite Integrals and the Substitution Method
Week 4	Definite Integral Substitutions and the Area Between Curves
Week 5	Applications of Definite Integrals: Volumes Using Cross-Sections and Cylindrical Shells
Week 6	Arc Length, Areas of Surfaces of Revolution
Week 7	The Logarithm Defined as an Integral, Hyperbolic Functions
Week 8	Techniques of Integration: Using Basic Integration Formulas
Week 9	Integration by Parts, Trigonometric Integrals, Trigonometric Substitutions
Week 10	Integration of Rational Functions by Partial Fractions, Integral Tables and Computer Algebra Systems
Week 11	Improper Integrals
Week 12	First-Order Differential Equations: separable and homogeneous
Week 13	First-Order Differential Equations: linear and exact
Week 14	Infinite Sequences and Series
Week 15	Parametric Equations and Polar Coordinates
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Weir, M., Hass and Giordano. (2008). Thomas' Calculus. Eleventh Edition, Pearson-Addison-Weesley.	Y
Recommended Texts	Howard, A. et. Al. (2008). Calculus. McGraw-Hill	Y
Websites		

Arabic Language II Course Description Form

Module Information					
Module Title	**ARABIC LANGUAGE 1**			**Module Delivery**	
Module Type	**BASIC**			**Theory**	
Module Code	**UOB101**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Computer		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MA	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Fatma.salman		**e-mail**	Fatma.salman@alfarabiuc.edu.iq	
Review Committee Approval	17/6/2023		**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims

General Objectives of the Arabic Language II Course

The course aims to:

1. **Promote the Arabic language and preserve its correct and proper use**, while reducing common linguistic errors.
2. Enable students to **use the Arabic language accurately and effectively** in communicating with others through speaking, writing, listening, and reading, thereby facilitating their daily affairs and helping them address their needs and interests.
3. Develop students' ability to **express themselves clearly and accurately**, both orally and in writing, and to describe what they perceive through their senses.
4. Enrich students' **linguistic repertoire** by introducing them to a variety of vocabulary, expressions, and language structures.
5. Enable students to **identify common linguistic errors** and guide them toward correcting and avoiding such errors.
6. Foster students' **interest in reading and independent study**, encouraging them to develop regular reading habits.
7. Enable students to **recognize and appreciate the aesthetic features of the Arabic language and its literature**.
8. Develop students' skills in **engaging with and appreciating the Arab cultural and literary heritage**, while establishing connections between it and other fields of culture.
9. Enable students to **apply Arabic grammar rules effectively in reading and writing** through practical exercises related to the proposed course topics.

Module Learning Outcomes

Learning Outcomes

Upon successful completion of the course, students will be able to:

1. **Develop a strong appreciation for the Arabic language** and take pride in its richness, heritage, and cultural significance.
2. **Demonstrate accurate pronunciation, effective oral delivery, and clear expression** using appropriate voice modulation and intonation. Students will also acquire a broad range of vocabulary, expressions, sentence structures, and linguistic styles that enrich their language skills

	and cultural knowledge. 3. **Write Arabic words accurately and correctly**, consolidate their visual representation in memory, and retrieve these forms effectively when writing. 4. **Identify more than fifty common linguistic errors**, understand the reasons behind them, and apply the appropriate corrections. 5. **Distinguish among the different forms and positions of the Arabic hamza**—initial, medial, and final—and apply the appropriate spelling rules accurately and consistently. 6. **Improve the accuracy and fluency of their spoken and written Arabic**, avoid common linguistic errors, and develop sound language habits that enable them to use words and sentences correctly while preserving the beauty, clarity, and eloquence of Arabic expression.
Indicative Contents	**Course Topics** 1. **The Origins and Development of the Arabic Language** 2. **The Importance of the Arabic Language:** A lesson highlighting the significance of the Arabic language in general, with particular emphasis on its importance for non-specialist students. 3. **Parts of Speech and the Inflected and Indeclinable Forms of Nouns and Verbs** 4. **Common Linguistic Errors** 5. **Hamzat al-Qaṭʿ and Hamzat al-Waṣl** (The Cutting Hamza and the Connecting Hamza) 6. **The Orthography of the Medial and Final Hamza** 7. **Letters Added in Arabic Spelling** 8. **Punctuation Marks in the Arabic Language** 9. **Numbers and the Rules for Writing Numbers in Arabic** 10. **The Subject (Mubtada') and the Predicate (Khabar)** 11. **Types of Arabic Plurals and Their Related Forms** 12. **A Poem by a Classical Arabic Poet** 13. **A Poem by a Modern Arabic Poet** 14. **The Particles "An" (أنَّ) and "Inna" (إنَّ): Differences and Usage** 15. **The Correct Use and Spelling of Ẓāʾ (ظ), Ḍād (ض), Tāʾ Marbūṭa (ة), and Hāʾ (ه)**
Learning and Teaching Strategies	
Strategies	11)Lectures. 12)Tutorials. 13)Homework and Assignments. 14)Tests and Exams.

	15)In-Class Questions and Discussions. 16)Extracurricular Activities. 17)Seminars. 18)In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**The Origins and Development of the Arabic Language**
Week 2	**The Importance of the Arabic Language: Its General Significance and Its Relevance to Non-Specialist Students**
Week 3	**Parts of Speech and the Inflected and Indeclinable Forms of Nouns and Verbs**
Week 4	**Hamzat al-Qaṭ‘ and Hamzat al-Waṣl**
Week 5	**The Orthography of the Medial and Final Hamza**
Week 6	**Common Linguistic Errors**
Week 7	**Punctuation Marks**
Week 8	**Letters Added in Arabic Spelling**
Week 9	**Numbers and the Rules for Writing Numbers in Arabic**
Week 10	**Types of Arabic Plurals and Their Related Forms**
Week 11	**The Open and Kasra Forms of “An” (أنَّ and إنَّ)**
Week 12	**The Subject (Mubtada’) and the Predicate (Khabar)**
Week 13	**A Poem by a Classical Arabic Poet**
Week 14	**A Poem by a Modern Arabic Poet**
Week 15	**The Correct Use and Spelling of Ẓā’ (ظ), Ḍād (ض), Tā’ Marbūṭa (ة), and Hā’ (ه)**
Week 16	**Final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1. Al-Tuni, Mustafa. *Hamzat in the Arabic Language: A Linguistic Study*. 2. Saad bin Ali bin Muhammad. *The Difference Between Ḍād (ض) and Ẓā’ (ظ).* 3. Abdul Qadir Amin. *General Arabic Language for Non-Specialist Departments.*	Yes

Recommended Texts	4. Al-Tarifi, Yusuf Ata. *Al-Wadih fi al-Imla' wa 'Alamat al-Tarqim* [The Clear Guide to Arabic Orthography and Punctuation Marks]. 5. Al-Adnani, Muhammad. *Mu'jam al-Aghlat al-Lughawiyyah* [Dictionary of Common Linguistic Errors].	No
Websites		

Electrical Circuits and Systems Course Description Form

Module Information					
Module Title	**ELECTRICAL CIRCUITS AND SYSTEMS**			**Module Delivery**	
Module Type	**CORE**			Class Lecture + Lab.	
Module Code	**COE109**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1	**Semester of Delivery**	2		
Administering Department	computer	**College**	Engineering		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor		**e-mail**			
Peer Reviewer Name	sara.khairallah	**e-mail**	sara.khairallah@alfarabiuc.edu.iq		
Review Committee Approval		**Version Number**	1.0		

Relation With Other Modules			
Prerequisite module	COE104 Electrical Circuits, COE101 Mathematics 1	**Semester**	1 1
Co-requisites module	-	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. **Understand Signals and Systems**: To provide students with a solid understanding of continuous-time signals, periodic signals, and key signal properties such as power, energy, and waveform characteristics. 2. **Analyze AC Circuits**: Enable students to analyze AC circuits, including understanding resistance, reactance, impedance, conductance, susceptance, and admittance. 3. **Apply Phasor Analysis**: Develop proficiency in using phasor analysis to analyze AC circuits, including the use of phasor diagrams and complex numbers. 4. **Explore Circuit Resonance**: Investigate series and parallel resonance circuits, including quality factor, selectivity, bandwidth, and their practical applications. 5. **Calculate Power in AC Circuits**: Understand and calculate power in AC circuits, including power factor, power factor correction, and related concepts. 6. **Utilize Network Theorems**: Apply network theorems such as superposition, Thevenin's, and Norton's theorems to simplify and

	analyze AC circuits. 7. **Integrate Practical Applications**: Introduce practical applications of AC circuit analysis and signal processing in computer engineering contexts. 8. **Enhance Problem-Solving Skills**: Develop problem-solving skills through hands-on exercises, simulations, and real-world applications in AC circuit analysis and signal processing.
Module Learning Outcomes	1. **Understand Signals and Systems**: ○ Explain the characteristics of continuous-time signals, including unit ramp, delta function, and periodic signals. ○ Calculate power, energy, and average values of waveforms. 2. **Analyze AC Circuits**: ○ Analyze the behavior of pure resistor, inductive, and capacitive elements in AC circuits. ○ Calculate impedance, reactance, and admittance using phasor analysis. 3. **Apply Phasor Analysis**: ○ Construct and interpret phasor diagrams for AC circuits. ○ Solve AC circuit problems using complex numbers and phasor techniques. 4. **Explore Circuit Resonance**: ○ Analyze series and parallel resonance circuits, including quality factor, selectivity, and bandwidth. ○ Determine resonant frequency and half-power frequencies in resonance circuits. 5. **Calculate Power in AC Circuits**: ○ Compute real, reactive, and apparent power in AC circuits. ○ Evaluate power factor and perform power factor correction calculations. 6. **Utilize Network Theorems**: ○ Apply superposition, Thevenin's, and Norton's theorems to simplify and analyze AC circuits. ○ Verify theorems through practical applications and simulations. 7. **Integrate Practical Applications**: ○ Design and simulate AC circuits using software tools. ○ Apply AC circuit analysis principles to practical engineering problems. 8. **Enhance Problem-Solving Skills**: ○ Solve complex problems related to AC circuits and signals. ○ Demonstrate proficiency in analyzing and troubleshooting AC circuits in various applications.
Indicative Contents	**Introduction to Signals and Systems** ● Overview of signals: continuous-time signals, unit ramp, delta function, periodic signals. ● Signal properties: power, energy, average, and RMS values of waveforms.

Electrical and Mechanical Angles

- Representation of waveforms in electrical and mechanical domains.
- Instantaneous and RMS values, form factor, peak factor, and phasor quantities.

Voltage and Current Relationships

- Analysis of pure resistive, inductive, and capacitive elements in AC circuits.
- Phasor representation of voltages and currents.

AC Circuit Analysis Fundamentals

- Resistance, reactance, impedance, conductance, susceptance, and admittance in AC circuits.
- Phasor diagram representation of AC circuits.

Series and Parallel AC Circuits

- Analysis of series and parallel AC circuits using phasor techniques.
- Calculation of total impedance and admittance.

Power in AC Circuits

- Real, reactive, and apparent power calculations.
- Power factor and power factor correction in AC circuits.

AC Circuit Analysis and Network Theorems

- Application of network theorems (superposition, Thevenin's, and Norton's theorems) to AC circuits.
- Practical applications and problem-solving exercises.

Series and Parallel Resonance Circuits

- Characteristics of series and parallel resonance circuits.
- Quality factor (Q), selectivity, half-power frequencies, and bandwidth calculations.

Practical Applications of AC Circuits

- Design and simulation of AC circuits using software tools (e.g., SPICE).
- Case studies and real-world examples of AC circuit applications.

Practical Exercises and Applications

- Hands-on lab sessions: construction, measurement, and analysis of AC circuits.
- Integration of theoretical knowledge with practical skills.

Final Project and Presentation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Signals and Systems • Overview of signals: continuous-time signals, unit ramp, delta function, periodic signals.
Week 2	• Signal properties: power, energy, average and RMS values of waveforms.
Week 3	Electrical and Mechanical Angles
Week 4	Voltage and Current Relationships • Analysis of pure resistive, inductive, and capacitive elements in AC circuits.
Week 5	• Phasor representation of voltages and currents.

Week 6	AC Circuit Analysis Fundamentals ● Resistance, reactance, impedance, conductance, susceptance, and admittance in AC circuits.
Week 7	● Phasor diagram representation of AC circuits.
Week 8	Series and Parallel AC Circuits ● Analysis of series and parallel AC circuits using phasor techniques.
Week 9	● Calculation of total impedance and admittance.
Week 10	Power in AC Circuits ● Real, reactive, and apparent power calculations.
Week 11	AC Circuit Analysis and Network Theorems ● Application of network theorems Thevenin's, and Norton's
Week 12	● superposition
Week 13	Series and Parallel Resonance Circuits
Week 14	Practical Applications of AC Circuits ● Design and simulation of AC circuits using software tools (e.g., SPICE).
Week 15	● Case studies and real-world examples of AC circuit applications.
Week 16	Review and revision and Final examination preparation

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Introduction to Lab Equipment and Basic Measurements
Week 2	EXP 1: **Introduction to Signals and Waveforms** ● **Objective**: Familiarize students with different types of signals and their properties. ● **Activities**: ○ Generate and observe continuous-time signals such as sinusoidal, square, and triangular waves using function generators. ○ Measure and calculate the average and RMS values of waveforms. ○ Introduce oscilloscope operation for waveform visualization.
Week 3	cont.
Week 4	EXP 2: **Phasor Analysis and AC Circuit Basics** ● **Objective**: Understand phasor representation and basic AC circuit analysis techniques. ● **Activities**: ○ Construct phasor diagrams for resistive, inductive, and capacitive AC circuits. ○ Measure and calculate impedance, reactance, and admittance using phasor

	techniques. ○ Verify calculations through experimental measurements using AC signal sources.
Week 5	EXP 3: **Series and Parallel AC Circuits** ● **Objective**: Analyze series and parallel AC circuits using phasor methods. ● **Activities**: ○ Construct series and parallel AC circuits with resistors, capacitors, and inductors. ○ Measure total impedance and current distribution in these circuits. ○ Compare theoretical predictions with experimental results and discuss discrepancies.
Week 7	cont.
Week 8	EXP 4: **Power in AC Circuits** ● **Objective**: Calculate real, reactive, and apparent power in AC circuits. ● **Activities**: ○ Measure voltage and current waveforms in AC circuits. ○ Calculate power using oscilloscope measurements and power analyzers.
Week 9	EXP 5: **Network Theorems in AC Circuits** ● **Objective**: Apply network theorems to simplify and analyze AC circuits. ● **Activities**: ○ Implement superposition, Thevenin's, and Norton's theorems in practical AC circuit configurations. ○ Verify theorem applications through experimental circuit measurements. ○ Discuss the advantages and limitations of each theorem in circuit analysis.
Week 10	cont.
Week 11	EXP 6: **Resonance in AC Circuits** ● **Objective**: Investigate series and parallel resonance phenomena. ● **Activities**: ○ Construct series and parallel resonance circuits with adjustable parameters. ○ Measure resonant frequency, quality factor (Q), and bandwidth. ○ Analyze frequency response and selectivity characteristics using frequency sweeps and measurements.

Week 12	cont.
Week 13	**Simulation and Design Project** ● **Objective**: Apply knowledge gained to design and simulate a comprehensive AC circuit project. ● **Activities**: ○ Select a project topic related to AC circuits and signals. ○ Design the circuit using simulation software (e.g., SPICE). ○ Simulate and analyze circuit performance, including frequency response and power characteristics. ○ Present findings and conclusions from the project in a final report or presentation.
Week 14	cont.
Week 15	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	1-Fundamentals of Modern Electric Circuit Analysis and Filter Synthesis A Transfer Function Approach Second Edition© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023 2-Fundamentals of Electric Circuits Charles K. Alexander Professor Emeritus of Electrical Engineering and Computer Science Cleveland State University ,Matthew N. O. Sadiku Department of Electrical and Computer Engineering Prairie View A&M University Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education. 3."Engineering Circuit Analysis" by William H. Hayt Jr. and Jack E. Kemmerly: This textbook provides a comprehensive introduction to electrical circuits, covering topics such as circuit analysis techniques, network theorems, and AC circuit analysis. 5."Introduction to Electric Circuits" by Richard C. Dorf and James A. Svoboda: This textbook offers a practical approach to understanding electric circuits. It covers topics such as circuit analysis techniques, network theorems, AC circuit analysis, and introduces mathematical modeling principles. 4."Mathematical Modeling and Simulation: Introduction for Scientists	Yes Soft copy

	and Engineers" by Kai Velten: This textbook focuses specifically on mathematical modeling techniques and their application in various scientific and engineering fields. It covers topics such as modeling principles, differential equations, simulation methods, and includes examples relevant to electrical circuits.	
Recommended Texts	1."Electric Circuits" by James W. Nilsson and Susan A. Riedel: This textbook offers a clear and concise introduction to electrical circuits and circuit analysis. It covers topics such as Kirchhoff's laws, network theorems, AC circuit analysis, and introduces mathematical modeling techniques. 2."Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" by Kai Velten: This textbook focuses specifically on mathematical modeling techniques and their application in various scientific and engineering fields. It covers topics such as modeling principles, differential equations, simulation methods, and includes examples relevant to electrical circuits. 3.Basic Engineering Circuit Analysis J. DAVID IRWIN Auburn University R. MARK NELMS Auburn University 2021 12th Edition 4-Fundamentals of Modern Electric Circuit Analysis and Filter Synthesis A Transfer Function Approach Second Edition© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2023 5-Fundamentals of Electric Circuits Charles K. Alexander Professor Emeritus of Electrical Engineering and Computer Science Cleveland State University ,Matthew N. O. Sadiku Department of Electrical and Computer Engineering Prairie View A&M University Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright © 2021 by McGraw-Hill Education.	Yes pdf
Websites	1.MATLAB(www.mathworks.com/products/matlab.html 2. Simulink (www.mathworks.com/products/simulink.html) 3. CircuitLab (www.circuitlab.com) 4. Multisim Live (www.multisim.com/live/)	

Logic Circuit Design Course Description Form

Module Information			
Module Title	**LOGIC CIRCUIT DESIGN**	**Module Delivery**	
Module Type	**CORE LEARNING ACTIVITY**	**Class Lecture + Lab**	
Module Code	**COE107**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	1	**Semester of Delivery**	2
Administering Department	Computer Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	yusra.abd	**e-mail**	yusra.abd@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	

Relation With Other Modules			
Prerequisite module	COE105	**Semester**	1
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims أهداف المادة الدراسية	● Understand and design circuits with sequential elements such as flip-flops, counters, and registers. ● Apply optimization techniques to improve the efficiency, reliability, and cost-effectiveness of digital circuit designs.

