نموذج وصف البرنامج الأكاديمي

اسم الجامعة: تكريت

الكلية: الهندسة

القسم العلمي: هندسة الطاقة المستدامة

اسم البرنامج الأكاديمي أو المهني: بكالوريوس هندسة الطاقة المستدامة

اسم الشهادة النهائية: بكالوريوس علوم في هندسة الطاقة المستدامة

النظام الدراسي: فصول دراسية

تاريخ اعداد الوصف: 2025/9/1

تاريخ ملئ الملف: 2025/9/1

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١٢/١٠/٢٠٢٥

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Ministry of Higher Education and Scientific Research
Tikrit University
College of Engineering
Department of Sustainable Energy Engineering

Academic Program and Course

2025−2026

Introduction

The educational program is a coordinated, organized package of courses that includes procedures and experiences, organized into a course vocabulary. Its main purpose is to build and refine graduates' skills, making them qualified to meet the requirements of the labor market. It is reviewed and evaluated annually through internal or external audit procedures and programs, such as the external examiner program.

The academic program description provides a brief summary of the program's main features and courses, indicating the skills students are working to acquire in line with the academic program's objectives. The importance of this description is evident in that it serves as the cornerstone for obtaining program accreditation and is written by the teaching staff under the supervision of the scientific committees in the academic departments.

This second edition of the guide includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester system), as well as adopting the generalized academic program description according to the Department of

Studies' letter T M3/2906 dated 3/5/2023 with regard to programs that adopt the Bologna Process as the basis for their work.

In this regard, we cannot help but emphasize the importance of writing descriptions of academic programs and courses to ensure the smooth running of the educational process.

Concepts and terminology:

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

Course description : This provides a concise summary of the course's key features and expected learning outcomes, demonstrating whether the student has made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious vision for the future of the academic program to be a sophisticated, inspiring, motivating, realistic and applicable program.

Program Mission: Briefly outlines the goals and activities necessary to achieve them, and identifies the program's development paths and directions.

Program objectives: These are statements that describe what the academic program intends to achieve within a specific time period and are measurable and observable.

Curriculum structure: All courses/study materials included in the academic program according to the approved learning system (semester, annual, Bologna track), whether required (Ministry, University, College and Scientific Department), with the number of study units.

Learning outcomes: A consistent set of knowledge, skills, and values acquired by the student after the successful completion of the academic program. The learning outcomes for each course must be defined in a way that achieves the program's objectives.

Teaching and learning strategies are the strategies used by faculty members to enhance student teaching and learning. There are plans followed to achieve learning objectives. In other words, they describe all classroom and extracurricular activities designed to achieving the program's learning outcomes.

Academic Program Description Template

Name : Tikrit

College/Institute: Engineering

Scientific Department: Sustainable Energy Engineering

Academic or professional program name: Bachelor of Science in Sustainable Energy Engineering

Final Certificate Title: Bachelor of Science in Sustainable Energy Engineering

system : Bologna

Description prepared on : 1/9/2026

Date the file was completed: 1/6/2026

Signature:	**Signature**
Name of Scientific	**Department Head's**
Assistant:	**Name:**

The file was reviewed by

Quality Assurance and University Performance Division

Name of the Director of the Quality Assurance and University Performance Division:

the date

the signature

Dean's approval

1. Program Vision

Working to make the Department of Sustainable Energy Engineering a local and regional leader in engineering education and scientific research in the field of clean and renewable energy, a reliable consulting source for state institutions and the private sector on energy issues, and a key partner in finding innovative and sustainable solutions to environmental challenges, in a way that contributes to achieving sustainable development and enhancing the position of the College of Engineering locally and globally .

2. Program Mission

1. To instill a culture of excellence in teaching and education in the field of clean and renewable energy, in order to graduate engineers who possess scientific competence and practical skills .
2. The department aims to be the preferred choice for students seeking to study energy engineering in Iraq, through a stimulating academic environment and modern educational programs.
3. Attracting and encouraging the admission of international students to enrich academic diversity and enhance the department's regional and global standing . Promoting applied scientific research in the fields of sustainable energy and supporting innovative ideas to create researchers and leaders who contribute to finding solutions to energy and environmental challenges .
4. Developing curricula and linking them to the latest global developments to develop students' personalities and enhance their leadership and innovation skills.
5. Building an effective communication network of graduates, employers, and governmental and industrial institutions to support the department and college in achieving its academic and community goals.

3. Program objectives

The Sustainable Energy Engineering program aims to:

1. To graduate competent engineers equipped with specialized scientific and practical skills in the fields of renewable and clean energy, and capable of competing in the local, regional, and global labor market.

2. Conducting academic and applied research in the fields of sustainable energy, energy efficiency, and storage and conversion technologies, contributing to providing practical solutions to environmental and energy challenges.

3. Contributing to the design, supervision, and consulting of renewable energy and resource efficiency projects in support of sustainable development in Iraq .

4. Maintaining continuous communication with government institutions and the private sector to identify energy-related problems and work on providing innovative solutions that integrate the theoretical and practical aspects .

5. Enhancing the department's academic reputation through participation in global rankings and achieving academic accreditation for engineering programs in the field of sustainable energy, while establishing a culture of total quality and continuous improvement .

6. Continuous work is underway to develop curricula and graduate programs aligned with scientific and technological progress in the field of clean energy, while promoting project-based learning and encouraging innovation.

7. Establishing research and academic cooperation with leading international universities and centers in the field of sustainable energy, with the aim of enhancing the scientific and research level of the department .

4. Program accreditation

ABET is accredited by the Ministry of Higher Education and Scientific Research

5. **Other external influences**
Infrastructure, financial, and human resources

6. **Program structure**				
Program structure	**Number of courses**	**Study unit**	**Percentage**	**comments ***
Institutional requirements	8	18	7.5	Basic
College requirements	9	49	20.42	Basic
Department requirements	35	173	72.08	Basic
Summer training				
Other				

* The notes may include whether the course is core or elective.