Module Learning Outcomes	• Demonstrate knowledge of sequential logic components such as flip-flops, counters, and registers. • Analyze the behavior, performance, and timing of digital circuits to ensure correct operation. • Apply techniques to optimize digital circuits for performance, cost, and power efficiency. • Utilize digital circuit simulation and design tools to model, test, and verify digital circuits.
Indicative Contents	
Learning and Teaching Strategies	
Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-class questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class conversations.

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1,2	Sequential Circuits, flip flop types
Week 3,4	Shift registers, linear feedback shift register
Week 5,6	Asynchronous Counter
Week 7,8	Synchronous Counter
Week 9	Midterm Exam
Week 10, 11	Memory: ROM, RAM
Week 12,13	Sequence generator & detector, PN generator
Week 14,15	Arithmetic circuits

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Fundamentals of logic design, 5th edition, Roth, 2004, Thomson learning, Inc. o Digital electronics, 5th edition, Bignell, 2007, Thomson learning, Inc. o Digital logic design, 4th edition, Holdsworth, 2002, Elsevier. o Digital systems,10th edition, Tocci, 2007,pearson prentice hall o Digital fundamentals, 10th edition, Floyd, 2009, Pearson prentice hall. o Digital design, 4th edition, Mano, 2007, Pearson prentice hall o Digital principles and applications, Tata McGrow-Hill,1985 Malveno/leach	
Recommended Texts		
Websites		

Physics and Semiconductor Devices Course Description Form

Module Information

Module Title	**SEMICONDUCTOR PHYSICS**	**Module Delivery**	
Module Type	**SUPORT**	**Class Lecture + Lab**	
Module Code	**COE110**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	1	**Semester of Delivery**	2
Administering Department	Computer Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assist. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Kaleed.hadi	**e-mail**	Kaleed.hadi@alfarabiuc.edu.iq
Peer Reviewer Name		**e-mail**	
Review Committee Approval	30/1/2026	**Version Number**	1.0

Relation With Other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	The aim of this module is to provide students with a comprehensive understanding of the fundamental principles and practical applications of semiconductor physics and electronic devices. This includes an in-depth study of the physics of semiconductors, diode and transistor characteristics, and their various applications in electronic circuits. The course combines theoretical knowledge with hands-on laboratory experiments to equip students with the skills necessary to analyze and design electronic circuits.

Module Learning Outcomes	By the end of this module, students will be able to:
	
	1. **Understand the Physics of Semiconductors**
	  o Explain the atomic structure and electronic states of semiconductors.
	  o Describe the formation and characteristics of PN junctions.
	2. **Analyze Diode Characteristics and Operations**
	  o Understand the forward and reverse biased conditions of PN junctions.
	  o Interpret the VI characteristics of semiconductor diodes, including Zener diodes.
	  o Assess the impact of temperature and other factors on diode performance.
	3. **Apply Diode Functions in Circuits**
	  o Perform load-line analysis for diodes in series and parallel configurations.
	  o Design and analyze rectifier circuits (half-wave and full-wave).
	  o Understand the application of diodes in clippers and clampers.
	4. **Understand Bipolar Junction Transistors (BJTs)**
	  o Explain the construction and operation of BJTs.
	  o Understand the different states of BJT operation and their significance.
	  o Analyze DC biasing techniques and load line analysis for BJTs.
	5. **Use BJTs as Switches and Amplifiers**
	  o Design circuits using BJTs as switches.
	  o Analyze the operation of BJTs as amplifiers and understand their role in amplification.
	6. **Develop Problem-Solving Skills in Electronic Circuit Design**
	  o Apply theoretical knowledge to solve practical problems in electronic circuit design.
	  o Use analytical and simulation tools to design and test semiconductor-based circuits.
	
	This module equips students with both the theoretical background and practical skills necessary for understanding and applying semiconductor devices in computer engineering.

Indicative Contents	**Week 1: Physics of Semiconductors** • **Topics**: Atomic Structure, Electronic State. **Week 2: PN Junction** • **Topics**: Formation of Depletion Layer, Junction Potential, Forward Biased PN Junction. **Week 3: PN Junction Characteristics** • **Topics**: Forward Biased VI Characteristics, Reverse Biased PN Junction, Reverse Biased VI Characteristics. **Week 4: Semiconductor Diodes**

- **Topics**: Diode Operating Conditions, Actual Diode Characteristics, Zener Region.

Week 5: Semiconductor Diodes

- **Topics**: Forward Bias Voltage, Temperature Effects, Diode Specification, and Max Ratings.

Week 6: Diode Applications

- **Topics**: Load-Line Analysis, Series Diode Configurations, Parallel Configurations.

Week 7: Diode Applications

- **Topics**: Half-Wave Rectification, Full-Wave Rectification, Peak Reverse Voltage.

Week 8: Diode Applications

- **Topics**: Diode Clippers, Biased Clippers, Parallel Clippers.

Week 9: Diode Applications

- **Topics**: Clampers, Biased Clamper Circuits.

Week 10: Diode Applications

- **Topics**: Zener Diodes.

Week 11: Bipolar Junction Transistor (BJT)

- **Topics**: Construction and Operation.

Week 12: Bipolar Junction Transistor (BJT)

- **Topics**: Construction and Operation (continued).

Week 13: DC Biasing of BJTs

- **Topics**: Biasing and the Three States of Operation.

Week 14: DC Biasing of BJTs

- **Topics**: Transistor Saturation Level, Load Line Analysis.

Week 15: BJT Applications

- **Topics**: The BJT as a Switch and Amplifier.

Laboratory Experiments

	1. **EXP 1: Diode Rectifier and Smoothing Filters** o Design and analyze rectifier circuits and smoothing filters. 2. **EXP 2: Non-linear Wave Shaping: Clipper and Clamper Circuits** o Implement and analyze clipper and clamper circuits. 3. **EXP 3: Zener Diode** o Explore the characteristics and applications of Zener diodes. 4. **EXP 4: BJT Characteristics and Parameters** o Analyze the characteristics and parameters of BJTs. 5. **EXP 5: Transistor as a Switch** o Implement and analyze transistors in switching applications. This structure ensures that students receive a balanced education with both theoretical knowledge and practical skills, preparing them for advanced studies or professional work in electronic engineering and related fields.
Learning and Teaching Strategies	
Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-Class Questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Physics of Semiconductors: Atomic Structure, Electronic State
Week 2	PN Junction: Formation of Depletion layer, Junction Potential, Forward Biased PN junction
Week 3	PN Junction: Forward Biased VI Characteristics, Reverse biased PN junction, Reverse biased VI Characteristics
Week 4	Semiconductor Diodes: Diode Operating Conditions, Actual Diode Characteristics, Zener Region
Week 5	Semiconductor Diodes: Forward Bias Voltage, Temperature Effects, Diode Specification and Max Ratings
Week 6	Diode Applications: Load-Line Analysis, Series Diode Configurations, Parallel Configurations
Week 7	Diode Applications:, Half-Wave Rectification, Full-Wave Rectification, Peak reverse voltage
Week 8	Diode Applications: Diode Clippers, Biased Clippers, Parallel Clippers
Week 9	Diode Applications: Clampers, Biased Clamper Circuits
Week 10	Diode Applications: Zener Diodes

Week 11	Bipolar Junction Transistor (BJT) Construction and Operation
Week 12	Bipolar Junction Transistor (BJT) Construction and Operation
Week 13	DC Biasing of BJTs: Biasing and the Three States of Operation
Week 14	DC Biasing of BJTs: Transistor Saturation Level, Load Line Analysis
Week 15	The BJT as a Switch and Amplifier
Week 16	**Final Exam**

Second Level

Course Description Form for Object-Oriented Programming

Module Information

Module Title	**Object-oriented Programming**	**Module Delivery**	
Module Type	**CORE**	**Class lecture + Lab**	
Module Code	**COE204**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Computer	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Msc.
Module Tutor		**e-mail**	
Peer Reviewer Name	naba.alaa	**e-mail**	naba.alaa@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules

Prerequisite module	**COE108**	**Semester**	1.2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	• Learning how to write OOP programs. • Gaining knowledge of OOP concepts like: class, inheritance, and data encapsulation. • Learning how to use OOP to solve real-life and scientific problems.
Module Learning Outcomes	By the end of this module, students will be able to: **14. Understand and Use Classes** o Describe the concept of classes and objects o Learn to implement classes, constructors, and method overloading. **15. Understand and Use Data Encapsulation** o Describe the concept of data encapsulation o Learn to use access modifiers, getters and setters, and static keyword. **16. Understand and Use Class Inheritance** o Describe class inheritance o Use superclasses, subclasses, method overriding, and final keyword. **17. Understand and Use Abstract Classes** o Describe abstract classes and abstract methods.

	○ Use abstract class in real-world problems. **18. Understand and Use Interfaces** ○ Describe interfaces. ○ Describe the difference between interfaces and abstract classes. ○ Use interface in real-world problems. **19. Understand and Use Multithreading** ○ Learn to use Thread class and Runnable interface ○ Use multithreading in real-world problems.
Indicative Contents	• Classes and Objects • Data Encapsulation • Class Inheritance • Abstract Classes • Interfaces • Multithreading
Learning and Teaching Strategies	
Strategies	19) Lectures. 20) Homework and Assignments. 21) Tests and Exams. 22) In-Class Questions and Discussions. 23) In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)	
Week	Material Covered
Week 1	Introduction to OOP and Java Basics
Week 2	Control Structures
Week 3	Classes and Objects
Week 4	Encapsulation and Data Hiding
Week 5	Class Inheritance
Week 6	Polymorphism
Week 7	Abstract Classes
Week 8	Interfaces
Week 9	Exception Handling
Week 10	Collections Framework 1
Week 11	Collections Framework 2
Week 12	File Handling
Week 13	Inner Classes and Nested Classes
Week 14	Multithreading
Week 15	Advanced OOP Concepts

Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Introduction to Java Development Environment (IDE setup, writing first Java program, basic input/output)
Week 2	Practice with Control Structures (if-else, loops, switch-case)
Week 3	Creating Classes and Objects (writing simple classes, constructors, and object creation)
Week 4	Encapsulation and Data Hiding (working with access modifiers, getters/setters)
Week 5	Implementing Class Inheritance (creating superclass-subclass relationships)
Week 6	Demonstrating Polymorphism (method overriding, dynamic method dispatch)
Week 7	Using Abstract Classes (creating abstract classes and methods)
Week 8	Working with Interfaces (defining and implementing interfaces)
Week 9	Exception Handling (writing try-catch blocks, custom exceptions)
Week 10	Collections Framework 1 (introduction to Lists, Sets, and Maps)
Week 11	Collections Framework 2 (practice with iterating, sorting, and advanced collection usage)
Week 12	File Handling (reading from and writing to files using Java I/O)
Week 13	Inner and Nested Classes (creating and using inner, local, and anonymous classes)
Week 14	Multithreading (creating threads using Runnable and Thread classes, synchronization)
Week 15	Advanced OOP Concepts (practical projects incorporating design patterns and advanced Java features like generics, enums)
Week 16	Final Exam

Course Description Form for Microprocessor 1

Module Information					
Module Title	**MICROPROCESSOR 1**			**Module Delivery**	
Module Type	**CORE**			**Class Lecture + Lab**	
Module Code	**COE201**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Computer Engineering		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	yusra.abd		**e-mail**	yusra.abd@alfarabiuc.edu.iq	
Review Committee Approval			**Version Number**		

Relation With Other Modules			
Prerequisite module	Logic Circuit Design	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	Learn the fundamental components and architecture of microprocessors, including CPU, and memory. and develop skills in programming microprocessors in assembly language and interface them with peripheral devices, also gain experience in designing and implementing microprocessor-based systems, including both hardware and software components.
Module Learning Outcomes	• Students will be able to describe the internal architecture and operation of microprocessors. • Students will develop the ability to write and debug assembly language programs for microprocessors. • Students will be able to design a memory interface with a microprocessor.
Indicative Contents	

Learning and Teaching Strategies

Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-class questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class conversations.

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to microprocessors
Week 2	BIU, EU, and memory organization.
Week 3	Assembly Language Programming & Addressing Modes of the 8088/ 8086.
Week 4	Converting Assembly Language Instructions to Machine Code.
Week 5	Data Transfer instructions
Week 6	Arithmetic Instructions
Week 7	Logical, Shift & Rotate Instructions
Week 8	Control Instructions. Unconditional jump [JMP].
Week 9	Conditional Jump Insts.
Week 10	LOOP&LOOP-Handling Instructions
Week 11	The Stack & Subroutines
Week 12	String and String-Handling Instructions
Week 13	The 8088 and 8086 μps: [Pin layout, Minimum & Max- Mode Interfaces].
Week 14	System Clock, Bus Cycle & Time States.8088/8086 Fully Buffered.
Week 15	The Memory System
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Addressing Modes I
Week 2	Addressing Modes II
Week 3	Data Transfer Instructions
Week 4	Arithmetic Instructions
Week 5	Logical, Shift, and Rotate Instructions

Week 6, 7	Transfer Control within a Program
Week 8	PUSH – POP Instructions
Week 9	CALL and RET Instructions
Week 10	String-Handling Instructions
Week 11	Define Byte (DB), Define Word (DW), and Equate (EQ) Directives
Week 12	Macros
Weeks 12, 13, 14	Input Output Instructions I
Week 15	Interrupts

Course Description Form for Engineering Mathematics

Module Information					
Module Title	Engineering Mathematics			**Module Delivery**	
Module Type	Suport			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE225				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	rami.majed		**e-mail**	rami.majed@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives

General Objectives of Teaching Engineering Mathematics

- **Overall Educational Objective:** To prepare students for academic, professional, and personal life by developing their knowledge, skills, and ability to contribute effectively to themselves and society.
- **General Objective:** To enhance students' proficiency in mathematics in particular and improve their overall learning and educational competencies.
- To develop students' abilities in **reasoning, deduction, generalization, and logical thinking**, and to apply mathematical logic effectively.
- To develop an understanding of fundamental mathematical concepts, including **relations, functions, trigonometric functions, differentiation, integration, and probability**.
- To develop students' understanding of **mathematical proofs and their logical foundations**, while recognizing their important applications in practical and real-life contexts.
- To demonstrate the **practical applications of mathematical and engineering concepts and principles**, highlighting the importance of Engineering Mathematics in engineering education and professional practice.

Module Learning Outcomes	**Knowledge and Understanding** 1. **1The course content has been restructured** to provide a more logical and coherent sequence aligned with the curriculum, with the aim of presenting multivariable calculus concepts in a clear, useful, and engaging manner for the next generation of engineers and scientists. 2. **The fundamental transcendental functions are introduced progressively** and integrated throughout the subsequent chapters through relevant examples and exercises to reinforce students' understanding and practical application. 3. **To develop students' understanding of the mathematical language and terminology** required to apply the concepts of multivariable calculus effectively to a wide range of applications in science and engineering.
Indicative Contents	

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**Vector in the plane, Cartesian coordinates and vectors in space**
Week 2	**Dot product and cross product**
Week 3	**Lines and planes in space, Cylinders and quadric surfaces**
Week 4	**Vector valued functions and space curves**
Week 5	**Functions of Several Variables : Limits and Continuity in Higher Dimensions**
Week 6	**Directional derivatives and gradient**
Week 7	**Lagrange multipliers**
Week 8	**Multiple integrals**
Week 9	**Multiple integrals**
Week 10	**Integrals and Vector Fields: Line Integrals, Work, Circulation, and Flux**
Week 11	**Path Independence, Conservative Fields, and Potential Functions**
Week 12	**Green's Theorem in the Plane, Surfaces and Area**
Week 13	**Surface Integrals, Stokes' Theorem, and the Divergence Theorem**
Week 14	**Second-Order Differential Equations**
Week 15	**Higher-Order Differential Equations**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Weir, M., Hass and Giordano. (2008). Thomas' Calculus. Eleventh Edition, Pearson-Addison-Weesley.	Y
Recommended Texts	Howard, A. et. Al. (2008). Calculus. McGraw-Hill	Y
Websites		

Course Description Form for Digital Circuit Design

Module Information

Module Title	**DIGITAL CIRCUIT DESIGN**	**Module Delivery**	
Module Type	**CORE**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COE203**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		
Module Level	2	**Semester of Delivery**	3
Administering Department	Computer Engineering	**College**	College of Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assist.Prof.	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Ahmed.Hussein	**e-mail**	Ahmed.Hussein@alfarabiuc.edu.iq
Review Committee Approval	24/08/2024	**Version Number**	1.1

Relation With Other Modules

Prerequisite module	COE107	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This program Specification provides a concise summary of the main features of the program of digital circuit design (DCD) and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programmed specification.
Module Learning Outcomes	1- Simplify & solved any Boolean equation until to 6 variables using K-map method. 2- Acknowledge how to design digital problem using finite state machine approach. 3- Analysis any sequential circuit of a digital system using Mealy and Moore state machine design. 4- Design practical & complex problem using multiple inputs and/or outputs. 5- Realize digital circuit design using various types of flip flops (FFs). 6- Separate between synchronous & asynchronous state machine approach in a design. Discuss all the problems of asynchronous design. 7- Design a digital circuit & solve practical problems by applying VHDL language

	in a design
Indicative Contents	

Learning and Teaching Strategies

Strategies	- Lectures. - Homework, Quizzes and Assignments. - Extracurricular Activities. - Tests and Exams. - In-class questions and Discussions. Student engagement during Lectures. - Individual / Group Projects - In- and Out-Class conversations.

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to synchronous sequential circuits with design methodology: State diagram, state table, reduction, binary assignment table and circuit realization. Then Introduction to FSMs: Mealy and Moore machines.
Week 2	Synchronous design process: state diagram, state table with limited number of inputs and outputs.
Week 3	Design examples of FSMs.
Week 4	Synchronous design process: reduction state table and binary assignment table with limited number of inputs and outputs. Design examples of FSMs.
Week 5	Synchronous design process: circuit realization with different types of flip flops.
Week 6	Analysis of synchronous sequential circuits.
Week 7	Student presentations of synchronous circuit design projects.
Week 8	Midterm Exam
Week 9	Introduction to Asynchronous sequential circuits with design methodology: state diagram, state table, reduction, merging table, binary assignment table and circuit realization.
Week 10	Asynchronous vs. synchronous sequential circuits: hazards and races in asynchronous circuits.
Week 11	Asynchronous design process: state diagram, primitive flow table with limited number of inputs and outputs. Design examples of FSMs.
Week 12	Asynchronous design process: reduction, merging table and binary assignment table with limited number of inputs and outputs. Design examples of FSMs.
Week 13	Analysis of Asynchronous sequential circuits
Week 14	Student presentations of Asynchronous circuit design projects.
Week 15	Review of key concepts and preparation for final exam
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Introduce basic VHDL concepts and its simulator
Week 2	VHDL description of logic circuits, VHDL models, operators and libraries.
Week 3	Implement different logic gates (AND, OR, NOT) using VHDL dataflow method
Week 4	Implement different logic gates (AND, OR, NOT) using VHDL structure method
Week 5	Implement simple combinational circuit using VHDL, adders and subtractors
Week 6, 7	Modeling other combinational logic components using VHDL structure method, such as Mux, Dmux, Decoder, Encoder, comparator ….. etc.
Week 8	Sequential Circuits - Latches and Flip-Flops using Behavioral modeling
Weeks 9, 10	Implementing SR, D flip-flops
Weeks 11, 12	Implementing JK, and T flip-flops
Weeks 13, 14	Implementing registers and counters using VHDL processes
Weeks 15	Mini Project and/or preparation for involving VHDL in final exam

Course Description Form for Arabic Language II

Module Information					
Module Title	**ARABIC LANGUAGE**			**Module Delivery**	
Module Type	**BASIC**			**Theory**	
Module Code	**GE101**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2	**Semester of Delivery**	3		
Administering Department	Computer	**College**	Engineering		
Module Leader		**e-mail**			
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**			
Module Tutor	None	**e-mail**			
Peer Reviewer Name	Fatma.salman	**e-mail**	Fatma.salman@alfarabiuc.edu.iq		
Review Committee Approval		**Version Number**	1.0		

Relation With Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims

1. **Promote and preserve the Arabic language** by developing students' linguistic competence and minimizing common linguistic errors.
2. **Develop students' ability to use the Arabic language accurately and effectively** in communication with others through speaking, writing, listening, and reading, enabling them to communicate their needs and interests clearly.
3. **Develop students' ability to express themselves effectively**, both orally and in writing, and to communicate their thoughts, ideas, and observations clearly.
4. **Enrich students' linguistic repertoire** by introducing a range of appropriate Arabic vocabulary, expressions, and linguistic structures.
5. **Enable students to identify common linguistic errors** and guide them toward recognizing, correcting, and avoiding such errors.
6. **Foster students' interest in reading and independent study** and encourage reading as a means of developing their linguistic and intellectual abilities.
7. **Develop students' appreciation of the aesthetic features of the**

	Arabic language and its literature and enable them to recognize its expressive and stylistic qualities. 8. **Develop students' skills in engaging with the Arab cultural and literary heritage** and promote integration between this heritage and various fields of knowledge and culture. 9. **Apply Arabic grammar rules in reading and writing** through practical exercises and activities related to the proposed course topics.
Module Learning Outcomes	1. **Develop appreciation for and pride in the Arabic language** and recognize its cultural and intellectual significance. 2. **Demonstrate accurate pronunciation, effective delivery, and clear oral expression** using appropriate voice intonation, while expanding their vocabulary through the acquisition of diverse words, expressions, sentence structures, and linguistic styles. 3. **Write Arabic words accurately** and develop the ability to retain and recall their correct orthographic forms when writing. 4. **Identify and correct more than fifty common linguistic errors**, demonstrating improved accuracy in the use of the Arabic language. 5. **Distinguish between the different forms of the Arabic hamza**, including initial, medial, and final hamza, and apply the appropriate rules for writing each form correctly. 6. **Improve linguistic accuracy and fluency** by avoiding common language errors and developing sound linguistic habits that enable students to use words and sentences correctly while preserving the clarity, elegance, and aesthetic quality of Arabic expression.
Indicative Contents	1. **The Origins and Development of the Arabic Language** 2. **The Importance of the Arabic Language:** An Introduction to Its General Significance and Its Relevance to Non-Specialist Students 3. **Parts of Speech and the Concepts of Inflected and Indeclinable Forms in Nouns and Verbs** 4. **Common Linguistic Errors** 5. **Hamzat al-Qaṭʿ and Hamzat al-Waṣl** 6. **The Orthographic Rules of Medial and Final Hamza** 7. **Letters Added in Arabic Orthography** 8. **Punctuation Marks in the Arabic Language** 9. **Numerals and the Rules for Writing Numbers** 10. **The Subject (Mubtadaʾ) and Predicate (Khabar)** 11. **Types of Plurals and Their Related Forms** 12. **A Poem by a Classical Arabic Poet** 13. **A Poem by a Modern Arabic Poet** 14. **"An (أن)" and "Inna (إنّ)": The Difference Between Them** 15. **Orthographic Distinctions Between Ẓāʾ and Ḍād, and Between Tāʾ Marbūṭah and Hāʾ**
Learning and Teaching Strategies	

Strategies	24)Lectures. 25)Tutorials. 26)Homework and Assignments. 27)Tests and Exams. 28)In-Class Questions and Discussions. 29)Extracurricular Activities. 30)Seminars. 31)In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	**The Origins and Development of the Arabic Language**
Week 2	**A Lesson on the General Importance of the Arabic Language and Its Significance for Non-Specialist Students**
Week 3	**Parts of Speech and the Inflected and Indeclinable Forms of Nouns and Verbs**
Week 4	**Hamzat al-Qaṭʿ and Hamzat al-Waṣl**
Week 5	**Writing Medial and Final Hamza**
Week 6	**Common Linguistic Errors**
Week 7	**Punctuation Marks**
Week 8	**Letters Added in Writing**
Week 9	**Numbers and the Rules for Writing Numbers**
Week 10	**Types of Plurals and Related Forms**
Week 11	**The Open and Broken Forms of "An" (أنَّ / إنَّ)**
Week 12	**The Subject and the Predicate**
Week 13	**A Poem by a Classical Arabic Poet**
Week 14	**A Poem by a Modern Arabic Poet**
Week 15	**Writing Ẓāʾ and Ḍād, and Distinguishing Tāʾ Marbūṭah from Hāʾ**
Week 16	**Final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	1. **Mustafa Al-Tuni**, *Hamza in the Arabic Language: A Linguistic Study.* 2. **Saad bin Ali bin Mohammed**, *The Difference Between Ḍād and Ẓāʾ.* 3. **Abdul Qader Amin**, *General Arabic Language*	Yes

	for Non-Specialist Departments.	
Recommended Texts	1. **Yousef Ata Al-Tarifi**, *Al-Wadih fi al-Imla wa 'Alamat al-Tarqim* (The Clear Guide to Arabic Spelling and Punctuation). 2. **Mohammad Al-Adnani**, *Mu'jam al-Aghlat al-Lughawiyyah* (Dictionary of Common Linguistic Errors).	No

Course Description Form for Engineering Analysis

Module Information					
Module Title	Engineering Analysis			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE206				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	4	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	PhD	
Module Tutor			**e-mail**		
Peer Reviewer Name	rami.majed		**e-mail**	rami.majed@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives

General Objectives of Teaching Engineering Analysis

- **Overall Educational Objective:** To prepare students for academic, professional, and personal life by developing their knowledge, analytical skills, and ability to contribute effectively to themselves and society.
- **General Objective:** To enhance students' proficiency in Engineering Analysis in particular and improve their overall academic and educational competencies.
- **Develop students' abilities in deduction, generalization, and logical reasoning**, enabling them to apply analytical thinking to engineering problems.
- **Develop students' understanding of important transforms used in systems engineering**, including the **Fourier Transform, Laplace Transform, and Z-Transform**.
- **Enable students to understand and apply these transforms** in analyzing frequency response, solving differential equations, and solving difference equations.
- **Demonstrate the practical applications of engineering concepts, principles, and mathematical methods**, emphasizing the importance of Engineering Analysis in engineering education and professional practice.

Module Learning Outcomes	**Knowledge and Understanding** 1. **Demonstrate a clear and systematic understanding of the course content** through a logically structured sequence of topics that is consistent with the approved curriculum. 2. **Understand fundamental transcendental functions** and apply them appropriately throughout the course through relevant examples and practical exercises. 3. **Understand and apply engineering transforms** that contribute to simplifying the analysis of continuous-time and discrete-time systems.
Indicative Contents	

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Signal and Sequence Functions, Operations on Functions, Classifications of Functions
Week 2	Continuous and Discrete-Time Systems, System Properties
Week 3	Fourier series Representation for Periodic Signals, Exponential and Trigonometric Forms
Week 4	Even and Odd Functions, Power Contents and Parseval's Identity
Week 5	Fourier Transform, Equations and Spectra
Week 6	Common Fourier Transform Pairs and Properties, Frequency Response
Week 7	Analysis of Continuous-Time LTI Systems, Impulse Response and Convolution
Week 8	Step Response, Properties of Impulse Response, Transfer Function
Week 9	Mid-Term Exam
Week 10	The Laplace Transform, Poles and Zeros, ROC, Common Laplace Transform Pairs and Properties
Week 11	Inverse Laplace Transform, Transfer Function, Solving ODE, Continuous-Time System Characterization
Week 12	Analysis of Discrete-Time LTI Systems, Impulse Response and Convolution
Week 13	Sequence Response, Properties of Impulse Response, Transfer Function
Week 14	The Z-Transform, Poles and Zeros, ROC, Common Z-Transform Pairs and Properties
Week 15	Inverse Z-Transform, Transfer Function, Solving DE, Discrete-Time System Characterization
Week 16	Term Final Exam

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Glyn James and Phil Dykes, Advanced Modern Engineering Mathematics, Fifth Edition (2018), Pearson	Y

Recommended Texts	K.A. Stroud and Dexter Booth, Advanced Engineering Mathematics, Sixth Edition (2020), Macmillan International	Y
Websites		

Course Description Form for Computer Architecture

Module Information

Module Title	**COMPUTER ARCHITECTURE 1**	**Module Delivery**	
Module Type	**CORE**	**Class Lecture + Lab**	
Module Code	**COE208**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Computer Engineering	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	Shams.abdrahman	**e-mail**	Shams.abdrahman@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	

Relation With Other Modules

Prerequisite module	COE107	**Semester**	2
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	Understand basic computer architecture and hardware. And Explore CPU design and execution methods.
Module Learning Outcomes	• Describe key principles of computer architecture, including the function of core hardware components and their interactions. • Recognize and explain the roles of various CPU components, such as ALUs, registers, and caches. • Solve practical problems by applying theoretical knowledge of computer architecture.
Indicative Contents	

Learning and Teaching Strategies

Strategies	- Lectures. - Homework and Assignments. - Tests and Exams. - In-class questions and Discussions. - Extracurricular Activities. - Individual / Group Projects - In- and Out-Class conversations.

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Register Transfer Language
Week 2	Arithmetic Micro operations
Week 3	Instruction Codes
Week 4	Timing and Control
Week 5	Memory-Reference Instructions
Week 6	Complete Computer Description
Week 7	Design of Accumulator Logic
Week 8	Control Memory
Week 9	Micro program Example
Week 10	Design of Control Unit
Week 11	Central Processing Unit
Week 12	Instruction Formats
Week 13	Addressing Modes
Week 14	Program Control
Week 15	Reduced Instruction Set Computer
Week 16	**Final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	• M. Morris. Mano, "Computer System Architecture" 3rd Edition • William Stalling, "Computer Organization and Architecture" 6th edition.	
Recommended Texts	• P. Trivedi and R. P. Tripathi, "Design & analysis of 16 bit RISC processor using low power pipelining," International Conference on Computing, Communication & Automation, Noida, 2015, pp. 1294-1297. • B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in IEEE Transactions on Industrial Electronics, vol. 49, no. 2, pp. 415-422, Apr 2002. • J. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-banked register file architectures," Proceedings of 27th International Symposium on Computer Architecture (IEEE Cat. No.RS00201), Vancouver, BC, Canada, 2000, pp. 316-325. • C. Hamacher, Z. Vranesic, S. Zaky, N. Manjikian "Computer Organization and Embedded Systems", Sixth Edition • Computer Architecture A Quantitative Approach, Sixth Edition, John L. Hennessy, David A. Patterson, 2019.	
Websites		

Course Description Form for English Language

Module Information					
Module Title	English Language2			**Module Delivery**	
Module Type	Basic			☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** **Practical** ☐ **Seminar**	
Module Code	UOB202				
ECTS Credits	2				
SWL (h/sem)	50				
Module Level	UGx111		**Semester of Delivery**	4	
Administering Department	Computer		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Mahmood.moloud		**e-mail**	Mahmood.moloud@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**		

Learning and Teaching Strategies	
Strategies	In order to build the character of the college students in in their specialty and at the English language subject, and for enhancing the students' linguistic skills (reading, writing, speaking and listening) well as developing such skills to enable them of practicing the language on daily basis ; a number of strategies have been followed: Textbook material. Discussion and interaction during lectures Reading passages and dialogues from different sources to develop their reading and listening skills. - Easily and thoroughly explain lessons with the participation of - students to ensure their understanding and make them able communicate with each other easily without hesitation. - Written quizzes help in developing the writing skills And nourish their thinking and expression abilities.

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Unit 1,2 conversation and writing skills measured
Week 2	Unit 3,4 plus writing composition
Week 3	Unit 5,6 plus reading activities
Week 4	Unit 7,8 reading and conversation activities
Week 5	Unit 9,10 conversation activities
Week 6	Unit 11 conversation activities
Week 7	Unit 12 conversation activities
Week 8	Unit 13 conversation activities
Week 9	Unit 14 conversation activities
Week 10	Different activities (reading, writing, conversation)
Week 11	Composition Writing
Week 12	Different activities (reading, writing, conversation)
Week 13	Presenting their projects + discussion
Week 14	Presenting their projects + discussion
Week 15	Different activities (reading, writing, conversation and Presenting their projects + discussion
Week 16	Different activities (reading, writing, conversation)

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	(1) New Headway Plus [pre-intermediate] by John and Liz Soars, Oxford: Oxford University Press (2006) (hard cover or Pdf version), (2) Modern scientific articles from the news related to the students' specialty, and (3) Internet links and videos related to the topics discussed in General English and English for Specific Purposes lectures.	No
Recommended Texts	Morphy,A.J (1983) English Grammar in use. Cambridge:CUP, Collins English for Exams Reading for IELTS by Els Van Geyte and Rona Snelling (2019).	No
Websites	https://www.bbc.co.uk/learningenglish/ any websites for learning English on social media and podcasts.	

Course Description Form for Digital Systems Design

Module Information

Module Title	**DIGITAL SYSTEM DESIGN (DSD)**	**Module Delivery**	
Module Type	**CORE LEARNING ACTIVITY**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**COE205**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	2	**Semester of Delivery**	4
Administering Department	Computer Engineering	**College**	College of Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	م.م هدى موفق كاظم	**e-mail**	Huda.mufak@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	1.1

Relation With Other Modules

Prerequisite module	COE203	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	This program Specification provides a concise summary of the main features of the program of digital system design (DSD) and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programmed specification.

Module Learning Outcomes	8- Simplify & solved any Boolean equation until to M variables using minimum K-map method. 9- Acknowledge how to design digital problem using Algorithm State Machine (ASM) approach. 10- Convert any ASM chart of a digital system to finite Mealy and Moore state machine designs. 11- Design practical & complex problem using multiple inputs and/or outputs. 12- Realize and convert different types of combination logic equations, regarding practical problems using various types of programmable logic device (PLD). 13- Various type of the PLD, like ROM, PLA, PAL, FPGA with MUXs… etc. 14- Separate between synchronous & asynchronous ASM in a design. Discuss all the problems of their design. 15- Design multiple digital circuits & solve practical system problems by applying VHDL language in a design according to sequential FFs with the ASM desgn.
Indicative Contents	
Learning and Teaching Strategies	
Strategies	- Lectures. - Homework, Quizzes and Assignments. - Extracurricular Activities. - Tests and Exams. - In-class questions and Discussions. Student engagement during Lectures. - Individual / Group Projects - In- and Out-Class conversations.

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Introduction to Programmable Logic Devices (ROM, PLA, PAL, FPGA, and MUX-based logic). Overview of sequential logic in PLD context. Principles of design using PLDs: design methodology.
Week 2	Introduction to ASM (Algorithmic State Machine) charts and FSM (Moore/Mealy) in programmable logic. This includes block diagrams, ASM chart formulation, state diagram → state table → assignment → realization using ROM/PLA.

Week 3	FSM Design Steps with PLDs: State minimization, binary state assignment, K-map optimization, mux-based realization. Simple examples of digital combination equations in different PLDs.
Week 4	FSM → PLD realization path: state diagram to simplified logic circuit using PLA and PAL with detailed truth table and programming table construction.
Week 5	Realization using ROM-based design: address/data table structure, implementation of a controller (e.g., traffic light). K-map for minimal ROM contents.
Week 6	Realization using PAL/PLA: limitations and advantages, fuse-map programming, design example (e.g., coin acceptor controller).
Week 7	Introduction to FPGA logic blocks and programmable interconnects. Design flow for FSM with FPGA, using MUX-based path selection logic.
Week 8	Midterm Exam – covering weeks 1–7
Week 9	Case Study 1: 4-bit binary adder and multiplier using PLDs. Truth table construction, K-map simplification, circuit realization.
Week 10	Case Study 2: Divider and basic ALU-style control logic using PLDs. Design steps and simplified expressions. Implement using ROM/PLA.
Week 11	Case Study 3: simple Traffic light controller and Elevator controller using FSM → K-map → PLD (ROM/PAL/PLA) circuits.
Week 12	Case Study 4: Vending machine / ATM / Can seller: Full design with inputs/outputs, FSM, assignment, simplification, and PLD realization.
Week 13	Case Study 5: Dice game controller – full example from ASM chart to PLD-based circuit. Include state table, binary assignment, simplified expressions, PLD implementation (PLA/PAL/FPGA).
Week 14	Student presentations of PLD-based FSM or ASM design projects (e.g., any control or arithmetic logic). Emphasis on optimization and implementation.
Week 15	Review of all design methodologies, comparisons between PLD types, practical trade-offs, final preparation.
Week 16	Final Exam – Comprehensive, covering all ASM design and PLD implementation techniques.