7 - Program Description				
Year / Level	**Course code**	**Course Name**	**Credit Hours**	
			Lectures (hr /w)	**Lab./ Prac./ Tutor. (hr /w)**
the first	SE_ENG-101	Introduction to Sustainable Energy Engineering	3	3
the first	MATH-101	Calculus 1	4	2
the first	SE_ENG-102	Physics	3	3
the first	UOT-003	Computer Science	1	2
the first	ENG-106	Engineering workshops	2	3
the first	UOT-002	English 1	2	—
the first	UOT-004	Democracy and human rights	2	—
the first	MATH-102	Calculus 2	4	2
the first	ENG-102	Engineering Mechanics	3	1
the first	SE_ENG-104	Basics of electricity	2	3
the first	SE_ENG-205	Environmental pollution	2	3
the first	ENG-101	Engineering drawing	1	2
the first	SE_ENG-105	Chemistry	2	3
the first	UOT-001	Arabic language 1	2	—
the second	SE-ENG-201	Fluid mechanics	2	3
the second	SE-ENG-202	Thermodynamics 1	2	3

the second	SE-ENG-210	Heat Transfer 1	2	3
the second	MATH-201	Geometric Analysis 1	4	—
the second	SE-ENG-204	Engineering materials	2	2
the second	ENG-105	Computer programming	1	2
the second	UOT-011	Arabic language 2	2	—
the second	SE-ENG-207	Thermodynamics 2	2	3
the second	SE-ENG-208	Material resistance	2	3
the second	SE-ENG-209	The economic management and ethics of energy	2	1
the second	SE-ENG-317	Heat Transfer 2	2	3
the second	MATH-202	Geometric Analysis 2	4	—
the second	UOT-021	English 2	2	—
the second	UOT-109	Determining geothermal energy	2	—
the third	SE-ENG-316	Solar thermal energy systems	2	3
the third	MATH-301	numerical methods	3	1
the third	SE-ENG-326	Photovoltaic energy systems	2	3
the third	SE-ENG-311	power plant	3	1
the third	SE-ENG-312	Applied Electronics	3	3
the third	SE-ENG-313	electric machine	2	3
the third	SE-ENG-301	Turbine machines	3	3
the third	SE-ENG-302	Principles of Combustion and Emissions	2	3
the third	SE-ENG-303	Energy storage systems	3	1
the third	SE-ENG-304	Computer-aided engineering design	2	2
the third	SE-ENG-305	Geothermal energy	2	3
the third	MATH-302	Engineering statistics	2	1
Fourth	SE-ENG-401	Improvement	2	1
Fourth	SE-ENG-402	Principles of fuel cell technology	2	3
Fourth	SE-ENG-403	Designing sustainable energy systems	3	1
Fourth	SE-ENG-404	mechanical vibrations	3	3
Fourth	SE-ENG-405	Automated control systems	3	3
Fourth	ENG-401	Graduation Project 1	1	2
Fourth	SE-ENG-406	Sustainable building design	2	1
Fourth	SE-ENG-407	Wind power systems	2	3
Fourth	SE-ENG-408	Biomass energy systems	2	3
Fourth	SE-ENG-409	Smart grid systems	2	3
Fourth	SE-ENG-410	Principles of air conditioning and refrigeration	2	2
Fourth	ENG-402	Graduation Project 2	1	2

7. Expected learning outcomes of the program

Knowledge

1- Applying the principles of engineering, science, and mathematics to identify, formulate, and solve complex engineering problems in the field of sustainable energy.
2- Employing specialized knowledge in renewable and clean energy technologies to address issues of pollution and environmental emissions.
3- Acquiring advanced scientific knowledge enables the graduate to pursue postgraduate studies and continuous professional development in the field of specialization .

Skills

1- Designing engineering solutions that meet specific needs while considering health, environmental, economic, and social aspects.
2- Developing and conducting engineering experiments, analyzing and interpreting data to draw accurate conclusions.
3- Effective communication, both orally and in writing, with various professional and community groups.
4- Working efficiently within multidisciplinary teams, participating in leadership, task planning, and goal achievement.
5- Employing self-learning strategies to acquire new knowledge and skills when needed .

Values

1- Adherence to ethical and professional responsibilities in engineering practices.
2- Making informed engineering decisions that take into account global, environmental, economic, and social impacts.
3- Contributing to community service and achieving sustainable development through innovation and professional collaboration.

8. Teaching and learning strategies

The program relies on interactive lectures to present the theoretical foundations of sustainable energy engineering while promoting dialogue and discussion. It also employs problem-based learning and engineering projects to link theoretical knowledge with real-world practical applications. This is supported by laboratory experiments and teamwork to develop analytical, technical, and communication skills. The program also encourages self-learning and the use of modern educational technologies to promote continuous professional development.

9. Assessment methods

1. Surprise exams (quiz)
2. Monthly exams.
3. Reports.
4. Homework.
5. Laboratories.

10. Faculty

Faculty members

Instructor's Name	Specialization		Special requirements/ skills (if any)		Faculty preparation	
	general	private			angel	lecturer
Prof. Dr. Fayyad Muhammad Abd	mechanical	Thermals			Permanent staff	

	engineering					
Prof. Dr. Khalaf Salloum Ka'id	Electrical Engineering	Control engineering			Permanent staff	
Prof. Dr. Yassin Ali Saleh	Civil Engineering	Construction			Permanent staff	
Prof. Dr. Manar Saleh Mahdi	mechanical engineering	solar energy			Permanent staff	
Prof. Dr. Naseer Damen Mukhlif	mechanical engineering	Refractory			Permanent staff	
Prof. Dr. Tadamon Ahmed Yassin	mechanical engineering	Refractory			Permanent staff	
Prof. Dr. Adel Mahmoud Bash	mechanical engineering	Applied Mechanics			Permanent staff	
Dr. Ali Ahmed Kitan	mechanical engineering	thermal fluids			Permanent staff	
Dr. Saad Nahi Saleh	Chemical Engineering	Computational Fluid Dynamics			Permanent staff	
Dr. Hussam Sami Dhiab	mechanical engineering	solar energy			Permanent staff	
Dr. Muhannad Latif Hamada	mechanical engineering	Production and Minerals			Permanent staff	
Dr. Hamza Raad Yassin	mechanical engineering	Thermals			Permanent staff	
Dr. Israa Sami Farhan	mechanical engineering	Refractory			Permanent staff	
M.D. Jalal Nizar Abdel Baqi	Electrical Engineering	Artificial intelligence			Permanent staff	

M. Ashraf Abdullah Ahmed	mechanical engineering	Power engineering			Permanent staff	
M. Sinai Khodair Salman	mechanical engineering	Thermals			Permanent staff	
M.M. Omar Nafeh Mahmoud	Electrical Engineering	Electrical Engineering			Permanent staff	
M.M. Sabah Mohammed Hassan	Chemical Engineering	Chemical Engineering			Permanent staff	
M.M. Noor Saeed Saleh	Computer Engineering	Artificial intelligence			Permanent staff	
M.M. Ahmed Hefzy Mohsen	Electrical Engineering	electronics			Permanent staff	
M.M. Aqhwana Abdelmajid	Chemical Engineering	Industrial units			Permanent staff	
M.M. Iyad Tariq Mahmoud	Electrical Engineering	control			Permanent staff	
M.M. Arjan Mosaddeq Taha	Electrical Engineering	Applied and natural sciences			Permanent staff	
M.M. Qahtan Ali Yousef	Electrical Engineering	Power systems			Permanent staff	

Professional Development
Orienting new faculty members
Iraqi Ministry of Higher Education and Scientific Research (with all its details).
Professional development of faculty members

Urging and encouraging faculty members to publish research, participate in conferences, seminars, workshops, and training courses held in the field of general specialization, auditing, or the field of academic work in general, and scientific cooperation with various institutions inside or outside the country.