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Introduction to Behavioral Modeling in VHDL
Week 2	Process Statements and Wait Conditions
Week 3	Conditional Statements in Behavioral Modeling
Week 4	Looping Constructs in VHDL
Week 5	Data Type Conversion Techniques
Week 6	Custom Types and Variables in VHDL
Week 7	Practical Example – 3-to-8 Decoder Implementation
Week 8	Practical Example – Vector Bit Toggle Using Loop
Week 9	Practical Example – 4-bit Up Counter with Reset and Load
Week 10	Practical Example – 4-bit Binary to Seven Segment Decoder
Weeks 11	Flip-Flops – D, JK and SR Design and Behavior

Weeks 12	Memory Design –RAM and ROM Implementation
Weeks 13	Finite State Machines – Mealy Model Implementation
Weeks 14	Finite State Machines – Moore Model Implementation
Weeks 15	Registers – N-bit Register with Clear, Load, and Increment

Course Description Form for Data Structures and Algorithms

Module Information

Module Title	Data Structures & Algorithms	**Module Delivery**	
Module Type	Core	☒ **Theory** **Lecture** **Lab** ☒ **Tutorial** **Practical** ☒ **Seminar**	
Module Code	COE207		
ECTS Credits	6		
SWL (h/sem)	150		
Module Level	2	**Semester of Delivery**	4
Administering Department	Computer	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name	yusra.abd	**e-mail**	yusra.abd@alfarabiuc.edu.iq
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules

Prerequisite module	COE204	**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1- The primary objective of data structures and algorithms (DSA) is to dev organized ways to store, process, and retrieve data. 2- DSA enables programmers to design and analyze algorithms, choose a structures for specific problems, and understand the performance of t terms of time and space complexity. 3- This knowledge is crucial for writing optimized and scalable software.
Module Learning Outcomes	Describe several searching strategies and trace any of the taught hashing schemes. Use any of the taught sorting methods. Understand recursion and polymorphism and be able to use them in algorithm design. Distinguish

	between different algorithm design strategies.
Indicative Contents	

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Arrays
Week 2	Simple Cryptography with Character Arrays
Week 3	Two-Dimensional Arrays and Positional Games
Week 4	Singly Linked Lists
Week 5	Circularly Linked Lists
Week 6	Doubly Linked Lists
Week 7	Stacks
Week 8	Matching Parentheses and HTML Tags
Week 9	Queues, Solving the Josephus Problem Using a Queue
Week 10	Array Lists
Week 11	Iterators
Week 12	General Trees
Week 13	Binary Trees
Week 14	Tree Traversal Algorithms
Week 15	Graph Algorithms
Week 16	**General discussions**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Arrays
Week 2	Simple Cryptography with Character Arrays
Week 3	Two-Dimensional Arrays and Positional Games

Week 4	Singly Linked Lists
Week 5	Circularly Linked Lists
Week 6	Doubly Linked Lists
Week 7	Stacks
Week 8	Matching Parentheses and HTML Tags
Week 9	Queues, Solving the Josephus Problem Using a Queue
Week 10	Array Lists
Week 11	Iterators
Week 12	General Trees
Week 13	Binary Trees
Week 14	Tree Traversal Algorithms
Week 15	Graph Algorithms
Week 16	**General discussions**

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Data Structures and Algorithms, 6th Edition	Electronic copy
Recommended Texts		No
Websites	https://dl.ebooksworld.ir/motoman/Wiley.Data.Structures.and.Algorithms.in.Java.6th.Edition.www.EBooksWorld.ir.pdf	

Third Level

Course Description Form for Communications

1. Course Name
Communications
2. Course Code
COE301
3. Semester / Academic Year
Fifth Semester, Academic Year 2025–2026
4. Date of Preparation of This Course Description
December 2025
5. Available Attendance Modes
In-Class Attendance
6. Total Contact Hours / Total Credits
125 hours, at a rate of 5 hours per week
7. Course Coordinator's Name
Name: Assist. Lecturer Sarah Khairallah Mahdi
Email: sara.khairallah@alfarabiuc.edu.iq
8. Course Objectives
The general objectives of teaching Communications are as follows:
The overall objective of this course is to prepare students for life within and beyond the university, enabling them to contribute effectively to their communities and achieve their personal and professional goals.
Enhance students' proficiency in communication systems and strengthen their overall academic performance to broaden their scientific and technical perspectives.
Develop students' abilities in deduction, design, and the application of logical reasoning to solve mathematical problems.
Understand the characteristics of analog and digital signals and systems in the field of communications engineering.
Master Fourier analysis techniques and their applications in signal analysis.
Understand analog and digital modulation and demodulation techniques.
9. Teaching and Learning Strategies
Lectures
Practical Sessions
Homework and Assignments

Quizzes and Examinations					
In-Class Questions and Discussions					
Extracurricular Activities					
Seminars					
Oral Discussions Inside and Outside the Classroom					
10. Course Structure					
Assessment Method	**Learning Method**	**Unit or Topic Title**	**Required Learning Outcomes**	**Hours**	**Week**
Assessment Methods 11&9	**Learning Methods9**	**Introduction to Communications: Definitions, Elements of a Communication System, Types of Communication Systems, and Signal Classification**	**Section Nine**	**3 Theoretical / 2 Practical**	**1**
Assessment Methods 11&9	**Learning Methods9**	**Fourier Analysis I: Fourier Series, Trigonometric Form, and Exponential Form**	**Section Nine**	**Theoretical 3 Practical 2 /**	**2**
Assessment Methods 11&9	**Learning Methods9**	**Fourier Analysis II: Normalized Power of Periodic Signals and the Fourier Transform**	**Section Nine**	**Theoretical 3 Practical 2 /**	**3**
Assessment Methods 11&9	**Learning Methods9**	**Fourier Analysis III: Normalized Energy of Aperiodic Signals, Convolution, and Frequency Response**	**Section Nine**	**Theoretical 3 Practical 2 /**	**4**
Assessment Methods 11&9	**Learning Methods9**	**Amplitude Modulation I: Conventional AM (Generation and Detection), Power, and Bandwidth in AM**	**Section Nine**	**Theoretical 3 Practical 2 /**	**5**
Assessment Methods 11&9	**Learning Methods9**	**Amplitude Modulation II: Double-Sideband Suppressed-Carrier (DSB-SC) Modulation and Demodulation**	**Section Nine**	**Theoretical 3 Practical 2 /**	**6**
Assessment Methods	**Learning Methods9**	**Amplitude Modulation III: Single-Sideband (SSB) Modulation and Vestigial**	**Section Nine**	**Theoretical 3 Practical 2 /**	**7**

11&9		Sideband (VSB) Modulation			
Assessment Methods 11&9	Learning Methods9	AM Receivers: Superheterodyne Receiver for Amplitude Modulation	Section Nine	Theoretical 3 Practical 2 /	8
Assessment Methods 11&9	Learning Methods9	Angle Modulation I: Introduction to FM and PM, NBFM Generation, and WBFM Generation	Section Nine	Theoretical 3 Practical 2 /	9
Assessment Methods 11&9	Learning Methods9	Angle Modulation II: Direct FM Generation, Indirect FM Generation, Power, and Bandwidth in FM	Section Nine	Theoretical 3 Practical 2 /	10
Assessment Methods 11&9	Learning Methods9	FM Systems: FM Detection, Superheterodyne FM Receiver, and Frequency Division Multiplexing (FDM)	Section Nine	Theoretical 3 Practical 2 /	11
Assessment Methods 11&9	Learning Methods9	Noise Analysis: Noise in Amplitude Modulation and Noise in Angle Modulation	Section Nine	Theoretical 3 Practical 2 /	12
Assessment Methods 11&9	Learning Methods9	Digital Communications I: Sampling Theorem, Pulse Code Modulation (PCM), and Noise in PCM	Section Nine	Theoretical 3 Practical 2 /	13
Assessment Methods 11&9	Learning Methods9	Digital Communications II: Probability of Error (Pe), Delta Modulation (DM), Noise in DM, and Time Division Multiplexing (TDM)	Section Nine	Theoretical 3 Practical 2 /	14
Assessment Methods 11&9	Learning Methods9	Digital Modulation and Information Theory: ASK, PSK and DPSK, FSK, Information Measurement, Discrete Memoryless Channels, Source Coding, Channel Capacity, and an Introduction to Channel	Section Nine	Theoretical 3 Practical 2 /	15

		Coding			
Assessment Methods **11&9**		**Final Examination Preparation Week**	**Section Nine**	**Theoretical 3** **Practical 2 /**	**16**

11. Course Assessment	
• Quizzes and Examinations: (15%)	
• Homework Assignments: (5%)	
• Project: (10%)	
• Reports or Presentations: (10%)	
• Midterm Examination: (10%)	
• Final Examination: (50%)	
12. Learning and Teaching Resources	
Digital Communications by John G. Proakis and Masoud Salehi	**Required Textbooks (Curriculum Textbooks)**
Salehi Digital Communications by John G. Proakis and Masoud	**Main References (Sources)**
Communication Systems by Ferrel G. Stremler, Third Edition	**Recommended Supporting Books and References (Scientific Journals, Reports, etc.)**
All available and reliable websites related to the subject.	**Electronic References and Websites**

Course Description Form for Digital Signal Processing

Module Information

Module Title	**DIGITAL SIGNAL PROCESSING**		**Module Delivery**
Module Type	CORE		**Theory**
Module Code	**COE302**		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	3	**Semester of Delivery**	5
Administering Department	Computer	**College**	College of Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	hoda.ali	**e-mail**	hoda.ali@alfarabiuc.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules

Prerequisite module	Computer analysis, mathematics	**Semester**	
Co-requisites module	Digital Control Systems, Image Processing	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims

General Objectives of Teaching Digital Signal Processing:

- The overall objective of education is to prepare students for life inside and outside the university, enabling them to contribute effectively to their community and achieve their personal and professional goals.
- Enhance students' knowledge and proficiency in Digital Signal Processing, while improving their overall academic level and broadening their scientific and technical perspectives.
- Develop students' abilities in analysis, deduction, design, and the use of logical reasoning when solving mathematical and engineering problems.
- Understand the characteristics of digital signals and systems in the field of Computer Engineering and relate them to real-life and practical applications.
- Understand the fundamental concepts of Digital Signal Processing and apply them to frequency-response analysis and digital filter design.
- Develop students' ability to apply practical concepts, principles, and mathematical analysis techniques related to digital signals and systems.

Module Learning Outcomes	**Knowledge and Understanding** 1. Understand the scientific content in a logical and coherent manner to develop useful and practical knowledge for the next generation of engineers and scientists. 2. Introduce and understand the fundamental functions and integrate their applications throughout the course, particularly through examples and exercises. 3. Provide students with opportunities to work with digital signals and systems and understand their applications in various real-life processes. 4. Enhance students' understanding of the mathematical language required to apply digital signal concepts, which are fundamental to numerous engineering applications**.**
Indicative Contents	

Learning and Teaching Strategies

Strategies	1) Lectures. 2) Tutorials. 3) Homework and Assignments. 4) Tests and Exams. 5) In-Class Questions and Discussions. 6) Extracurricular Activities. 7) Seminars. 8) In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Introduction to digital signal processing and its applications
Week 2	Classification of discrete Signals
Week 3	Classification of discrete systems
Week 4	Linear Time-Invariant (LTI) systems
Week 5	Sampling theory
Week 6	Quantization
Week 7	Difference equations and Impulse response
Week 8	Frequency domain analysis and Matrix form of DFT
Week 9	Convolution & Discrete Convolution
Week 10	Convolution & Discrete Convolution
Week 11	Digital Signal Processing Systems
Week 12	Realization of Digital Filters
Week 13	Types of digital filters
Week 14	Finite Impulse Response

Week 15	Infinite Impulse Response Filter Design and Understand the concept of windowing theorem
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	• Tan, Lizhe, and Jean Jiang. Digital signal processing: fundamentals and applications. Academic Press, 2018.	No
Recommended Texts	• Smith, S. (2013). Digital signal processing: a practical guide for engineers and scientists. Elsevier. • Kuo, Sen M., Bob H. Lee, and Wenshun Tian. Real-time digital signal processing: fundamentals, implementations and applications. John Wiley & Sons, 2013.	No
Websites		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**		25%		
	Assignments		5%		
	Projects / Lab.		5%		
	Report		5%		
Summative assessment	**Midterm Exam**		10%		
	Final Exam		50%		
Total assessment			100% (100 Marks)		

Course Description Form for Computer Networks I

Module Information					
Module Title	**COMPUTER NETWORKS 1**			**Module Delivery**	
Module Type	**CORE**			**Theory and lab**	
Module Code	**COE303**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	1		**Semester of Delivery**	5	
Administering Department	Computer Engineering		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	estabraq.abdulrahman		**e-mail**	estabraq.abdulrahman@alfarabiuc.edu.iq	
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	1. Explore the application layer protocols and services that enable network applications to communicate over the Internet. This includes topics such as HTTP, DNS, email protocols (SMTP, POP, IMAP), and multimedia streaming. 2. Understand the role of the transport layer in providing reliable and efficient data transfer between end systems. Topics covered include TCP and UDP protocols, congestion control, and flow control.

Module Learning Outcomes	1. Understanding of Network Architecture: Students should be able to explain the layered network architecture, including the functions and interactions of each layer. 2. Knowledge of Network Protocols: Students should have a solid understanding of various network protocols and their purpose, such as HTTP, DNS, TCP, UDP, IP, and Ethernet. 3. Application Layer Skills: Students should be able to analyze and design network applications, understand their protocols, and troubleshoot issues related to application-layer communications. 4. Transport Layer Skills: Students should be able to analyze and evaluate the performance of transport layer protocols, understand congestion control mechanisms, and configure transport layer parameters for different scenarios.
Indicative Contents	1. Introduction to Computer Networks • Overview of computer networks and their importance • Network architecture and the layered approach • Internet history and evolution 2. Application Layer • Introduction to application layer protocols • Web and HTTP protocols • Domain Name System (DNS) • Email protocols (SMTP, POP, IMAP) • Multimedia streaming protocols 3. Transport Layer • Transport layer services and principles • User Datagram Protocol (UDP) • Transmission Control Protocol (TCP) • Congestion control algorithms

Learning and Teaching Strategies

Strategies	32)Lectures. 33)Tutorials. 34)Homework and Assignments. 35)Tests and Exams. 36)In-Class Questions and Discussions. 37)Extracurricular Activities. 38)Seminars. 39)In- and Out-Class oral conversations. 40) Lab. Experiments

Module Evaluation

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

Formative assessment	**Quizzes**	2	5% (5)	6, 10	LO #1, 2, 3 and 4
	Assignments	2	5% (5)	2, 12	LO # 1, 3
	Projects / Lab.	15	15% (15)	All	All
	Report	1	5% (5)	13	LO # 3-5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-5
	Final Exam	3 hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to Computer Networks and the Internet
Week 2	Delay, Loss, and Throughput in Packet-Switched Networks
Week 3	Application Layer: Web and HTTP
Week 4	Application Layer: E- Mail
Week 5	Application Layer: DNS
Week 6	Application Layer: Peer-to-Peer File Distribution, Video Streaming, and Content Distribution Networks
Week 7	Socket Programming
Week 8	Mid-Term Exam
Week 9	Transport Layer Protocols: Introduction and UDP
Week 10	Principles of Reliable Data Transfer Protocol
Week 11	Pipelining Protocols
Week 12	Transport Layer Protocols: TCP
Week 13	Principles of Congestion Control
Week 14	TCP Congestion Control
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Introduction to the network Lab
Week 2	Building and testing a simple LAN
Week 3	Configuring IP addresses
Week 4	File sharing in LAN
Week 5	Getting Started with Wireshark
Week 6	Network Virtualization
Week 7	Mid Lab.Exam
Week 8	HTTP
Week 9	Email and FTP
Week 10	DNS

Week 11	TCP
Week 12	UDP
Week 13	Socket Programming with UDP
Week 14	Socket Programming with TCP
Week 15	Final Lab. Exam

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Computer-Networking: A-Top-Down-Approach by James F. Kurose & Keith W. Ross-8th-edition	No
Recommended Texts	• Computer Networks 5th edition by Andrew S. Tanenbaum, David J. Wetherall • **Computer Networks:** A **Systems Approach**, **Sixth** Edition by Larry Peterson and Bruce Davie • Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition By Behrouz A. Forouzan	No
Websites	https://gaia.cs.umass.edu/kurose_ross/index.php	

Course Description Form for Operating Systems

Module Information					
Module Title	**OPERATING SYSTEMS**			**Module Delivery**	
Module Type	**CORE LEARNING ACTIVITY**			**Class Lecture+Lab.**	
Module Code	**COE304**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Computer Eng.		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	naba.alaa		**e-mail**	naba.alaa@alfarabiuc.edu.iq	
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	Computer Programming Data Structure and Algorithms	**Semester**	2 4
Co-requisites module			

Module Aims, Learning Outcomes and Indicative Contents

Module Aims	The aim of the operating systems module is : 1. To explain main components of OS and their working 2. To familiarize the operations performed by OS as a resource Manager 3. To impart various scheduling policies of OS 4. To teach the different memory management techniques.
Module Learning Outcomes	At the end of the course students will be able to:

	1. Outline various concepts and features of Operating systems. 2. Compare various operating systems with respect to characteristics and features 3. Implement algorithm of CPU Scheduling, Memory Scheduling and disk scheduling. 4. Make changes in the OS configurations as per need
Indicative Contents	Operating systems course is intended as a general introduced to the techniques used to implement operating systems and related kinds of systems software. The topics covered will be functions and structure of operating systems, process management (creation, synchronization, and communication); processor scheduling; deadlock prevention, avoidance, and recovery; main-memory management; virtual memory management (swapping, paging, segmentation and page-replacement algorithms).
Learning and Teaching Strategies	
Strategies	1. Lectures. 2. Homework and Assignments. 3. Tests and Exams. 4. In-Class Questions and Discussions. 5. Extracurricular Activities. 6. Seminars. 7. In- and Out-Class oral conversations.

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to operating systems Basic concepts and definitions
Week 2	Processes Process States
Week 3	Process Description Process Control
Week 4	Memory Management Requirements Memory Partitioning
Week 5	Paging
Week 6	Segmentation
Week 7	Virtual Memory Hardware and Control Structures
Week 8	Operating System Software Principles of Concurrency

Week 9	Mutual Exclusion: Hardware Support Semaphores
Week 10	Deadlock and Starvation Principles of Deadlock
Week 11	Deadlock Prevention Deadlock Avoidance
Week 12	Deadlock Detection I/O management
Week 13	Disk scheduling I/O Devices
Week 14	Organization of I/O functions Operating System Design issues
Week 15	Uniprocessor Scheduling Types of Processor Scheduling Scheduling Algorithms
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Basic Linux Commands and Overview
Week 2-5	Write Shell Script for followings: ➢ To find the global complete path for any file. ➢ To broadcast a message to a specified user or a group of users logged on any terminal. ➢ To copy the file system from two directories to a new directory in such a way that only the latest file is copied in case there are common files in both the directories. ➢ To compare identically named files in two different directories and if they are same, copy one of them in a third directory. ➢ To delete zero sized files from a given directory (and all its sub- directories). ➢ To display the name of those files (in the given directory) which are having multiple links. ➢ To display the name of all executable files in the given directory. ➢ Write a script to display the date, time and a welcome message (like Good Morning etc.). The time should be displayed with “a.m.” or “p.m.” and not in 24 hours notation. ➢ Write a script to display the directory in the descending order of the size of each file. ➢ Write a script to implement the following commands: Tree (of DOS) which (of UNIX)
Week6	Implementation Of FCFS (First Come First Serve) CPU Scheduling.
Week 7	Implementation Of SJF (Shortest Job First) CPU Scheduling.

Week 8	Implementation Of Round Robin (RR) CPU Scheduling.
Week 9	Implementation Of Priority CPU Scheduling Algorithm
Week 10	Implementation Of FIFO Replacement Algorithm.
Week 11	Implementation Of Optimal Page Replacement Algorithm
Week 12	Implementation Of LRU Page Replacement Algorithm by Stack method
Week 13	Project
Week 14	Project
Week 15	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	William Stallings, OPERATING SYSTEMS Internal and Design Principles, 6th Edition	Yes
Recommended Texts	1.Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc. 2. Modern Operating Systems -By Andrew S. Tanenbaum (PHI) 3. Operating Systems 5th Edition, William Stallings, Pearson Education India	No
Websites	https://ldrp.ac.in/images/syllabus/BE-Computer/CE503%20-%20Operating%20System.pdf	

Course Description Form for Mathematical Modeling and Simulation

Module Information					
Module Title	Mathematical Modelling and Simulation			**Module Delivery**	
Module Type	support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE305				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	sina.quduri		**e-mail**	sina.quduri@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Engineering Analysis	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**General Objectives of Teaching Mathematical Modeling and Simulation:** • The overall objective of education is to prepare students for public and private life, enabling them to contribute effectively to their community and achieve their personal and professional goals. • Improve students' knowledge and proficiency in Mathematical Modeling, while enhancing their overall educational level and broadening their scientific perspectives. • Develop students' abilities in deduction, generalization, and the use of logical reasoning in solving mathematical and engineering problems. • Understand the methods used to represent linear systems mathematically and apply techniques for linearizing nonlinear systems. • Develop mathematical models for mechanical, electrical, and electromechanical systems.

	• Provide an introduction to feedback systems, their control, performance, and applications. • Use MATLAB for modeling and simulation of electrical and mechanical systems. • Demonstrate the practical applications of engineering concepts, principles, and mathematical models, highlighting their importance in solving real-world engineering problems.
Module Learning Outcomes	**Knowledge and Understanding** 1. The course content has been restructured in a more logical and coherent manner to ensure alignment with the curriculum. 2. The course introduces the fundamental mathematical functions and integrates them throughout the subsequent chapters through examples and exercises. 3. This course provides students with the opportunity to work with modern methods for modeling electrical and mechanical systems, contributing to the simplification and analysis of control processes for continuous systems.
Indicative Contents	

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

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	4	20%		
	Assignments	1	5%		
	Projects / Lab.	2	10%		
	Report	1	5%		
Summative assessment	**Midterm Exam**		10%		
	Final Exam		50%		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Review of the Laplace Transform and the Matrix Algebra
Week 2	Transfer Function Form of Model Representation
Week 3	Input-Output Relation of Model Representation
Week 4	State-Space Form of Model Representation
Week 5	Relations among Model Representations
Week 6	Block Diagram Representation and Reduction
Week 7	Linearization of a Nonlinear System
Week 8	Mid-Term Exam
Week 9	Modeling of Mechanical Elements and Systems
Week 10	Translational and Rotational Elements
Week 11	Mixed Translational and Rotational Systems, Gear-Train Systems
Week 12	Modeling of Electrical Elements and Systems
Week 13	Electrical Circuits and Operational Amplifiers
Week 14	Electromechanical Systems, Impedance Methods
Week 15	Introduction to Feedback Control Systems: Stability, Performance and Benefits
Week 16	Term Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Ramin Esfandiari and Bei Lu: Modeling and Analysis of Dynamic Systems, Third Edition, 2018	Y
Recommended Texts	Ramin Esfandiari: Numerical Methods for Engineers and Scientists using MATLAB, Second Edition, 2017	Y
Websites		

Course Description Form for Microprocessor II

1. Course Name	
Microprocessor II	
2. Course Code	
)E306	
3. Semester / Academic Year	
First Semester of the Academic Year 2025–2026 (Fifth Semester)	
4. Date of Preparing the Course Description	
October 2025	
5. Available Attendance Modes	
Full-time attendance is mandatory. Bologna Process system.	
6. Total Contact Hours / Total Credit Units	
150 hours / 6 credit units **79 scheduled hours** (in-class lectures and laboratory sessions) **71 unscheduled hours**	
7. Course Coordinator's Name (If more than one, list all names)	
Name: Asst. Lect. Yusra Abdulrazzaq Sarour **Email:** yusra.abd@alfarabiuc.edu.iq	
8. Course Objectives	
1- How to relate the skills and concepts learned from Microprocessors 1 course to understand the concepts of this course 2- Understand the different components of a microcomputer system 3- Design some parts of a microcomputer system 4- Develop the required software to program it 5- The course also includes lab, which supports the theoretical part through processor-based learning kits and simulation software. Learning outcomes: L1. Understanding of Peripheral interfaces	**Course Objectives**

L2. Interface and control different I/O devices L3. Understand interrupt driven operation and interface L4. interface the interrupt controller and develop interrupt service procedures L5. Understand the memory management	

9. Teaching and Learning Strategies

Teaching and Learning Methods T1. Lectures T2. Homework T3. Classwork T4. Lab. Experiments. T5. Discussions Evaluation Methods: E1. Lab E2. Quizzes and exams E3. Homework E4. Assignments	**Strategy**

10. Course Structure

Assessment Method	Learning Method	Unit or Topic Name	Required Learning Outcomes	Hours	Week
E1-E4	T1-T5	Processor interaction with memory and IO	L1.	5	1
E1-E4	T1-T5	Basic I/O interface	L1	5	2
E1-E4	T1-T5	Basic I/O interface	L2	5	3
E1-E4	T1-T5	8255 Programmable peripheral controller mode 0	L2	5	4
E1-E4	T1-T5	8255 with 7-segment	L2	5	5

E1-E4	T1-T5	displays	L2	5	6
E1-E4	T1-T5	8255 with stepper motor	L2	5	7
		8255 with key matrix		5	8
E1-E4	T1-T5	Mid Exam		5	9
E1-E4	T1-T5	Interrupt Structure and interface	L3	5	10
E1-E4	T1-T5	Expanding interrupt structures	L3	5	11
E1-E4	T1-T5	Command words of the 8259 interrupt controller	L4	5	12
E1-E4	T1-T5	Programming the 8259 interrupt controller	L4	5	13
E1-E4	T1-T5	Memory management in protected mode	L5	5	14
		Introduction to other controllers Interval controller, DMA controller, and 16550 controller.	L1		

11. Course Assessment

50% Final Exam (10% Lab + 40% Theoretical), 40% (15% Lab work +25% quizzes, homework, assignments), Midterm Exam (10%).

11. Learning and Teaching Resources

The Intel Microprocessors, 8086/8088, 80186/80188, 80286,… Core" by Barray B, Brey	**Prescribed Textbooks / Core Curriculum**
The Intel Microprocessors, 8086/8088, 80186/80188, 80286,… Core" by Barray B, Brey	**Primary References / Main Sources**
	Recommended Supplementary References (Scientific Journals, Reports, etc.)

	Electronic Resources and Websites

Course Description Form: Artificial Intelligence and Its Applications

Course Code		**COE 307**	Course Title in English	Artficial Intelligence and Applications
Credit Hours / Week	Theoretical	2	Course Title in Arabic	الذكاء الاصطناعي والروبوتات
	Tutorial	1	Language of instruction	English
	Practical	0	Year of Study	Fourth
Units		5	Course Work Marks (%)	30
Course Duration (Weeks)		15	Final Exam (%)	70

Course Coordinator	almuntadher.mahmood@alfarabiuc.edu.iq
Office Hours	Monday (10:00am – 12:00pm), Tuesday (10:00am – 12:00pm), Thursday (8:00am – 12:00pm), or by appointment
Course Schedule	Sunday (8:30am – 10:30am) , Wednesday (9:30 am-10:30 am)
Lecture Room	Computer classroom (Dept. of CE building, First floor)
Virtual Classroom	Google Classroom (Joining Code:)

Course Prerequisites	Mathematics
	Digital Control Systems
	MATLAB
Course Corequisites	
	None

Course Objectives	1. This subject has been prepared as a comprehensive study of control engineering. 2. To help the students to understand the artificial intelligent and robotics system for variety of engineering applications 3. To cover the artificial intelligent and robotics system

Teaching/Learning Strategies	Direct Instruction
	Classroom Discussions
	Group Design Projects
	Seminars

Textbook(s)	● Spong, M.W., Hutchinson, S. and Vidyasagar, M., 2020. *Robot modeling and control*. John Wiley & Sons. ● Zurada, J., 1992. *Introduction to artificial neural systems*. West Publishing Co.
References	● Robinett III, R.D., Feddema, J., Eisler, G.R., Dohrmann, C., Parker, G.G., Wilson, D.G. and Stokes, D., 2012. *Flexible robot dynamics and controls* (Vol. 19). Springer Science & Business Media. ● Abdi, H., Valentin, D. and Edelman, B., 1999. *Neural networks* (No. 124). Sage.

Course Outline			
Subject	Duration (Hours)	Course Learning Outcomes (LOs)	
Introduction What Is AI? The Foundations of Artificial Intelligence The History of Artificial Intelligence	2 weeks	LO#1	● Understand the reason behind studying AI in Computer engineering and its main applications.

The State of the Art			
Fundamental Concepts and Models of Artificial Neural Systems	2 weeks	LO#2	● Understand the Models of Artificial Neural Networks. ● To understand the terminology and discusses the most important neural processing paradigms, network properties.
Neural Network Learning Rules	2 weeks	LO#3	● To study the learning concepts, Basic assumptions, definitions, and models of neurons and neural architectures.
Single-Layer Perceptron Classifiers	2 weeks	LO#4	● The concept of the nonpararnetric training of a linear machine composed of discrete perceptron is introduced. The training is discussed in geometric terms, and the steepest descent minimization of the classification error function is accomplished for a network with continuous perceptron.
Multilayer Feedforward Networks, Single-Layer Feedback Networks	2 weeks	LO#5	● Discrete-time and continuous-time gradient-type networks are learned. The time-domain behavior of single-layer feedback networks is emphasized. Particular attention is paid to the energy minimization property during the evolution of the system in time, and to the use and interpretation of trajectories in the output space. A comprehensive example involving analog-to-digital converters and an optimization problem solving using gradient-type networks are presented to illustrate the theory.
Introduction to Robotics, Rigid Motions And Homogeneous Transformations	2 weeks	LO#6	● To learn the basic issues to be resolved and what must we learn in order to be able to program a robot to perform some tasks ●
Forward Kinematics & Inverse Kinematics	2 weeks	LO#7	● To develop the forward or configuration kinematic equations for rigid robots. ● To understand the inverse kinematics problem, which is concerned with determining values for the joint variables that achieve a desired

			position and orientation for the end-effector of the robot.
Computer Vision	1 week	LO#8	• To understand the use of cameras to obtain position and orientation of objects.

Assessments *		
Week**	Assessment Type	Tested Learning Outcome
4	Mid-term Exam	LO#1 and LO#2
6	Short quiz	LO#3
8	Homework Assignment – Group Project	LO#2 and LO#3
9	Mid-Term Exam	LO#4 and LO#5
11	Mid-Term Exam	LO#6 and LO#7
12	Homework Assignment – Group Project	LO#8
15	Written/Oral Project	LO#3 and LO#8

Course versus Program Graduate Outcomes*** Mapping							
COE-405/GO	GO#1	GO#2	GO#3	GO#4	GO#5	GO#6	GO#7
	High	**Medium**	**Low**	**Low**	**None**	**None**	**High**

Course Learning Outcomes (LOs) versus Program Graduate Outcomes (GOs) Mapping H: High, M: Medium, L: Low, Blank: None							
GO/LO	**GO#1**	**GO#2**	**GO#3**	**GO#4**	**GO#5**	**GO#6**	**GO#7**
LO#1	**H**			**M**			
LO#2	**M**	**H**					**H**
LO#3	**H**			**M**			
LO#4	**H**			**M**			
LO#5	**H**			**M**			

LO#6	**H**	**M**	**M**				
LO#7	**H**			**M**			**H**
LO#8		**H**					**H**

GO#1	An ability to distinguish identifies, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics
GO#2	An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.s
GO#3	An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.
GO#4	An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels
GO#5	An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations
GO#6	An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.
GO#7	An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

Course Description Form: Project Development and Ethics

Module Information					
Module Title	**PROJECT DEVELOPMENT AND ETHICS**			**Module Delivery**	
Module Type	SUPPORT OR RELATED LEARNING ACTIVITY			**Theory**	
Module Code	**COE308**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	Shams.abdrahman		**e-mail**	Shams.abdrahman@alfarabiuc.edu.iq	
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules			
Prerequisite module	-	**Semester**	
Co-requisites module	Project1, Project2	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	**General Objectives for Teaching Project Development and Ethics:** Preparing students for academic and post-academic life, enabling them to make meaningful contributions to society and their personal career development. Enhancing student capabilities in their scientific pursuits specifically, and their professional trajectories after graduation in general. Cultivating a thorough understanding of the principles and ethical standards of scientific research writing and methodology development.

	Comprehending key concepts in research development and mastering their integration with real-world applications. Understanding the core curriculum and leveraging it effectively in academic, practical, and advanced scientific research domains both during undergraduate studies and after graduation.
Module Learning Outcomes	**Knowledge and Understanding:** Understanding the structured flow of instructional content to ensure logically coherent presentation, fostering academically and ethically enriched outcomes for future cohorts and graduates. Evaluating and comprehending ethical methodologies for composing, refining, and advancing graduation capstone projects. Providing students with analytical frameworks to innovate original methodologies for project execution and troubleshooting. Enhancing academic language proficiency to elevate overall scholarly rigor and analytical output.
Indicative Contents	
Learning and Teaching Strategies	
Strategies	1) Lectures. 2) Tutorials. 3) Homework and Assignments. 4) Tests and Exams. 5) In-Class Questions and Discussions. 6) Extracurricular Activities. 7) Seminars. 8) In- and Out-Class oral conversations.

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**		25%		
	Assignments		5%		
	Projects / Lab.		5%		
	Report		5%		
Summative	**Midterm Exam**		10%		

assessment	**Final Exam**		50%		
		Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
Week	**Material Covered**
Week 1	Introduction to Project
Week 2	Ethics in writing a project
Week 3	Grammar and Writing Skills
Week 4	Writing Task: Build a Model
Week 5	How to Write an Introduction
Week 6	How to make a literature review
Week 7	Writing a Methodology Section
Week 8	Writing a Results section
Week 9	Writing the Discussion/Conclusion
Week 10	Writing the Abstract
Week 11	Writing and citating the References
Week 12	Reference Manager
Week 13	Appendix writing structure
Week 14	Plagiarism and scientific misconduct
Week 15	Entire project writing structure
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	• Glasman-Deal, Hilary. Science research writing for non-native speakers of English. World Scientific, 2010.	No
Recommended Texts	• Bos, Jaap. *Research ethics for students in the social sciences*. Springer Nature, 2020. •	No
Websites		

Course Description Form: Database Systems

1. Course Title
Database Systems
2. Course Code
)E309
3. Semester / Year
Sixth Semester / Third Year
4. Date of Preparation of This Specification
25/1/8
5. Available Attendance Modes
In-Person (On-Campus)
6. Total Contact Hours / Total Credit Units
5
1. Course Coordinator Name(s) (If more than one name, list all)
Name: Assist. Lect. Farah Raad Fadhil **Email:** farah.raad@alfarabiuc.edu.iq
1. Course Objectives

• **Core Understanding:** Developing students' understanding of the role of database systems in information management, including theoretical and practical issues that influence the design and implementation of Relational Database Management Systems (RDBMS). **Practical Skills in SQL:** Equipping students with the necessary skills to create, maintain, and query relational databases using commercially available database software, while applying SQL syntax according to modern standards to ensure portability and applicability across various SQL platforms. **Critical Analysis and Solutions:** Enabling students to critically evaluate common database challenges and propose suitable solutions within multi-user relational database environments.	**Course Learning Outcomes / Learning Objectives**
1. Teaching and Learning Strategies	
Direct Instruction: Interactive lectures to explain core theoretical concepts, RDBMS architectures, and standard SQL syntax. **Classroom Discussions:** Active Q&A and guided discussions analyzing real-world database case studies, normalization challenges, and query optimization. **Group Design Projects:** Collaborative team assignments focused on end-to-end relational database modeling, ERD drafting, schema implementation, and multi-user constraint setup. **Homework & Practical Exercises:** Hands-on lab tutorials,	**Strategy**

weekly query formulation tasks, and application-based problem sets to reinforce standard SQL execution.	