11. Admission standard

According to the instructions of the Iraqi Ministry of Higher Education and Scientific Research

12. Key sources of information about the program

- Textbooks
- Scientific research
- The International Information Network (Internet)

13. Program development plan

1- Working to attract as many students as possible by enhancing the program's academic reputation and developing its educational environment.
2- Increasing field visits to governmental and private projects with the aim of linking the theoretical aspect with practical applications in the field of sustainable energy.
3- Encouraging students to make continuous use of the college and university library and available scientific resources to enhance knowledge acquisition.
4- Improving the level of research projects and graduation research, and raising their quality in line with approved academic standards.

5- Expanding the horizons of scientific and research cooperation with academic and research institutions inside and outside Iraq, thereby contributing to the development of the program and enhancing its scientific standing.

Program Skills Plan															
				Learning outcomes required from the program											
				Knowledge				Skills				Values			
Year / Level	Course code	Course Name	Essential or optional	A1	A2	A3	A4	B1	B2	B3	B4	Part 1	Part 2	Part 3	Q4
Level 1 // Academic Year 2025-2026	SE_ENG-101	Introduction to Sustainable Energy Engineering	essential	√	√	√	√	√	√	√	√	√	√	√	√
	MATH-101	Calculus 1	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE_ENG-102	Physics	essential	√	√	√	√	√	√	√	√	√	√	√	√
	UOT-003	Computer Science	essential	√	√	√	√	√	√	√	√	√	√	√	√
	ENG-106	Engineering workshops	essential	√	√	√	√	√	√	√	√	√	√	√	√
	UOT-002	English 1	essential	√	√	√	√	√	√	√	√	√	√	√	√

	UOT-004	Democracy and human rights	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	MATH-102	Calculus 2	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	ENG-102	Engineering Mechanics	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	SE_ENG-104	Basics of electricity	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	SE_ENG-205	Environmental pollution	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	ENG-101	Engineering drawing	essential	√	√	√	√	√	√	√	√	√	√	√	√	√
	SE_ENG-105	Chemistry	essential	√	√	√	√	√	√	√	√	√	√	√	√	√

- **Please check the boxes corresponding to the individual learning outcomes from the program that are being assessed.**

Program Skills Plan																
				outputs Learning Required from the program												
/ Year Level	code of the course	name of the course	Essential or optional	Knowledge				Skills				Values				
				A١	A٢	A٣	A٤	B١	B٢	B٣	B٤	Part 1	Part 2	Part 3	Part 4	
Level // Two -٢٠٢٥ ٢٠٢٦	SE_ENG-101	Introduction to Sustainable Energy Engineering	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-201	Fluid mechanics	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-202	Thermodynamics ١	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-210	Heat Transfer ١	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	MATH-201	Geometric Analysis ١	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-204	Engineering materials	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	ENG-105	Computer programming	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	UOT-011	Arabic language ٢	essential	√	√	√	√	√	√	√	√	√	√	√	√	

	SE-ENG-207	Thermodynamics ۲	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-208	Material resistance	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-209	The economic management and ethics of energy	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-317	Heat Transfer ۲	essential	√	√	√	√	√	√	√	√	√	√	√	√
	MATH-202	Geometric Analysis ۲	essential	√	√	√	√	√	√	√	√	√	√	√	√

Program Skills Plan																
				outputs Learning Required from the program												
Year / Level	code of the course	name of the course	Essential or optional	Knowledge				Skills				Values				
				A1	A2	A3	A4	B1	B2	B3	B4	Part 1	Part 2	Part 3	Part 4	
Level Three // 2025-2026	SE-ENG-316	Solar thermal energy systems	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	MATH-301	numerical methods	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-326	Photovoltaic energy systems	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-311	power plant	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-312	Applied Electronics	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-313	electric machine	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-301	Turbine machines	essential	√	√	√	√	√	√	√	√	√	√	√	√	

	SE-ENG-302	Principles of Combustion and Emissions	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-303	Energy storage systems	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-304	Computer Engineering Design	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-305	Geothermal energy	essential	√	√	√	√	√	√	√	√	√	√	√	√
	MATH-302	Engineering statistics	essential	√	√	√	√	√	√	√	√	√	√	√	√

Program Skills Plan																
				outputs Learning Required from the program												
Year / Level	code of the course	name of the course	Essential or optional	Knowledge				Skills				Values				
				A1	A2	A3	A4	B1	B2	B3	B4	Part 1	Part 2	Part 3	Part 4	
Level Four / 2025-2026	SE_ENG-101	Introduction to Sustainable Energy Engineering	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-401	Improvement	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-402	Principles of fuel cell technology	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-403	Designing sustainable energy systems	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-404	mechanical vibrations	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-405	Automated control systems	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	ENG-401	First graduation project	essential	√	√	√	√	√	√	√	√	√	√	√	√	
	SE-ENG-406	Sustainable building design	essential	√	√	√	√	√	√	√	√	√	√	√	√	

	SE-ENG-407	Wind power systems	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-408	Biomass energy systems	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-409	Smart grid systems	essential	√	√	√	√	√	√	√	√	√	√	√	√
	SE-ENG-410	Principles of air conditioning and refrigeration	essential	√	√	√	√	√	√	√	√	√	√	√	√
	ENG-402	Second graduation project	essential	√	√	√	√	√	√	√	√	√	√	√	√

Course description template

1-Course Name
Introduction to Sustainable Energy Engineering
2-Course code:
SE-ENG-101
3-Term/Year: Annual
Level 1 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
Theoretical lectures – Practical lessons – E-learning – Project
6-- Total study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Manar Saleh Mahdi – Asst . Prof. Dr. Hussam Sami Dhiab
8- Course Objectives
1- Developing an understanding of the basic concepts of energy and sustainability. 2- Identifying traditional and renewable energy sources. 3- Analysis of the environmental and economic impacts of energy. 4- Developing skills in solving energy balance problems. 5- Promoting the concept of sustainable energy management .
9-Teaching and learning strategies
1- Interactive lectures to explain basic concepts . 2- Solve practical problems to enhance understanding . 3- Classroom exercises and assignments . 4- Simple project-based learning . 5- Classroom discussions .
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	It defines the concepts of energy, systems, and international units, and explains the characteristics of systems.	Basic concepts	a lecture	Short test
2	3	It distinguishes forms of energy and explains how they are transferred by heat and work.	energy transfer	Lecture + Exercise	duty
3	3	The first law of thermodynamics applies to simple problems.	First Law	a lecture	a test
4	3	It explains the second law of thermodynamics and analyzes efficiency.	Second Law	a lecture	duty
5	3	It explains heat transfer patterns and applies them to elementary problems.	heat transfer	Lecture + Exercise	a test
6	3	It explains combustion processes and determines fuel properties.	Fuel and combustion	a lecture	duty
7	-	His comprehension is assessed through a mid-term test.	Midterm exam	a test	exam
8	3	It explains the basics of solar energy and the types of solar collectors.	solar thermal energy	a lecture	a test
9	3	It explains the principle of solar cells and analyzes photovoltaic energy production.	Photovoltaic solar energy	a lecture	duty
10	3	It explains the basics of wind energy and identifies the	Wind power	a lecture	a test

		components of a turbine.			
11	3	It explains the principles of hydropower and types of turbines.	hydropower	a lecture	duty
12	3	It explains the fundamentals of water turbine design.	Turbine design	a lecture	a test
13	3	It explains geothermal energy sources and their applications.	Geothermal energy	a lecture	duty
14	3	It explains biomass sources and evaluates their use.	biomass	a lecture	a test
15	3	It explains energy storage technologies and compares their types.	energy storage	Lecture + Project	Project evaluation
16	-	He demonstrates his comprehensive understanding of the concepts through the final exam.	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	Dincer , I., & Abu- Rayash , A. (2019). Energy Sustainability. Elsevier.
Main references (sources)	Kanoğlu , M., Çengel , Y. A., & Cimbala J. M. (2020). Fundamentals and Applications of Renewable Energy. McGraw-Hill.
Recommended supporting books and references (scientific journals, reports...)	Dunlap, R. B. (2017). Sustainable Energy
references , websites	https://www.iea.org/energy-system

Course description template

1. Course Name :
CALCULUS I
2. Course code:
MATH-101
3. Semester/Year: Annual
Annual – First Stage / First Semester
4. Date this description was prepared
2025/2026
5. Available attendance formats :
Theoretical lectures – Practical lessons – E-learning – Project
6. Number of study hours (total) / Number of units (total):
- Number of European units (ECTS): **6** - Total course load : **150 hours/semester** - Theoretical weekly hours : approximately **6 hours**
7. Name of the course coordinator (if there is more than one, please mention it).
Dr. Hamza Raad Yassin Dr. Muhannad Latif Hamada
8. Course objectives
This course aims to : 1. Developing students' ability to understand the basic principles of engineering mathematics . 2. Developing students' skills in analyzing mathematical functions and representing them graphically . 3. To enable students to apply different integration methods to solving engineering and physics problems . 4. To enhance students' ability to use mathematical series to representing functions. 5. Preparing students to use mathematics to solving engineering problems related to the field of sustainable energy.
9. Teaching and learning strategies
The teaching and learning strategies in this course rely on a range of educational methods aimed at developing students' mathematical thinking and analytical skills, including : • **Theoretical lectures to explain the basic concepts .**

- **Solving applied problems and classroom exercises .**
- **Group discussions to promote a deep understanding of mathematical concepts .**
- **Homework and short quizzes to measure students' comprehension .**
- **Cooperative learning and working in groups to solve mathematical problems .**
- **Using educational tools and modern technologies to present mathematical concepts .**

10. Course structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	6	Review of basic differential and integral concepts	Review of Differentiation and Integration	Lecture + Problem Solving	Classroom questions
2	6	Understanding inverse trigonometric functions and their derivatives	Inverse Trigonometric Functions	Lecture + Exercises	duty
3	6	Understanding the natural logarithm and its properties	Natural Logarithm and its Properties	Lecture + Applications	Short test
4	6	Applying the properties of natural logarithms to mathematical problems	Natural Logarithm Applications	Lecture + Problem Solving	duty
5	6	Analysis of exponential functions and	Exponential Functions	Lecture + Discussion	a test

		their applications			
6	6	Applying the part-integration method	Integration by Parts	Lecture + Exercises	duty
7	6	Analysis of trigonometric functions products	Products of Trigonometric Functions	Lecture + Application	Term test
8	6	Study of the pair powers of sine and cosine	Even Powers of Sine and Cousin	Lecture + Problem Solving	duty
9	6	Applying trigonometric substitutions in integration	Trigonometric Substitution	Lecture + Application	a test
10	6	Identifying hyperbolic functions	Hyperbolic Functions	a lecture	duty
11	6	Calculating derivatives and integrals of hyperbolic functions	Derivatives and Integrals of Hyperbolic Functions	Lecture + Exercises	Short test
12	6	inverse hyperbolic functions	Inverse Hyperbolic Functions	a lecture	duty
13	6	Understanding Taylor polynomials	Taylor Polynomials	Lecture + Application	project
14	6	Study of the Taylor series of basic functions	Taylor Series	Lecture + Problem Solving	a test

15	6	Applying the binomial theorem	Binomial Theorem	Lecture + Discussion	review
16	-	Final exam	Final Exam	Written test	Final assessment

11. Course evaluation	
Quizzes 20% – Homework 10% – Online assignments 5% – Project 5% – Midterm exam 10% – Final exam 50% – Total 100 %	
12. Learning and teaching resources	
Required textbooks (methodology, if applicable)	Thomas, GB (2010). **Calculus**
Main references (sources)	Kreyszig , E. (2011). **Advanced Engineering Mathematics**
Recommended supporting books and references (scientific journals, reports...)	Stroud, K. A., & Booth, D. J. (2001). **Engineering Mathematics** John, B. (2010). **Higher Engineering Mathematics**
references , websites	MIT OpenCourseWare - Calculus Khan Academy – Calculus Wolfram MathWorld Paul's Online Math Notes