1. Course Structure

Assessment Method	Learning Method	Unit or Topic Title	Required Learning Outcomes	hours	week
	Theory + Practical **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical** **Theory + Practical**	– File **systems and database** **–Database design concepts** **–Database design concepts** **–Exam** **–Structure Query nguage (SQL)–DDl** **–Structure Query nguage (SQL)–DMl** **–Exam** **Entity Relationship Modeling** **–Normalization–1** **–Normalization–2** **–Advanced Data Modeling** **–Database Design** **–Distributed**	**- Benefits of Studying Database Systems in Computer Engineering** **- Understanding Database Models and Systems** **- Understanding Database Design** **- Studying the Fundamentals of SQL** **- Entity-Relationship (ER) Modeling** **- Learning How to Design Databases Using the Bottom-Up Design Approach** **- Understanding Advanced Database Design Techniques** **- Studying the System Development Life Cycle (SDLC)** **- Studying the Database Life Cycle**	2+3 2+3 2+3 2+3 2+3 2+3 2+3 2+3 2+3 2+3 2+3	Week1 Week2 Week3 Week4 Week5 Week6 Week7 Week8 Week9 Week10 Week11 Week12 Week13 Week14 Week15

	Theory + Practical **Theory + Practical**	**systems–1** **–Distributed systems–2** **–Final exam**	**(DBLC)** **- Understanding Distributed Systems Design**		

1. Course Assessment

Assessment Method	Weight
Quizzes	10%
Laboratory Work	15%
Project	15%
Midterm Exam	10%
Final Exam	50%
Total	**100%**

1. Learning and Teaching Resources

abase systems (design, implementation and nagement).by Beter Rob and Carlos Coronel, 16th Edition 2.	**Required Textbooks (Prescribed Curriculum)**
adde H. Integrating AI into SQL Query Processing: Challenges and portunities. International Journal of Advanced Engineering hnologies and Innovations. 2022;1(3):194–219. charya K. Avoid waste management system project. horea. July 29, 2024. DOI: https://doi. org/10.22541/au. 228528.85022205/v1. 2024 Jul.	**Main References (Core Literature)**
abase systems concepts sixth edition, Abraham Silberschatz, 2	**Recommended Books & Reference Materials (Scientific Journals, Reports, etc.)**
	Electronic Resources & Internet Sites

Course Description Specification Image Processing

Module Information					
Module Title	Image Processing			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE310				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	3		**Semester of Delivery**	6	
Administering Department	Computer		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name	hoda.ali		**e-mail**	hoda.ali@alfarabiuc.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	Engineering Analysis	**Semester**	
Co-requisites module	Computer Vision	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives أ	**Overarching Educational Objective** To prepare students for professional and personal endeavors, empowering them to actively contribute to society and achieve personal fulfillment through

	academic growth. **Main Course Aim** To equip students with a comprehensive understanding of digital image processing concepts, enabling them to implement computational techniques and algorithms for image analysis, processing, and real-world problem-solving. **Specific Instructional Objectives** **Analytical & Deductive Reasoning:** Develop core competencies in logical reasoning, mathematical generalization, and analytical deduction within image processing frameworks. **Fundamentals & Spatial Domain Operations:** Master image processing fundamentals and implement spatial domain filtering—including convolution operations—to achieve image enhancement and noise reduction. **Frequency Domain Analysis & Image Transforms:** Analyze digital images in the frequency domain, execute image transformations, and utilize frequency response dynamics for advanced feature manipulation. **Practical Application & Problem-Solving:** pply computational algorithms to engineer effective, real-world solutions for complex digital image processing challenges.
Module Learning Outcomes	**Knowledge and Understanding** **1. Image Representation and Transformations** **En:** Master the mathematical representation of digital images and their fundamental transformations, including the Discrete Fourier Transform (DFT). **2. Image Enhancement Techniques** **En:** Comprehend core image enhancement methodology, encompassing spatial domain filtering, intensity/contrast transformations, and image sharpening techniques. **3. Image Segmentation and Object Recognition** **En:** Understand image segmentation algorithms and object recognition techniques, including thresholding, edge detection, and morphological shape analysis. **4. Image Processing Applications** **En:** Gain insight into real-world image processing applications across healthcare and biomedical imaging, enabling students to evaluate their impact in practical scenarios.
Indicative Contents	

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

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**		25%		
	Assignments		5%		
	Projects / Lab.		5%		
	Report		5%		
Summative assessment	**Midterm Exam**		10%		
	Final Exam		50%		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to Image Processing
Week 2	Digital Image Representation
Week 3	Fundamentals of Color Image, Color Models, and Color Transformation
Week 4	Advanced Color Image, Color Models, and Color Transformation
Week 5	Geometrical Transformation
Week 6	Intensity transformation functions
Week 7	Image Histogram

Week 8	Spatial Filtering
Week 9	Filtering in the Frequency Domain: Preliminaries
Week 10	Filtering in the Frequency Domain: Filters
Week 11	Edge Detection
Week 12	Discrete Transforms: Fundamentals
Week 13	Discrete Transform: Transform types
Week 14	Morphological Image Processing
Week 15	Introduction to Image Segmentation
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Gonzalez, R., & Woods, R. (2017). Digital Image Processing. Pearson International.	Y
Recommended Texts	Umbaugh, S. E. (2017). Digital image processing and analysis: applications with MATLAB and CVIPtools. CRC press.	Y
Websites		

Course Description Form for Computer Networks II

Module Information					
Module Title	**COMPUTER NETWORKS 2**			**Module Delivery**	
Module Type	**CORE**			**Theory and lab**	
Module Code	**COE311**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1	**Semester of Delivery**	6		
Administering Department	Computer Engineering	**College**	Engineering		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor	None	**e-mail**	None		
Peer Reviewer Name	estabraq.abdulrahman	**e-mail**	estabraq.abdulrahman@alfarabiuc.edu.iq		
Review Committee Approval		**Version Number**	1.0		

Relation With Other Modules			
Prerequisite module	Computer Networks 1	**Semester**	5
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	3. Study the network layer protocols and algorithms responsible for routing and forwarding packets across multiple network devices. This includes topics such as IP addressing, routing algorithms (e.g., RIP, OSPF), IP versioning (IPv4 and IPv6) and Software Defined Networks (SDNs). 4. Examine the link layer protocols that facilitate communication within a single network, including Ethernet, switches, and wireless LANs. Understand concepts like MAC addresses, bridging, and

	multiple access protocols (e.g., CSMA/CD and CSMA/CA).
Module Learning Outcomes	5. Network Layer Skills: Students should be able to design and analyze network addressing schemes, understand routing protocols and algorithms in addition to the SDNs and troubleshoot network layer issues. 6. Link Layer Skills: Students should be proficient in designing and configuring local area networks (LANs), understanding link layer protocols, and troubleshooting link layer connectivity problems.
Indicative Contents	4. Network Layer • Router Internals • Network layer protocols and addressing • IP addressing and subnetting • Internet Protocol (IP) and its versions (IPv4 and IPv6) • Generalized SDN and Forwarding • Routing algorithms (e.g., distance vector, link-state) • SDN Control Plane • Internet Control Message Protocol (ICMP) • Network Management 5. Link Layer and Local Area Networks (LANs) • Link layer services and protocols • Error detection and Correction • Ethernet and switches • Wireless LANs and Wi-Fi • Multiple Access protocols (e.g., CSMA/CD, CSMA/CA) • Address Resolution Protocol (ARP) • Data center Networking
Learning and Teaching Strategies	
Strategies	41)Lectures. 42)Tutorials. 43)Homework and Assignments. 44)Tests and Exams. 45)In-Class Questions and Discussions. 46)Extracurricular Activities. 47)Seminars. 48)In- and Out-Class oral conversations.

	49) Lab. Experiments

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	6, 10	LO #1, 2, 3 and 4
	Assignments	2	5% (5)	2, 12	LO # 1, 3
	Projects / Lab.	15	15% (15)	All	All
	Report	1	5% (5)	13	LO # 3-5
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-5
	Final Exam	3 hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Network Layer Data Plane: Introduction and Router Internals
Week 2	Network Layer Data Plane: Internet Protocol version 4
Week 3	Network Layer Data Plane: IP Addressing and Subnetting
Week 4	Network Layer Data Plane: NAT and IP version 6
Week 5	Network Layer Data Plane: SDN
Week 6	Network Layer Control Plane: Link-State Routing Algorithm
Week 7	Network Layer Control Plane: Distance-Vector Routing Algorithm
Week 8	Mid-Term Exam
Week 9	Network Layer Control Plane: SDN Control Plane and ICMP
Week 10	Network Layer Control Plane: Network Management
Week 11	Link Layer: Error-Detection and Correction Techniques
Week 12	Link Layer: Multiple Access Links and Protocols
Week 13	Link Layer: Switched Local Area Networks
Week 14	Link Layer: Link Virtualization and Data Center Networking
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Implementing (Client/Server UDP)
Week 2	Implementing (Client/Server UDP)
Week 3	Implementing (Reliable data transfer protocol 1)
Week 4	Implementing(Reliable data transfer protocol 2)
Week 5	Lab. Exam
Week 6	IP
Week 7	NAT
Week 8	DHCP
Week 9	ICMP
Week 10	Ethernet and ARP
Week 11	Network Automation
Week 12	Understanding and using APIs
Week 13	Network Virtualization
Week 14	Network Virtualization
Week 15	Final Exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Computer-Networking: A-Top-Down-Approach by James F. Kurose & Keith W. Ross-8th-edition	No
Recommended Texts	• Computer Networks 5th edition by Andrew S. Tanenbaum, David J. Wetherall • **Computer Networks:** A **Systems Approach**, **Sixth** Edition by Larry Peterson and Bruce Davie • Data Communications and Networking with TCP/IP Protocol Suite, 6th Edition By Behrouz A. Forouzan	No
Websites	https://gaia.cs.umass.edu/kurose_ross/index.php	

Course Description Form for Mathematical Modelling and Control Systems

1. Course Name

Mathematical Modelling and Control Systems

2. Course Code

COE312

3. Semester / Academic Year

3/2

4. Date of Preparation of the Course Description

07/01/2026

5. Available Modes of Attendance

In-Person / Online (Remote)

6. Total Contact Hours / Total Credits

5/5

7. Course Coordinator's Name (If there is more than one coordinator, list all names)

Assist. Lect. Sina Ghani Qadouri
Email: sina.quduri@alfarabiuc.edu.iq

8. Course Objectives

• To provide students with advanced analytical tools for evaluating the performance and stability of linear feedback control systems. • To develop comprehensive skills in the design and tuning of controllers, including Proportional-Integral-Derivative (PID) controllers and Lead-Lag compensators, to meet precise transient-response and steady-state performance specifications. • To develop proficiency in frequency-domain techniques for system analysis and the determination of stability margins. • To introduce modern control theory through state-space analysis, enabling the modelling and design of Multiple-Input Multiple-Output (MIMO) systems using pole-placement and state-observation techniques.	**Course Objectives**

9. Teaching and Learning Strategies

• **Lectures** • **Homework and Assignments** • **Tests and Examinations** • **In-Class Questions and Discussions** • **Extracurricular Activities** • **Seminars** • **Oral Discussions Inside and Outside the Classroom**	**Strategy**

10. **Course Structure**

Assessment Method	Teaching and Learning Method	Unit or Topic Name	Required Learning Outcomes	Hours	week
		Transient and Steady-State Responses		2	1
		Transient and Steady-State Responses		2	2
		Root-Locus Analysis		2	3
		Root-Locus Analysis		2	4
		Root-Locus Design		2	5
		Frequency Response Analysis		2	6
		Frequency Response Analysis		2	7
		Frequency Response Design		2	8
		PID Controllers Design		2	9
		PID Controllers Design		2	10
		State-Space Analysis		2	11
		State-Space Analysis		2	12
		State-Space Analysis		2	13
		State-Space Design		2	14
		State-Space Design		2	15
		Preparatory week before the fir Exam		2	16

11. Course Evaluation

The 100-point course grade is distributed among the various student-assigned tasks and assessment components, including daily preparation, daily written and oral examinations, monthly examinations, written assessments, reports, assignments, and other relevant academic activities.

12. Learning and Teaching Resources

Ogata, Modern Control Systems, Fifth Edition, 2010 Ramin Esfandiari and Bei Lu: Modeling and Analysis of Dynamic Systems, Third Edition, 2018	**Required Textbooks (Prescribed Textbooks, if available)**
	Main References (Sources)
• https://search.app/bJn1n1rg26XWuZSp6 • https://search.app/ayP7KS4TCwXbwDTs9	**Recommended Supporting Books and References (Scientific Journals, Reports, etc.)**
	Electronic References and Internet Resources

Fourth Stage

Course Description Form for Computer Architecture II

1. Course Name
Computer Architecture II
2. Course Code
)E 402
3. Semester / Academic Year
First and Second Semesters (Annual) – 2025–2026
4. Date of Preparation of the Course Description
26-1-5
5. Available Modes of Attendance
Mandatory Attendance
6. Total Contact Hours / Total Credits
)0
7. Course Coordinator's Name (If there is more than one coordinator, list all names)
Name: Assist. Lect. Sina Ghani Qadouri **Email:** sina.quduri@alfarabiuc.edu.iq
8. Course Objectives

• To explore advances in computer engineering and prepare students to understand, analyze, and contribute to current trends in computer architecture and engineering. • To understand how computer performance can be evaluated from both theoretical and practical perspectives. • To understand **Moore's Law** and its impact on the development and evolution of computer architecture. • To understand the principles of **instruction pipelining**, including both static and dynamic pipelining, as well as the three major types of pipeline hazards: **structural hazards, data hazards, and control hazards**, along with current techniques for addressing these hazards. In addition, students will understand the behavior and handling of **interrupts and exceptions** from a computer engineering perspective. • To understand **compiler optimization**, **loop unrolling**, and **branch prediction** techniques used to improve processor performance. • To develop an understanding of **Instruction-Level**	**Course Objectives**

9. Teaching and Learning Strategies	
A. Knowledge and Cognitive Objectives **A1.** Write Register Transfer Level (RTL) descriptions for hardware functions. **A2.** Identify and explain the fundamental principles of computer architecture and the	**Strategies**

interaction between hardware and software components.

A3. Understand the data path and its operation within a computer architecture.

A4. Understand the organization and structure of computer architectures.

A5. Understand Internet organization and architecture, with emphasis on the user's perspective of computer networks.

A6. Appreciate the importance of proof, generalization, and abstraction in the logical development of formal theories.

A7. Understand the architectural building blocks involved in computer architecture.

A8. Identify and understand fundamental computer architecture problems and their solutions.

A9. Apply engineering analysis, including time, cost, and performance considerations, in computer system design.

A10. Understand different Internet architectures and their fundamental principles.

B. Course-Specific Skills Objectives

B1. Apply fundamental mathematical concepts and algorithms to describe and solve engineering problems.

B2. Understand fundamental developments and emerging trends in Internet technology and related disciplines.

B3. Develop the ability to conduct experiments, collect data, and analyze experimental results.

B4. Apply engineering principles and modern techniques to analyze and solve computer architecture problems.

B5. Identify, formulate, and solve Internet technology problems using modern engineering tools, techniques, and skills.

B6. Collaborate effectively in group projects and team-based activities.

B7. Develop written and oral communication skills through presentations of project results and technical findings.

B8. Develop an awareness and understanding of ethical issues associated with professional engineering practice.

C. Affective and Value-Oriented Objectives

C1. Develop students' ability to participate effectively in collaborative learning and

peer-evaluation activities.

C2. Conduct periodic surveys to assess the extent to which students have achieved the intended learning outcomes.

C3. Evaluate students' perceptions and learning experiences through questionnaires related to teaching and course activities.

D. Transferable General and Employability Skills

D1. Develop the ability to conduct independent study, take effective notes, and undertake relevant background reading.

D2. Develop problem-solving skills based on conceptual understanding and analytical thinking.

D3. Develop the ability to acquire, retain, and apply essential technical knowledge and fundamental concepts.

D4. Develop self-discipline, self-motivation, and the ability to work independently.

10. Course Structure

Assessment Method	Teaching and Learning Method	Unit or Topic Name	Required Learning Outcomes	Hours	week
Motivation **Tests** **Home work Examination** **Peer Assessment**	**Student Engagement** **Guided Discovery, Interactive Lectures, and Concept-Summary Presentations, in Addition to the Full Available Text.** **Assignment of Semin Presentations** Playing Selected Vide to Reinforce Student Understanding and Demonstrate Practic Capabilities	**Emerging Trends in Computer Engineering** **CPU Performance Equations** **Static and Dynamic Pipelining** **Superscalar Architecture** **Memory Architecture Overview** **Multicore and Many-Core Architectures and Parallel Processing** **Review, Seminars, and Project Discussion**	**A1** **A2** **A3** **A4** **B1** **B2** **B3** **C1** **C2** **C3** **C4** **C5**	90	1-30

	Group Discussion	**Recent Topics in Computer Engineering**	**C6**		

1. Course Evaluation

1. **Examinations and Assessments**
2. **Extracurricular Activities**
3. **Student Participation During Lectures**
4. **Students' Responses to the Course and Faculty Member Evaluation Questionnaire**

1. Learning and Teaching Resources

1. Computer Architecture a Quantitative Approach, Hennessey & Patterson, (3rd, 4th, & 5th editions), Elsevier, (2003, 2006, & 2012). 2. Computer Organization and Architecture Design for Performance, William Stalling, 9th edition, Pearson, 2013. 3. Computer Organization and Design: The Hardware/Software Interface Patterson & Hennessey, 4th edition, The Morgan Kaufmann Series in Computer Architecture and Design, 2008. 4. Microprocessor Architecture, Jean-Loup Baer, Cambridge University Press, 2010. 5. Structure Computer Organization, Tanenbaum, 5th edition, Prentice Hall,2006. 6. OpenCL Programming by Example, **Banger & Bhattacharyya,** PACKT, 2013. 7. Modern X86 Assembly Language Programming_ 32-bit, 64-bit, SSE, and AVX, Kusswurm, APRESS, December 2014. 8. The Java Tutorial, 6th Edition, Gallardo et. al., Addison-Wesley Professional, December 2014.	**Prescribed Textbooks and References**
mputer Architecture a Quantitative Approach , Hennessey & atterson, (3rd, 4th, & 5th editions), Elsevier, (2003 , 2006, & 2012).	**Primary References (Sources)**
Papers: • P. Trivedi and R. P. Tripathi, "Design & analysis of 16-bit RISC processor using low power pipelining," International Conference on Computing, Communication & Automation, Noida, 2015, pp.	**Recommended Supporting Books and References (Scientific Journals,**

1294-1297. • B. W. Bomar, "Implementation of microprogrammed control in FPGAs," in *IEEE Transactions on Industrial Electronics*, vol. 49, no. 2, pp. 415-422, Apr 2002. L. Cruz, A. Gonzalez, M. Valero and N. P. Topham, "Multiple-nked register file architectures," Proceedings of 27th International mposium on Computer Architecture (IEEE Cat. No.RS00201), Vancouver, BC, Canada, 2000.	**Reports, etc.)**
hthttps://drive.google.com/drive/folders/1EDL0L8_5DZI-XZTWFCtOce_FCAQQy5DL	**Electronic References and Websites**

Course Description Template: Computer Security

1. Course Name
Computer Security
1. Course Code
)E 404
1. Semester / Academic Year
First and Second Semesters, Academic Year 2025–2026
1. Date of Preparation of the Course Description
)/02/202
1. Available Modes of Attendance
Annual System: There is only one mode of delivery, namely the **Daily Program**. Students attend on a **full-time, on-campus basis**, following a full-day academic schedule through **face-to-face instruction**. The academic year consists of **30 weeks of regular instruction**.
1. Total Contact Hours / Total Credit Units
90 theoretical hours, at a rate of 3 hours per week / Total Credit Units: 6
1. Name(s) of the Course Coordinator(s)
Name: Asst. Prof. Ahmed Saad Hussein **Email:** Ahmed.Hussein@alfarabiuc.edu.iq
1. Course Objectives

Learning Outcomes	**Course Objectives**
A1: Understand and effectively apply the **OSI Security Architecture**. **A2:** Design and analyze a basic model of **classical cryptographic techniques**. **A3:** Evaluate **security models** and their effectiveness. **A4:** Identify and diagnose **major vulnerabilities in security systems**. **A5:** Analyze **advanced cryptographic techniques** and their applications.	

1. Teaching and Learning Strategies	
Teaching and Learning Methods (T-Methods) 1. 1**Lectures** 2. **Tutorials and Practical Lessons**	**Strategy**

3. **Homework and Assignments** 4. **Quizzes and Examinations** 5. **Classroom Discussions and Question-and-Answer Sessions** 6. **Integrating Theory with Practical Applications** 7. **Seminars** 8. **Oral Discussions Inside and Outside the Classroom** 9. **Reports, Presentations, and Posters**	

1. Course Structure

Assessment Method	Teaching and Learning Method	Unit or Topic Name	Required Learning Outcome	hours	week
A-Methods 1–4	**T-Methods 1–9**	**Introduction to Security Trends, OSI Architecture**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**1**
A-Methods 1–4	**T-Methods 1–9**	**A Model of network security**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**2**
A-Methods 1–4	**T-Methods 1–9**	**Classical Encryption techniques**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**3**
A-Methods 1–4	**T-Methods 1–9**	**Symmetric Key Cryptography**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**4**
A-Methods 1–4	**T-Methods 1–9**	**DES**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**5**
A-Methods 1–4	**T-Methods 1–9**	**DES**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**6**
A-Methods 1–4	**T-Methods 1–9**	**Finite Field**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**7**
A-Methods 1–4	**T-Methods 1–9**	**AES**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**8**

A-Methods 1–4	**T-Methods 1–9**	**Modes of Operation**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**9**
A-Methods 1–4	**T-Methods 1–9**	**Message Authentication**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**10**
A-Methods 1–4	**T-Methods 1–9**	**Public Key Cryptography**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**11**
A-Methods 1–4	**T-Methods 1–9**	**Public Key Cryptography**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**12**
A-Methods 1–4	**T-Methods 1–9**	**Digital Signature**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**13**
A-Methods 1–4	**T-Methods 1–9**	**User Authentication**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**14**
A-Methods 1–4	**T-Methods 1–9**	**User Authentication**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**15**
A-Methods 1–4	**T-Methods 1–9**	**Access Control**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**16**
A-Methods 1–4	**T-Methods 1–9**	**Access Control**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**17**
A-Methods 1–4	**T-Methods 1–9**	**Malware**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**18**

A-Methods 1–4	**T-Methods 1–9**	**Malware**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**19**
A-Methods 1–4	**T-Methods 1–9**	**Denial of Service Attacks**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**20**
A-Methods 1–4	**T-Methods 1–9**	**Denial of Service Attacks**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**21**
A-Methods 1–4	**T-Methods 1–9**	**Firewall**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**22**
A-Methods 1–4	**T-Methods 1–9**	**Firewall**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**23**
A-Methods 1–4	**T-Methods 1–9**	**Intrusion Detection System**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**24**
A-Methods 1–4	**T-Methods 1–9**	**Trusted Computing**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**25**
A-Methods 1–4	**T-Methods 1–9**	**Trusted Computing**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**26**
A-Methods 1–4	**T-Methods 1–9**	**Web Security**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**27**
A-Methods 1–4	**T-Methods 1–9**	**Web Security**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**28**
A-Methods 1–4	**T-Methods**	**Internet**	**Learning Outcomes: A1–**	**3.**	**29**

	1–9	**Security**	**A5**	**Theoretical**	
A-Methods 1–4	**T-Methods 1–9**	**Internet Security**	**Learning Outcomes: A1–A5**	**3. Theoretical**	**30**

1. Course Evaluation

The student's final grade is calculated and distributed according to the semester-based system, out of 100%, as follows:

A. Annual Coursework Assessment: 30%

B. Final Examination: 70%

The final grade is determined based on the following **Assessment Methods (A-Methods):**

1. **Monthly and Final Examinations (70 marks), Laboratory Assessments (10 marks), and Daily Quizzes (5 marks).**
2. **Extracurricular Activities (5 marks).**
3. **Student Participation and Engagement During Lectures (5 marks).**
4. **Students' Responses to a Course Evaluation Questionnaire administered by the Faculty Member.**

1. Learning and Teaching Resources

▪ Computer Security, 3rd edition, William stalling, 2015.	**Required Prescribed Textbooks (if applicable)**
▪ Cryptography and Network Security, 7th edition, William stalling, 2017. ▪ Applied Cryptography, 2nd edition, Bruce Schneier, 1996.	**Primary References (Sources)**
▪ paper1: van der Veen, V.; dutt-Sharma, N.; Cavallaro, L., and Bos, H. "Memory errors: the past, the present, and the future." in Proceedings of the 15th international conference on Research in Attacks, Intrusions, and Defenses (RAID'12), Springer-Verlag, pp. 86–106, 2012 ▪ Paper2: Felten, E. "Understanding	**Recommended Supporting Books and References (Scientific Journals, Reports, etc.)**

Trusted Computing: Will Its Benefits Outweigh its Drawbacks?" *IEEE Security and Privacy*, May/June 2003. ▪ Paper3: Cheng, T., et al. "Evasion Techniques: Sneaking through Your Intrusion Detection/Prevention Systems." *IEEE Communications Surveys &Tutorials*, Fourth Quarter 2012.	
All available and reliable websites relevant to the course subject.	**Electronic References and Websites**

Course Description Template: Artificial Intelligence and Robotics

1. Course Name:	
Artificial Intelligence and Robotics	
1. Course Code:	
)E 405	
1. Semester / Academic Year:	
25-2026	
1. Date of Preparation of the Course Description:	
)\2026	
1. Available Modes of Attendance: Student Attendance	
Students attend on a **full-time, on-campus basis**, following a **full-day academic schedule through face-to-face instruction**. The academic year consists of **30 weeks of regular instruction**.	
1. Total Contact Hours / Total Credit Units: 3 Hours	
90 Hours	
1. Name(s) of the Course Coordinator(s):	
Name: Prof. Mazen Sameer Ali Al-Hakeem **Email:** mazin.alhakeem@alfarabiuc.edu.iq	
1. Course Objectives	
• This course has been designed to provide comprehensive coverage appropriate for undergraduate studies in **Computer Engineering**. • The course enables students to develop a fundamental understanding of **Artificial Intelligence and Robotics systems** and their applications across a wide range of engineering fields. • The course covers the fundamental concepts, principles, and applications of **Artificial Intelligence and Robotics**.	**Course Objectives**
1. Teaching and Learning Strategies	
A. Cognitive Objectives **A1.** Design, program, and evaluate artificial neural networks. **A2.** Design and train neural networks for robotic applications and navigation. **A3.** Analyze, design, and test algorithms implemented using the **backpropagation error algorithm**. **A4.** Evaluate hardware and software requirements for robotics applications. **A5.** Solve industrial problems related to control systems and robotics. **A6.** Understand and apply the characteristics of artificial intelligence networks	**Strategy**

to design robotic systems that integrate sensing and behavior in various industrial production environments.

A7. Understand and apply the methods and tools required to develop and optimize software for training artificial neural networks and integrating their applications in robotics.

B. Program-Specific Skill Objectives

B1. Apply fundamental mathematical concepts and algorithms to describe and solve engineering problems.

B2. Demonstrate an understanding of fundamental developments in the field of Artificial Intelligence.

B3. Develop the ability to implement algorithms and analyze their results.

B4. Identify, formulate, and solve Artificial Intelligence and robotics problems using modern engineering tools, techniques, and skills.

B5. Collaborate effectively in group projects.

B6. Develop written and oral communication skills through presentations of project results.

B7. Demonstrate awareness of ethical issues related to professional practice.

Teaching and Learning Methods

1. Lectures.
2. Tutorials and Practical Lessons.
3. Homework and Assignments.
4. Quizzes and Examinations.
5. Seminars.
6. Reports, Presentations, and Posters.

Assessment Methods

1. Examinations, Quizzes, and Tests.
2. Extracurricular Activities.
3. Student Participation and Engagement During Lectures.
4. Students' Responses to a Course Evaluation Questionnaire regarding the course and the faculty member.

C. Affective and Value-Based Objectives

C1. Obtain students' collaborative assessment data at the end of the cooperative learning experience.

C2. Conduct an annual survey to determine the extent to which students have

achieved the intended learning outcomes. **C3.** Evaluate students' achievement based on data collected through questionnaires distributed to students concerning educational and academic courses. **Teaching and Learning Methods** 1. Quizzes and Tests. 2. Student Activities.	

		1. Course Structure			
Assessment Method	**Teaching and Learning Method**	**Unit or Topic Name**	**Required Learning Outcomes**	**Hours**	**week**
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Introduction What Is AI? The Foundations of Artificial Intelligence The History of Artificial Intelligence The State of the Art	**Item A1 from Section 9**	2 theory 1 tutorial	1
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Intelligent Agents Agents and Environments. Good Behavior: The Concept of Rationality. The Nature of Environments. The Structure of Agents	**Item A1 from Section 9**	2 theory 1 tutorial	4
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Learning Methods Examples	**Item A1 from Section 9**	2 theory 1 tutorial	5
Items 1–4 from	**Items 1–6 from Section 9**	Supervised Learning	**Item A1 from Section 9**	2 theory	6

Section 9		Learning Decision Trees Evaluating and Choosing the Best Hypothesis.		1 tutorial	
Items 1–4 from Section 9	**Items 1–6 from Section 9**	The Theory of Learning Regression and Classification with Linear Models.	**Item A1 from Section 9**		8
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Artificial Neural Networks Nonparametric Models	**Item A1 from Section 9**		9-10
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Training And Classification Using The Discrete Perceptron: Algorithm And Example	**Item A1 from Section 9**		11-12
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Linearly Non Separable Pattern Classification	**Item A1 from Section 9**		13
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Feedforward Recall And Error Back-Propagation Training	**Item A1 from Section 9**		14
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Single-Layer Feedback Networks	**Item A1 from Section 9**		15
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Robotics Introduction	**Item A1 from Section 9**		16-17
Items 1–4 from	**Items 1–6 from**	Rigid Motions And	**Item A1 from**		18-

Section 9	**Section 9**	Homogeneous Transformations	**Section 9**		0
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Homogeneous Transformations	**Item A1 from Section 9**		1-2
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Forward Kinematics: The Denavit-Hartenberg Convention	**Item A1 from Section 9**		3-4
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Denavit Hartenberg Representation	**Item A1 from Section 9**		5
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Examples Cylindrical Manipulator With Spherical Wrist	**Item A1 from Section 9**		6
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Scara Manipulator	**Item A1 from Section 9**		7
Items 1–4 from Section 9	**Items 1–6 from Section 9**	Inverse Kinematics	**Item A1 from Section 9**		8-9
Items 1–4 from Section 9	**Items 1–6 from Section 9**	The General Inverse Kinematics Problem	**Item A1 from Section 9**		0

1. Course Evaluation
Grade Distribution (100%) The student's grade is distributed out of 100% according to the assigned academic tasks and assessment activities, including daily preparation, daily quizzes, oral examinations, monthly and written examinations, reports, and other related activities. • **30%** – Quizzes, midterm examinations, daily participation, and attendance. • **70%** – Final Examination.

1. Learning and Teaching Resources	
Stuart J. Russell and Peter Norvig "Artificial Intelligence: A Modern Approach", 2010 by Pearson Education, Inc., Third Edition. .1 M.W.Spong , S. Hutchinson and M. Vidyasagar, "Robot Modeling and Control", 2006. .2 Kevin M. Lynch and Frank C. Park, "Modern Robotics Mechanics, Planning, And Control", 2017. .3	**Required Prescribed Textbooks (if available)**
JACEK M. ZURADA, "Introduction to Artificial Neural Systems" , 1992.	**Primary References (Sources)**
	Recommended Supporting Books and References (Scientific Journals, Reports, etc.)
https://engineering.louisville.edu/sites/introduction-to-artificial-neural-systems	**Electronic References and Websites**

Course Description Template: Internet Technology

1. Course Name
ernet Technology
1. Course Code
)E 401
1. Semester / Academic Year
First and Second Semesters, Academic Year 2025–2026
1. Date of Preparation of the Course Description
26/01/10
1. Available Modes of Attendance
Face-to-Face Attendance
1. Total Contact Hours / Total Credit Units
90 theoretical hours (3 hours per week) / 60 practical laboratory hours (2 hours per week)
1. Name(s) of the Course Coordinator(s)
Name: Assist. Lecturer Huda Ali Mahdi **Email:** hoda.ali@alfarabiuc.edu.iq
1. Course Objectives

Course Objectives • Provide students with fundamental and advanced knowledge of **Internet Technology** and its underlying architecture and operation. • Introduce students to different types of **Internet Service Providers (ISPs)** and their roles in the Internet infrastructure. • Explain different **network switching techniques** and fundamental Internet protocols. • Familiarize students with **Broadband Access Technologies**	**Course Objectives**
1. Teaching and Learning Strategies	
Teaching and Learning Methods 1. **Lectures** 2. **Tutorials** 3. **Theoretical and Practical Assignments** 4. **Quizzes and Examinations** 5. **Classroom Questions and Discussions** 6. **Integration of Theoretical and Practical Components** 7. **Seminars** 8. **In-Class and Out-of-Class Discussions** 9. **Reports, Presentations, and Posters**	**Strategy**
1. Course Structure	

Assessment	Teaching	Unit or Topic Name	Required	hours	week

Method	and Learning Method		Learning Outcomes		
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Introduction	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	1
Items 1–4 from Section 12	**Items 1–12 from Section 11**	ISP (Internet Provider Service	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	2
Items 1–4 from Section 12	**Items 1–12 from Section 11**	ISP (Internet Service Provider)	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	3
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Web Hosting	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	4
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Content Delivery Networks	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	5
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Content Delivery Networks	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	6
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Circuit Switching	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	7
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Circuit Switching	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	8

Items 1–4 from Section 12	**Items 1–12 from Section 11**	Dedicated Circuits	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	9
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Dedicated Circuits	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	10
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Dedicated Circuits	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	11
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Packet Switching.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	12
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Packet Switching.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	13
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Packet Switching.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	14
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Broadband Internet Access Technologies.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	15
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Broadband Internet Access Technologies.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	16
Items 1–4 from Section 12	**Items 1–12 from**	Broadband Internet Access Technologies.	**Item 1 from**	**2 Theoretical**	17

	Section 11		**Section 10**	**Hours** **2 Practical Hours**	
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Broadband Internet Access Technologies.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	18
Items 1–4 from Section 12	**Items 1–12 from Section 11**	ARP	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	19
Items 1–4 from Section 12	**Items 1–12 from Section 11**	ARP	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	20
Items 1–4 from Section 12	**Items 1–12 from Section 11**	FTP	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	21
Items 1–4 from Section 12	**Items 1–12 from Section 11**	FTP	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	22
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Email.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	23
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Email.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	24
Items 1–4 from Section 12	**Items 1–12 from Section 11**	Email.	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical**	25

				Hours	
Items 1–4 from Section 12	**Items 1–12 from Section 11**	DNS	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	26
Items 1–4 from Section 12	**Items 1–12 from Section 11**	DNS	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	27
Items 1–4 from Section 12	**Items 1–12 from Section 11**	DNS	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	28
Items 1–4 from Section 12	**Items 1–12 from Section 11**	DNS	**Item 1 from Section 10**	**2 Theoretical Hours** **2 Practical Hours**	29

1. Course Evaluation

Course Evaluation

- **Daily Examinations and Quizzes:** At least seven closed-book examinations and daily quizzes are administered throughout the course.
- **Oral and Written Assessments:** Students are encouraged to present and discuss their ideas for solving problems during lectures.
- **Final Examination:** A comprehensive closed-book final examination is administered at the end of the course.

1. Learning and Teaching Resources

• Oliver Heckmann, "THE COMPETITIVE INTERNET SERVICE PROVIDER ", 2006, John Wiley & Sons Ltd. • Margaret Levine Young et al, " Internet: The Complete Reference 2nd Edition, 2002, McGraw-Hill. • Edward Insam, " TCP/IP Embedded Internet Applications ", 1st publish Edition, 2003, Linacre House, Jordan Hill. • Huub van Helvoort, " Next Generation SDH/SONET Evolution or Revolution?", 2005, John Wiley & Sons Ltd.	**Required Prescribed Textbooks (if available)**

• Eric A. Hall, " Internet Core Protocols The Definitive Guide", 200 O'Reilly & Associates, Inc.	
• Oliver Heckmann, "THE COMPETITIVE INTERNET SERVI PROVIDER ", 2006, John Wiley & Sons Ltd. • Margaret Levine Young et al, " Internet: The Complete Reference 2nd Edition, 2002, McGraw-Hill.	**Primary References (Sources)**
• Kurose, J. F., & Ross, K. W., *Computer Networking: A Top-Down Approach*, 8th Edition, 2021, Pearson. • Tanenbaum, A. S., & Wetherall, D. J., *Computer Networks*, 6th Edition, 2021, Pearson. • Böttger, J., et al., *Content Delivery Networks: A Comprehensive Survey*, IEEE Communications Surveys & Tutorials, 2020. • Krishnan, S., et al., *Evolution of Internet Traffic Engineering and CDN Architectures*, IEEE Communications Magazine, 2021. • Van der Wee, M., et al., *Broadband Access Networks and FTTH Deployment: Recent Trends*, IEEE Communications Magazine, 2022.	**Recommended Supporting Books and References (Scientific Journals, Reports, etc.)**
• Internet Engineering Task Force (IETF) https://www.ietf.org • IEEE Xplore Digital Library https://ieeexplore.ieee.org • Cisco Networking and Research https://www.cisco.com • Cloudflare Learning Center https://www.cloudflare.com/learning • MDN Web Docs (Mozilla Developer Network) https://developer.mozilla.org • World Wide Web Consortium (W3C) https://www.w3.org • PHP Official Documentation https://www.php.net/docs.php • International Telecommunication Union (ITU) https://www.itu.int	**Electronic References and Websites**

Course Description Form: Computer Vision and Pattern Recognition

1. Course Title

Computer Vision and Pattern Recognition

1. Course Code

DE 406

1. Semester / Academic Year

26−2025

1. Date of Preparation of This Course Description

December 2025

1. Available Modes of Attendance

Annual System:
There is only one mode of attendance, namely **mandatory attendance as part of the daily academic program**.

Student Attendance:
Students attend on a **full-time basis on campus**. They participate in a full-day academic program through **face-to-face instruction**. The academic year consists of courses delivered over a period of **30 weeks**.

1. Total Contact Hours / Total Credit Units

90 hours, at a rate of 3 hours per week.