Course description template

1. Course Name :
Physics

2. Course code:
SE-ENG-102
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2025 2026
5- Available forms of attendance :
Theoretical lectures – Laboratory – Practical lessons – E-learning – Laboratory repo
6- Total number of study hours / Total number of units:
- Number of European units (ECTS): **6** - Total course load : **150 hours/semester** - Theoretical weekly hours : approximately **6 hours**
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Tadamon Ahmed Yassin
8- Course Objectives
This course aims to : 1. To provide students with the basic foundations and concepts of physics. 2. Understanding the laws of motion, energy, and momentum, and their applications in engineering systems. 3. Studying the properties of fluids, gravity, and simple harmonic motion . 4. Understanding the basic principles of electricity and electronics . 5. Developing students' ability to analyze physical problems related to engineeri applications . 6. Developing students' skills in conducting laboratory experiments and analyzin scientific results .
9-Teaching and learning strategies
The teaching and learning strategies in this course rely on a range of methods that help students acquire and practically apply physical concepts, including : • Interactive lectures using demonstrations and multimedia . • Problem-solving sessions and practical exercises . • Conducting laboratory experiments to explain physical concepts practically .

- Group discussions and classroom assignments .
- Continuous assessment through short tests and laboratory reports .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	6	Understanding basic concepts in physics and physical quantities	Introduction to Physics and Physical Quantities	Lecture + Discussion	Classroom questions
2	6	Understanding Newton's laws of motion and their applications	Newton's Laws of Motion	Lecture + Exercises	duty
3	6	Analysis of the forces acting and circular motion	Forces and Circular Motion	Lecture + Applications	Short test
4	6	Understanding the concepts of work, energy, and power	Work, Energy, and Power	Lecture + Problem Solving	duty
5	6	Studying Momentum and the Law of Conservation of Momentum	Momentum and Impulse	Lecture + Application	a test
6	6	Study of simple harmonic motion and the law of universal gravitation	Simple Harmonic Motion and Gravitation	Lecture + Discussion	duty
7	6	Midterm exam	Midterm Exam	Written test	evaluation

8	6	Understanding the principles of fluid mechanics and Archimedes' law	Fluid Mechanics	Lecture + Application	a test
9	6	Understanding the structure of the atom and the properties of materials	Atomic Structure and Materials	a lecture	duty
10	6	Study of semiconductors, diodes, and transistors	Diodes and Transistors	Lecture + Practical Explanation	Short test
11	6	Assessing students' level of understanding of basic concepts	Course Review and Assessment	Discussion + Application	a test
12	6	Understanding the principles of diodes and transistors in circuits	Diode and Transistor Concepts	a lecture	duty
13	6	Identifying current, voltage, and electrical components	Current and Voltage	Lecture + Application	a test
14	6	Studying Ohm's Law and Analyzing Electrical Circuits	Ohm's Law and Circuit Analysis	Lecture + Problem Solving	duty
15	6	Studying Kirchhoff's laws and	Kirchhoff's Laws	Lecture + Discussion	review

		analyzing circuits			
16	-	Final exam	Final Exam	Written test	Final assessment

11-Course Evaluation	
Quizzes 10% – Assignments 10% – Homework 10% – Lab Reports 10% – Midterm Exam 10% – Final Exam 50% – Total 100	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Halliday, D., Resnick, R., & Walker, J. (2014). Fundamentals of Physics
Main references (sources)	Serway , R. A., & Jewett, J. W. (2018). Physics for Scientists and Engineers
Recommended supporting books and references (scientific journals, reports...)	Giancoli , D. C. (2009). Physics: Principl with Applications
references , websites	MIT OpenCourseWare - Physics

Course description template

1. Course Name :
Computer Science
2. Course code:
UOT-003
3. Semester/Year: Annual
Annual – First Stage / First Semester
4. Date this description was prepared
2025 2026
5- Available forms of attendance :
Theoretical lectures – Computer lab – Practical lessons – E-learning
6- Total number of study hours / Total number of units:
- Number of European units (ECTS): 3

- Total course load: 75 hours/semester
- Weekly theoretical and practical hours: 3 hours

7-Name of the course coordinator (if there is more than one name, mention it):

Dr. Jalal Nouri Abdulbaqi,
M.M. Nour Saeed Saleh

8- Course Objectives

This course aims to :

7. Introducing students to the basic concepts of computer science and its historic development.
8. To enable students to understand how data is represented within a computer.
9. Understanding the components of a computer and their basic functions.
10. Developing students' skills in designing algorithms to solve problems.
11. Learn the basics of programming languages and the principles of software development.
12. Understanding the structure and functions of operating systems.
13. To learn about the applications of computer science in various fields.
14. Understanding the basics of the Internet and computer networks.
15. Identifying cyber threats and ways to protect against them.

9-Teaching and learning strategies

The teaching and learning strategies in this course rely on a range of methods that help students understand the fundamentals of computer science and apply them practically, including :

- Theoretical lectures to explain the basic concepts .
- Practical laboratories for acquiring skills in using computer programs .
- Practical exercises in algorithm design and programming .
- Assignments and short quizzes to reinforce understanding and application .
- Classroom discussions and group work to develop thinking and analytical skills.

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	3	Understanding the history and development of computer science	History of Computer Science	Lecture + Discussion	Classroom questions
2	3	Understanding methods of data representation in computers	Data Representation	Lecture + Application	duty
3	3	Understanding computer components and their functions	Computer Components	Lecture + Practical Explanation	Short test
4	3	Understanding the concept of algorithms and methods of designing them	Algorithms	Lecture + Exercises	duty
5	3	Understanding the fundamentals of programming languages	Programming Languages I	Lecture + Application	a test
6	3	Applying basic programming concepts	Programming Languages II	Lecture + Lab	duty
7	3	Midterm exam	Midterm Exam	Written test	evaluation
8	3	Understanding operating	Operating Systems I	a lecture	a test

		systems and their functions			
9	3	Studying the components of operating systems	Operating Systems II	Lecture + Discussion	duty
10	3	Understanding Information Systems	Information Systems	a lecture	a test
11	3	Understanding artificial intelligence applications	Artificial Intelligence Applications	a lecture	duty
12	3	Studying computer graphics and user interaction	Computer Graphics and HCI	Lecture + Application	a test
13	3	Understanding the fundamentals of computer networks	Networking	a lecture	duty
14	3	Studying the Internet and communication protocols	Internet Technologies	Lecture + Discussion	a test
15	3	Understanding cybersecurity	Cybersecurity	Lecture + Application	review
16	-	Final exam	Final Exam	Written test	Final assessment
11-Course Evaluation					