1. Name(s) of the Course Coordinator(s)

Name: Assist. Lecturer Al-Muntadher Mahmoud Abdulwahid
Email: almuntadher.mahmood@alfarabiuc.edu.iq

1. Course Objectives

• Introduce the fundamental principles of modern computer vision systems equipped with pattern recognition capabilities in a clear, comprehensive, and systematic manner. • Provide an in-depth discussion of the fundamentals of computer vision algorithms and basic filters, with emphasis on analyzing and implementing selected algorithms based on fundamental principles, enabling students to understand and apply them effectively. • Study the relationship between computer vision and the human visual system, color spaces and their interrelationships, multilevel features, feature extraction and matching, optical flow, machine learning, and object detection.	**Course Learning Objectives**

1. Teaching and Learning Strategies

Teaching and Learning Methods (T-Methods) **T1.** Lectures. **T2.** Tutorials and practical sessions. **T3.** Homework assignments. **T4.** Quizzes and examinations. **T5.** In-class discussions and question-and-answer sessions. **T6.** Integrating theoretical concepts with practical applications. **T7.** Seminars. **T8.** Oral discussions inside and outside the classroom.	**Strategy**

T9. Reports, presentations, and posters.

Learning Outcomes (L-Methods)

L1. Understand the fundamental principles of digital image processing and analysis.

L2. Understand and analyze computer vision and pattern recognition algorithms.

L3. Develop the specialized skills required for the course topics.

L4. Enable students to design and model computer vision and pattern recognition algorithms.

L5. Understand computer vision systems as systems designed to emulate or substitute aspects of the human visual system in computer-based applications.

L6. Understand the relationship between computer vision algorithms and the human visual system.

Assessment Methods (E-Methods)

E1. Daily written or oral examinations.

E2. Monthly tests.

E3. Homework assignments.

E4. Tasks and scientific presentations.

.1

week	Hours	Intended Learning Outcomes (ILOs)	Unit or Topic Title	Teaching and Learning Methods	Assessment Methods
1	2 the. 1 tut.	L1-L6	Introduction to Computer ern Vision and Pat Recognition.	Teaching and Learning Methods for Section 9	Assessment Methods for Sections 9 and 11
2-3	4 the. 2 tut.	L1-L6	Human Vision, Color Spaces and Transforms	Teaching and Learning Methods for Section 9	Assessment Methods for Sections 9 and 11

3-4	**4 the. 2 tut.**	**L1-L6**	**Image coordinates and resizing**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
5-8	**6 the. 3 tut.**	**L1-L6**	**Filters and convolutions**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
9-10	**4 the. 2 tut.**	**L1-L6**	**Harris detector and matching**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 1**
11-13	**6 the. 3 tut.**	**L1-L6**	**Matching, RANSAC, HOG, and SIFT**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
13-14	**4 the. 2 tut.**	**L1-L6**	**Optical Flow**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
15	**2 the. 1 tut.**	**L1-L6**	**Machine Learning**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
16	**2 the. 1 tut.**	**L1-L6**	**Machine Learning for Computer Vision**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
17-18	**4 the. 2 tut.**	**L1-L6**	**Feature extraction**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
19-20	**4 the. 2 tut.**	**L1-L6**	**Neural Networks**	**Teaching and Learning**	**Assessment Methods for Sections 9 and 11**

				Methods for Section 9	
21-22	**4 the. 2 tut.**	**L1-L6**	**Support Vector Machine**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
23	**2 the. 1 tut.**	**L1-L6**	**Introduction to Convolutional Neural Networks**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
24-25	**4 the. 2 tut.**	**L1-L6**	**Object Detection**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
26-27	**4 the. 2 tut.**	**L1-L6**	**Segmentation**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
27-28	**4 the. 2 tut.**	**L1-L6**	**Face detection and recognition**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**
29-30	**4 the. 2 tut.**	**L1-L6**	**Seminars**	**Teaching and Learning Methods for Section 9**	**Assessment Methods for Sections 9 and 11**

1. Course Evaluation

The student's final grade is calculated and distributed according to the **annual assessment system**, with a total of **100%**, as follows:

A. Annual Coursework Assessment – 30%

The annual coursework grade is based on the following assessment components:

1. **Monthly Examinations – 25%**
2. **Daily Quizzes, Homework Assignments, Class Discussions, Attendance, Oral Examinations, and Student Participation in Classroom Activities – 5%**

B. Final Examination – 70%	
1. Learning and Teaching Resources	
Feature extraction image processing for computer vision, Nixon, Mark S and Aguado, Alberto S, 2012, Academic Press. -1 Color image processing: methods and applications, Lukac, Rastislav and Plataniotis, Konstantinos N, 2006, CRC press. -2	**Required Textbooks (if any)**
1- Computer Vision: Algorithms and Applications Rick Szeliski, 2010. 2- Digital Image Processing, Fourth Edition, Rafael C. Gonzalez and Richard E. Woods, 2018.	**Main References (Sources)**
Abdulhussain, Sadiq H. and Ramli, Abd Rahman and Mahmmod, Bahseera M and Al-Haddad, S A R and Jassim, Wissam A. “Image Edge Detection Operators based on Orthogonal Polynomials.” International Journal of Image and Data Fusion 8.3 (2017), 293-308. -1 Mahmmod, Basheera M. and bin Ramli, Abd Rahman and Abdulhussain, Sadiq H and Al-Haddad, Syed Abdul Rahman and Jassim, Wissam A. “Signal compression and enhancement using a new orthogonal-polynomial-based discrete transform.” IET Signal Processing 12.1(2018): 129-142. -2 Lowe, David G. "Distinctive image Features from scale-invariant keypoints." ternational journal of computer vision 60.2 (2004): 91-110. -3 -4	**Recommended Supporting Books and References (Scientific Journals, Reports, etc.)**
MIT OpenCourseWare	**Electronic References and Websites**

Course Description Form for Embedded Systems

1. Course Title
Embedded Systems
1. Course Code
)E 403
1. Semester / Academic Year
26/2025
1. Date of Preparation of This Course Description
7 January 2026
1. Available Modes of Attendance
Students are **full-time students attending on campus**. They participate in a **full-day, face-to-face academic program**. The academic year consists of **regular courses delivered over a period of 30 weeks**.
1. Total Contact Hours / Total Credit Units
150 Hours / 6 Credit Units
1. Name(s) of the Course Coordinator(s)
Name: Assist. Lecturer Estabraq Abdulrahman **Email:** estabraq.abdulrahman@alfarabiuc.edu.iq
1. Course Objectives

• Provide a comprehensive introduction to the field of **embedded systems**, equipping students with the knowledge and skills required to design, implement, and optimize embedded systems for various applications. • Explore the fundamental concepts and technologies related to embedded systems, which are computer-based systems designed to perform specific tasks with dedicated functionalities.	**Course Learning Objectives**

1. Teaching and Learning Strategies	
أA. Cognitive Objectives **A1.** Design, program, and evaluate real-time systems. **A2.** Design electronic circuits for information processing in communication and control systems. **A3.** Analyze, design, test, and maintain complex embedded systems. **A4.** Evaluate hardware and software requirements for communication and control applications. **A5.** Solve industrial problems related to control and automation systems.	**Strategy**

A6. Understand and apply sensor characteristics in designing electronic systems that integrate measurement and behavioral functions across various industrial production domains.

A7. Understand and apply the methods and tools required to develop and optimize software implemented on microprocessors, microcontrollers, and data acquisition devices.

B. Course-Specific Skills Objectives

B1. Apply fundamental mathematical concepts and algorithms to describe and solve engineering problems.

B2. Understand fundamental developments and concepts in the field of embedded systems.

B3. Develop the ability to conduct experiments and analyze data.

B4. Identify, formulate, and solve embedded systems problems using modern engineering tools, techniques, and skills.

B5. Collaborate effectively in group projects.

B6. Develop written and oral communication skills through presentations of project results.

B7. Develop an awareness of ethical issues associated with professional engineering practice.

Teaching and Learning Methods

1. Lectures.

2. Tutorials and practical sessions.

3. Homework and assignments.

4. Quizzes and examinations.

5. Seminars.

6. Reports, presentations, and posters.

Assessment Methods

1. Examinations and quizzes.

2. Extracurricular activities.

3. Student participation during lectures.

4. Student responses to questionnaires evaluating the course and the teaching staff member.

C. Affective and Values-Based Objectives

C1. Obtain students' collaborative assessment data at the end of the cooperative learning experience.

C2. Conduct an annual survey to determine the extent to which students have achieved the intended learning outcomes.

C3. Evaluate the course based on student feedback collected through questionnaires distributed to students regarding the educational experience and academic courses.

Teaching and Learning Methods

1. Quizzes and tests.

2. Learning activities.

3. Participation during lectures.

Assessment Methods

1. Reviewing the career status and employment outcomes of previous graduates.

2. Evaluation by relevant administrative committees, such as the Scientific Committee and the Quality Assurance Committee.

3. Tracking employment trends of graduates annually, including their workplaces and job titles.

D. Transferable and General Skills

D1. Ability to conduct independent study, take notes, and undertake background reading.

D2. Problem-solving based on conceptual understanding.

D3. Ability to learn and retain fundamental facts and concepts.

D4. Self-discipline and self-motivation.

1. Course Structure

Assessment Methods	Teaching and Learning Methods	Unit or Topic Title	Intended Learning Outcomes (ILOs)	Hours	Week

Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Review of microcontrollers and Digital Signal Processors (DSP), architecture, peripheral modules.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	1
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Embedded micro controller cores (ARM, RISC, CISC, SOC), addressing modes.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	2
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Interrupts structure, hardware multiplier, pipelining.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	3
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Hardware/Software co-design. Architecture of embedded systems.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	4
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Tutorials & Quiz**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	5
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Assemblers, linkers and loaders. Binary file formats for processor executable files.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	6

Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Typical structure of timer–interrupt driven programs.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	7
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**GNU–GCC compiler introduction, programming with Linux environment and gnu debugging.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	8
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**GNU insight with step level trace debugging, make file interaction, building and execution.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	9
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Introduction to ARM instruction set, addressing modes, operating modes with ARM core.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	10
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**ARM TDMI modes, ADC, Timers, Interrupt structure.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	11
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Byte ordering (LE, BE), Thumb mode normal mode instructions changes.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	12
Items 1–4 from	**Items 1–6 from**	**Pipeline utilization with all**	**Items A1–A7 from**	**3 Theoretical**	13

Section 9	**Section 9**	**register allocations.**	**Section 9**	**Hours 2 Practical Hours**	
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Compare the ARM7, ARM9, and ARM11 with new features additions. System design with ARM processor.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	14
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Interfacing switches, keyboards, LED's and LCD's.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	15
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Transistors used for digital–controlled switches, digital–controlled relays, solenoids & Quiz**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	16
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Interfacing of DC, AC and stepper motors.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	17
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Analog interfacing and data acquisition systems.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	18
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Real Time Operating System Concepts, Kernel Structure.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	19

Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Critical Sections, Multitasking, Task Management.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	20
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Time Management, Schedulers, Event Control**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	21
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Blocks, Priorities, Deadlocks.**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	22
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Tutorial & Quiz**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	23
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Synchronization, Semaphore Management, Exclusion. Mutual**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	24
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Message Mailbox Management, Message Queue Management, Memory Management**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	25
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Tutorial & Quiz**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	26
Items 1–4 from	**Items 1–6 from**	**Applications for**	**Items A1–A7 from**	**3 Theoretical**	27

Section 9	**Section 9**	**Embedded Systems**	**Section 9**	**Hours 2 Practical Hours**	
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Applications for Embedded Systems**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	28
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Applications for Embedded Systems**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	29
Items 1–4 from Section 9	**Items 1–6 from Section 9**	**Tutorial & Quiz**	**Items A1–A7 from Section 9**	**3 Theoretical Hours 2 Practical Hours**	30

11. Course Evaluation

بالصياغة الأكاديمية المناسبة لنموذج وصف المقرر:

- **25%** — Quizzes, Midterm Examinations, Daily Participation, and Attendance
- **15%** — Laboratory Work
- **10%** — Final Laboratory Examination
- **50%** — Final Examination

12. Learning and Teaching Resources

Embedded Systems, Architecture, Programming and Design - Raj Kamal -Tata McGraw Hill	**Required Textbooks (if applicable)**
• ARM System Developer's Guide, Designing and Optimizing System Software - Andrew N. Sloss, Dominic Sysmes and Chris Wright - Elsevier Inc. • An Embedded Software Primer - David E. Simon - Pearson Education South Asia	**Core References (Primary Sources)**
• S. Edwards, L. Lavagno, E. A. Lee and A. Sangiovanni-Vincentelli, "Design of embedded systems: formal models, validation, and synthesis," in Proceedings of the IEEE, vol. 85, no. 3, pp. 366-390, March 1997. • Daler Rakhmatov and Sarma Vrudhula. 2003. Energy management for battery-powered embedded systems. ACM Trans. Embed. Comput. Syst. 2, 3 (August 2003), 277-324.	**Recommended Supplementary Books and References (Scientific Journals, Reports, etc.)**
https://www.labcenter.com/ https://www.microchip.com/	**Electronic References and Websites**

Course Description Form – English Language

1. Course Name
English Language
2. Course Code
S 408
3. Semester / Academic Year
First and Second Semesters (2025–2026)
4. Date of Course Description Preparation
26/1/6
5. Available Attendance Modes
In-Person / Daily Attendance
6. Total Contact Hours / Total Credit Units
6. Total Contact Hours / Total Credit Units
7. Course Coordinator/Instructor (if more than one, list all names)
Name: Assist. Lecturer Noor Al-Huda Kareem **Email:** noralhadi.kariem@alfarabiuc.edu.iq
8. Course Objectives

The academic program aims to strengthen students' language skills and enhance their understanding of English terminology and grammatical structures, thereby enriching and expanding their linguistic repertoire. Furthermore, the course encourages students to use and practice English on a daily basis, fostering effective communication and improving their overall language proficiency.	**Course Objectives**
9. Teaching and Learning Strategies	
To develop students' academic and linguistic competencies in English and to enhance their language skills in reading, writing, listening, and speaking, the course adopts a range of teaching and learning strategies. Students are also encouraged to practice English on a daily basis with their peers to promote collaborative learning, communication, and active participation. These strategies include: • **Structured Lectures:** Delivering the course content through systematic and well-organized lectures. • **Discussion and Dialogue:** Encouraging interaction, discussion, and dialogue during lectures to enhance students' communication skills and active engagement. • **Reading and Listening Activities:** Using supplementary reading passages and conversations to improve students' reading and listening comprehension skills. • **Interactive and Student-Centered Learning:** Presenting the course material in a clear and accessible manner while involving students in explanation, clarification, and classroom activities to ensure active participation, effective interaction, and a deeper understanding of the content. • **Oral Practice:** Providing opportunities for students to practice spoken English, express their ideas, and communicate with their peers, thereby strengthening their speaking and oral expression skills.	**Teaching and Learning Strategy**

• **Daily Quizzes and Written Activities:** Conducting regular assessments to evaluate students' ability to express themselves in writing and construct meaningful sentences, while continuously developing their writing and composition skills.					
10. Course Structure					
Assessment Method	**Learning Method**	**Unit / Topic Name**	**Intended Learning Outcomes**	**hours**	**week**
Student Discussion **Discussion and Daily Quiz** **Student Discussion and Participation** **Student Discussion and Participation** **Student Discussion and Participation**	**Lecture** **Lecture** **Lecture** **Lecture**	**First Semester** Review of English Tenses and Writing Emails in Their Various Forms **Second Semester** • Present Perfect Tense • Reading Comprehension: Texts from the Course Book and an Additional Specialized Scientific Text • Writing a Curriculum Vitae (CV) **Third Semester** • Past Tense • Explanation and Analysis of Literary Texts from the Course Book • Pronunciation Techniques and Word Stress **Fourth Semester** • Suffixes and Word Formation • Antonyms • Reading and Explanation of Texts from the Course	**Definition and Explanation** **Definition and Explanation** **Definition and Explanation** **Definition and Explanation** **Definition and**	1 1 1 1 1 1	2+1 4+3 6+5 7+6 9+8 11+10 13+12

Student Discussion and Participation	**Lecture**	Book	**Explanation**	1	15+14
			Definition and Explanation		
Student Discussion and Participation		**Fifth Semester** • Future Tense • Polite Requests and Expressions • Phrasal Verbs in the Course Book • Ambition	**Definition and Explanation** وشرح	1 1	17+16 19+18
Student Discussion and Participation		**Sixth Semester**	تعريف وشر		
Student Discussion and Participation		• Countable and Uncountable Nouns • How to Participate Effectively in Meetings • Reading and Explanation of Texts from the Course Book • BBC Podcast on New Year's Goals and Resolutions • Unit Six	تعريف وشرح	1 1	21+20 23+22
Student Discussion and Participation		**Seventh Semester** • Use of Modal Verbs • Phrasal Verbs • Reading and Explanation of Texts from the Course Book • How to Describe a Scientific Experiment	تعريف وشرح	1	25+24
Student					

Discussion and Participation **Download the Course Material in PDF Format** **Download the Course Material in PDF Format** **Discussion** **Discussion**		**Eighth Semester** • Linking Expressions and Cohesive Phrases • Adverbial Structures • Reading and Explanation of the Texts in the Unit **Ninth Semester** • Expressing Habits • Words with Similar Pronunciation and Similar Meaning • Homophones and Synonyms **Tenth Semester** • Explanation of Idiomatic Expressions • Antonyms and Synonyms **Eleventh Semester** • Conditional Sentences (If-Clauses) • Making Assumptions and Presuppositions • Reading and Explanation of Texts from the Unit and Additional External Texts **Twelfth Semester** • Demonstrative Pronouns and Definite Articles **Unit 5 (p. 38)** – Unit 5 from the supplementary **Professional English** textbook • **Describing a Process** **Unit 10 (p. 78)** • **Poster Presentation or Oral Presentation**	**Definition and Explanation** **Definition and Explanation** **Definition and Explanation** **Definition and Explanation**	1 1	27+26 29+28

		Discussion of Students' Reports **Discussion of Students' Reports**			

11. Course Evaluation

The course grade is distributed out of 100 marks according to the tasks and activities assigned to students, including daily preparation, daily quizzes, oral and monthly examinations, written examinations, reports, and other academic activities.

- **30 marks** — Annual Coursework / Continuous Assessment
- **70 marks** — Final Examination

12. Learning and Teaching Resources

Headway plus Upper-Intermediate	**Required Textbooks (if applicable)**
Ha Cambridge English for ımzen Armer + Scientists by Cambridge English for ngineering by Mark Ibbotson	**Primary References (Core Sources)**
English /English dictionaries) Stories and books for learning English for specific purposes	**Recommended Supplementary Books and References (Scientific Journals, Reports, etc.)**
BBC learning English, BBC earning English from the news podcast, and other relevant podcast	**Electronic References and Websites**