Quizzes 10% – Assignments 10% – Homework 10% – Lab Reports 10% – Midterm Exam 10% – Final Exam 50% – Total 100	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Dale, N., & Lewis, J. (2020). **Computer Science Illuminated (7th ed.)**
Main references (sources)	Brookshear , J. G., & Brylow , D. (2019). **Computer Science: An Overview**
Recommended supporting books and references (scientific journals, reports...)	Tanenbaum, A. S. (2015). **Structured Computer Organization**
references , websites	MIT OpenCourseWare – Computer Science Khan Academy – Computing Coursera – Introduction to Computer Science W3Schools Programming Tutorials

Course description template

1-Course Name
English Language I
2-Course code:
UOT-002
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2025 2026
5- Available forms of attendance :
Theoretical lectures, discussion groups, projects, seminars
6-- Total study hours / Total number of units:

- 50 hours / 2 credit units

7-Name of the course coordinator (if there is more than one name, mention it):

A.M. Ahmed Sobhi Abdullah

8- Course Objectives

The course aims to develop the English language skills of engineering students, enabling them to communicate effectively in academic and professional settings, and to develop their abilities in reading, writing, technical presentation, and discussion of technical topics, in addition to enhancing research skills, critical thinking, and the application of academic knowledge in addressing practical problems.

9-Teaching and learning strategies

- Theoretical lectures to explain basic concepts in technical language.
- Practical training in academic reading and writing skills .
- Group discussions to develop technical dialogue skills .
- Preparing technical presentations .
- Collaborative learning and working in groups .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Identifying technical presentation skills	Technical presentations	Lecture and discussion	Short test
2	2	Developing research and information gathering skills	Academic research skills	Lecture and exercises	duty
3	2	Applying technical reading skills	Reading engineering texts	Lecture and discussion	duty
4	2	Developing proposal writing skills	Technical discussions and proposal writing	Lecture and discussion	duty

5	2	Technical Problem Analysis	Discussion of engineering solutions	group discussion	sharing
6	2	Developing presentation skills	presentations	Practical demonstration	Show rating
7	2	Measuring the level of achievement	Midterm exam	a test	exam
8	2	Developing technical discussion skills	Discussion of engineering projects	group discussion	sharing
9	2	Applying technical dialogue skills	Dialogue in engineering teams	discussion	evaluation
10	2	Technical Information Analysis	Reading and analyzing reports	a lecture	duty
11	2	Writing technical reports	Technical reports	practical application	a report
12	2	Organizing technical information	Report formatting	practical application	a report
13	2	Developing professional writing skills	Academic writing	a lecture	duty
14	2	Writing official correspondence	Business correspondence	practical application	evaluation
15	2	Review of basic concepts	General review	discussion	evaluation

16	2	Measuring final outputs	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, seminars, reports, midterm exam, and final exam	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Beer, D. & McMurrey , D. 2004, A Guide to Writing as an Engineer (2nd ed), New York: Wiley
Main references (sources)	Borowick , Jerome N., 2002, Technical Communication and its Applications (2nd ed), New Jersey: Prentice-Hall, Inc.
Recommended supporting books and references (scientific journals, reports...)	Scientific journals and specialized reports in technical and engineering communication
references , websites	http://umich.edu/~elements/5e/lectures/index.html

Course description template

1-Course Name
Democracy and human rights
2-Course code:
UOT-004
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2026 2026
5- Available forms of attendance :
Theoretical lectures
6-- Total study hours / Total number of units:
50 hours / 2 credit units
7-Name of the course coordinator (if there is more than one name, mention it):
Abdul Rahman Zaidan

8- Course Objectives

1- To enable students to understand the basic concept of human rights, children's rights, and democracy.
2- To identify the historical origins of the concepts of human rights and democracy and to understand their advantages and disadvantages .
3- Learning about human rights, children's rights, and democracy in Islam .
4- Identifying the sources of human rights and the characteristics and features of a democratic system .
5- Understanding the impact of technological development on human rights, children's rights, and democracy .
6- Understanding related concepts such as globalization, civil society institutions, elections, referendums, good governance,the constitution, and crimes against humanity .
7- Reviewing the guarantees that ensure human and children's rights and guarantee the democratic system and public freedoms

9-Teaching and learning strategies

1- Theoretical lectures to explain the basic concepts .
2- Classroom discussions to enhance students' understanding of human rights and democratic concepts .
3- Students are assigned short research papers and assignments on international conventions and global experiences .
4- Analysis of real-world examples from international and Arab societies .
5- Encouraging students to familiarize themselves with the laws and constitutions related to human rights .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding the historical roots of concepts	Human rights and democracy in ancient civilizations	a lecture	Short test

2	2	Understanding human rights in Islam	Human rights, children's rights, and democracy in Islam	a lecture	discussion
3	2	Identifying human rights sources	International sources and characteristics of democracy	a lecture	duty
4	2	Analysis of local human rights sources	Local resources and the advantages of democracy	a lecture	duty
5	2	Understanding legal safeguards	Human rights guarantees and components of democracy	a lecture	a test
6	2	Understanding international guarantees	International guarantees for the democratic system	a lecture	discussion
7	2	Understanding the role of international institutions	Human Rights Council and Elections	a lecture	discussion
8	2	Measuring academic achievement	Midterm exam	a test	exam
9	2	Analysis of the impact of technology	Technological development and human rights	a lecture	duty
10	2	Understanding globalization	Globalization and civil society institutions	a lecture	discussion
11	2	Understanding the concept of	Good governance and referendum	a lecture	a test

		good governance			
12	2	Understanding constitutional systems	Constitution and its types	a lecture	duty
13	2	Promoting the values of equality	Gender equality and children's rights	a lecture	discussion
14	2	Identifying crimes against humanity	Genocide crimes and their impact	a lecture	duty
15	2	Analysis of contemporary models	Contemporary Democracy and Case Studies	a lecture	discussion
16	2	Evaluating learning outcomes	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, discussions, midterm exam, and final exam	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	The book "Human Rights and Democracy was authored by: Prof. Dr. Maher Saleh Alawi Al-Jubouri, Prof. Dr. Riyadh Aziz Hadi, Prof. Dr. Raad Naji Al-Jada, Asst. Prof. Dr. Kamel Abdul -Ankoud , Asst. Prof. Dr. Ali Abdul-Razzaq Muhammad, Prof. Dr. Hassan Muhammad Shafiq (200
Main references (sources)	Democracy, by Charles Tilly , translated l Mohamed Fadel Tabbakh, Egyptian General Book Organization (2010)
Recommended supporting books and references (scientific journals, reports...)	Basic human rights and the security role i protecting them, Dr. Mubarak Alawi Mohammed (2019)

references , websites	nothing

Course description template

1-Course Name
Engineering Workshops
2-Course code:
ENG-106
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2027 2026
5- Available forms of attendance :
Theoretical lectures – practical lessons – hands-on training in workshops
6- Total number of study hours / Total number of units:
- Number of European units (ECTS): 5 - Total course load: 125 hours/semester - Weekly theoretical and practical hours: 5 hours

7-Name of the course coordinator (if there is more than one name, mention it):

Dr. Muhannad Latif Hamada

8- Course Objectives

This course aims to :

1- To provide students with basic practical skills in the field of engineering workshops.

2- Training students on the principles of industrial safety in the work environme
3- To equip students with skills in measurement, identification, and the use of manual tools.
4- Learn the basics of carpentry, blacksmithing, welding, and plumbing.
5- Training students in mechanical operations, including turning and milling.
6- Learn the basics of simple electrical work in engineering workshops.

9-Teaching and learning strategies

The teaching and learning strategies in this course rely on combining theoretical and practical aspects through :

- Explanation of basic concepts in theoretical lectures .
- Practical training within engineering workshops .
- Applying skills using different tools and equipment .
- Solving practical problems through applied exercises .
- Providing students with sufficient time to practice practical skills under the supervision of the teacher

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	5	Understanding the principles of industrial safety and the foundations of measurement	Industrial Safety and Measurement	Lecture + Practical Training	Classroom questions

2	5	Acquiring skills in using hand files	Filing Workshop	Practical training	duty
3	5	Applying metal filing and shaping skills	Filing Workshop	Practical training	Short test
4	5	Learning about carpentry tools and types of wood	Carpentry Workshop	Practical training	duty
5	5	Application of cutting and shaping operations in carpentry	Carpentry Workshop	Practical training	a test
6	5	Understanding the basics of welding and its types	Welding Workshop	Practical training	duty
7	5	Application of welding processes in metals	Welding Workshop	Practical training	a test
8	5	Understanding the basics of plumbing work	Plumbing Workshop	Practical training	duty
9	5	Implementing practical applications in plumbing	Plumbing Workshop	Practical training	a test
10	5	Understanding mechanical	Machining Workshop	Practical training	duty

		processing operations			
11	5	Application of turning and machining operations	Machining Workshop	Practical training	a test
12	5	Understanding the basics of metal plumbing	Casting Workshop	Practical training	duty
13	5	Execution of metal casting operations	Casting Workshop	Practical training	a test
14	5	Understanding the basics of electrical work	Electrical Workshop	Practical training	duty
15	5	Applying the fundamentals of electrical connections	Electrical Workshop	Practical training	review
16	-	Final exam	Final Exam	Written test	Final assessment

11-Course Evaluation	
Quizzes 5% – Assignments 15% – Midterm Exam 30% – Final Exam 50% – Total 100 %	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Abd Fares, **Engineering Workshops**
Main references (sources)	Technology of Machine Tools, Steve F. Krar & J. William Oswald, McGraw-Hill Publishing Company, Fourth Edition, 199
Recommended supporting books and references (scientific journals, reports...)	----------

references , websites	----------

Course description template

1-Course Name
CALCULUS II
2-Course code:
MATH-102
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2028 2026
5- Available forms of attendance :
Theoretical lectures, exercises, seminars, and practical applications
6- Total study hours / Total number of units:
150 hours / 6 study units
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Hamza Raad Yassin Dr. Israa Sami Farhan
8- Course Objectives

The course aims to develop students' ability in the principles of general mathematics and its applications, and to develop their skills in analyzing mathematical problems related to vectors, multivariable functions, and multiple differentiation and integration, in addition to understanding complex numbers and their applications in geometric and applied engineering problems .

9-Teaching and learning strategies

1- Theoretical lectures to explain basic mathematical concepts.
2- Solving math exercises and problems inside the classroom.
3- Assigning students homework and exercises to enhance their problem-solving skills.
4- Encouraging teamwork and discussion in analyzing mathematical problems.
5- Using teaching methods that support analytical and logical thinking in students.

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding operations on vectors	Vectors in space, standard multiplication, and vector multiplication	a lecture	Short test
2	3	Determining the equations of lines and planes	Equations of lines and planes in space	a lecture	duty
3	3	Understanding multivariable functions	Functions with two variables and partial derivatives	a lecture	duty
4	3	Calculating partial derivatives	Partial derivatives with constant variables	a lecture	a test

5	3	Gradient calculation and directional differentiation	slope and directional derivation	a lecture	duty
6	3	Finding tangent levels	tangent plane and vertical line	a lecture	duty
7	3	Applications of partial derivatives	Maximum and minimum values and saddle points	a lecture	a test
8	3	Understanding Multiple Integrations	Binary integration	a lecture	duty
9	3	Applying polar coordinates	Bilateral integration in polar coordinates	a lecture	duty
10	3	Coordinate conversion	Cartesian integrals to polarity	a lecture	a test
11	3	Tripartite integration	Triple integration in different coordinates	a lecture	duty
12	3	Understanding complex numbers	Addition and subtraction of complex numbers	a lecture	a test
13	3	Performing operations on complex numbers	Multiplication and division	a lecture	duty
14	3	Representing complex numbers	Polar representation of complex numbers	a lecture	duty
15	3	Finding the roots of	Roots	a lecture	a test

		complex numbers			
16	3	Evaluating learning outcomes	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, projects, classwork, midterm exam, final exam	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Calculus by George B. Thomas, Jr., 2010
Main references (sources)	Engineering Mathematics by K. A. Stroud & Dexter J. Booth, 5th edition, Industrial Press Inc., New York, 2001
Recommended supporting books and references (scientific journals, reports...)	Advanced Engineering Mathematics by Erwin Kreyszig , 10th Edition, 2011 ; Higher Engineering Mathematics by John 2010
references , websites	nothing

Course description template

1-Course Name
Engineering Mechanics
2-Course code:
ENG-102
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2029 2026
5- Available forms of attendance :

Theoretical lectures, exercises, seminars

6-- Total study hours / Total number of units:

100 hours / 4 study units

7-Name of the course coordinator (if there is more than one name, mention it):

Prof. Dr. Adel Mahmoud Bash,
Dr. Hamza Raad Yassin

8- Course Objectives

1- Introducing students to the concept of force and torque vectors and applications of vector algebra .
2- Explaining the concept of equilibrium for particles and solid objects in the plane and three-dimensional space .
3- Identifying the types of support and finding responses to them .
4- Analysis of structural equilibrium and internal forces in trusses and frames.
5- To learn about distributed loads and their applications.
6- Understanding the concept of the center of gravity and geometric centers.
7- Understanding moment of inertia and its engineering applications .

9-Teaching and learning strategies

1- Providing theoretical lectures to explain the basic concepts in engineering mechanics.
2- Using practical examples to illustrate physical and mathematical concepts.
3- Training students to solve engineering problems through classroom exercises.
4- Encouraging students to discuss and analyze problem-solving.
5- Assigning students tasks and exercises to enhance their problem-solving skills

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the general principles of mechanics	General principles , statics, and vectors	a lecture	Short test

2	3	Analysis of power systems	Planar forces and resultant forces	a lecture	duty
3	3	Applying the resultant force	The outcome of the power system	a lecture	duty
4	3	Free body diagram analysis	Definition of determination and the determination of the spouse	a lecture	a test
5	3	Azum application	Free body and moment diagrams	a lecture	duty
6	3	Equilibrium analysis	Equilibrium in two dimensions and equilibrium equations	a lecture	duty
7	3	Measuring the level of achievement	Midterm exam	a test	exam
8	3	spatial equilibrium analysis	Balance in three dimensions	a lecture	duty
9	3	Analysis of facilities	Trusses and frames	a lecture	discussion
10	3	Facilities applications	Truss and frame analysis	a lecture	a test
11	3	Understanding the center of mass	Center of mass and center of gravity	a lecture	duty
12	3	Calculating engineering centers	Centers for lines, spaces, and volumes	a lecture	duty
13	3	Understanding the moment of inertia	Inertia determination	a lecture	a test

14	3	Applications of the moment of inertia	Different moments of inertia	a lecture	duty
15	3	Understanding Friction	dry friction	a lecture	discussion
16	3	Course evaluation	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, seminars, discussions, midterm exam, and final exam	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Engineering Mechanics – Statics, J.L. Meriam, L.G. Kraige , Wiley, 5th Edition 2003
Main references (sources)	Engineering Mechanics – Statics, R. C. Hibbeler , 13th Edition, Pearson Prentice Hall, 2016
Recommended supporting books and references (scientific journals, reports...)	—
references , websites	N/A

Course description template

1-Course Name
Basics of Electricity
2-Course code:
SE-ENG-103
3-Term/Year: Annual
Annual – First Stage / First Semester

4-Date this description was prepared
2030 2026
5- Available forms of attendance :
Theoretical lectures, exercises, and practical laboratories
6-- Total study hours / Total number of units:
125 hours / 5 study units
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. Ahmed Hadhfi Mohsen M. Qahtan Ali Yousef
8- Course Objectives
1- Developing students' theoretical and practical skills in electrical circuit analysis. 2- To enable students to understand the concepts of voltage, current, and power in electrical circuits. 3- Introducing students to the basic concepts of electrical circuits and their components. 4- To enable students to understand Kirchhoff's laws of current and voltage in direct current and alternating current circuits. 5- The Mesh and Nodal current methods . 6- Applying electrical circuit theories such as superposition theory, Thevenin theory , Norton theory, and maximum power transfer theory
9-Teaching and learning strategies
1- Providing theoretical lectures to explain the basic concepts of electrical circuits. 2- Use practical examples to illustrate methods of analyzing electrical circuits. 3- Conducting laboratory experiments to enhance the practical understanding of electrical concepts. 4- Training students to solve problems through classroom exercises. 5- Encouraging students to participate in scientific discussions and teamwork
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	3	Understanding the basic concepts of electricity	Current, voltage, Ohm's law, power, and energy	a lecture	Short test
2	3	DC circuit analysis	Series and parallel circuits in direct current	a lecture	duty
3	3	Understanding electrical networks	Bridge networks and star-delta diversions	a lecture	duty
4	3	Analysis of electrical circuits	(Mesh) method	a lecture	a test
5	3	electrical contract analysis	Nodal Contract Method	a lecture	duty
6	3	Application of circuit theories	Superposition theory in DC circuits	a lecture	duty
7	3	Measuring the level of achievement	Thevenin's theory of direct current circuits	a test	exam
8	3	Analysis of electrical circuits	Norton's theory and the transfer of supreme power	a lecture	duty
9	3	Understanding alternating current circuits	Basic elements of alternating current circuits and sine waves	a lecture	duty
10	3	AC circuit analysis	Series and parallel circuits in alternating current	a lecture	a test
11	3	Network analysis	Bridge networks and star-delta diversions in AC	a lecture	duty
12	3	Circuit analysis	Loop currents method in AC circuits	a lecture	duty
13	3	Contract analysis	The connection method in AC circuits	a lecture	a test
14	3	Applying theories	Superposition theory in AC circuits	a lecture	duty

15	3	Circuit analysis	Thevenin and Norton theories and maximum power transfer in AC	a lecture	discussion
16	3	Course evaluation	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, lab exercises, discussions, midterm exam, and final exam .	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Introductory Circuit Analysis – Robert L. Boylestad , Pearson Publishing Company, 12th Edition, 2022
Main references (sources)	Fundamentals of Electrical Circuits – CK Alexander & MNO Sadiku , McGraw-Hill Education
Recommended supporting books and references (scientific journals, reports...)	—
references , websites	N/A

Course description template

1-Course Name
Environmental Pollution
2-Course code:
SE-ENG-104
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2031 2026
5- Available forms of attendance :
Theoretical lectures, exercises, seminars, and practical laboratories
6- Total number of study hours / Total number of units:
125 hours / 5 study units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Salwa Hadi Ahmed
8- Course Objectives

1- To provide students with basic knowledge about environmental pollution and its effects on ecosystems.
2- Introducing students to the different types and sources of pollution, such as water, air, soil, and thermal pollution.
3- Explaining methods for controlling pollution, treatment techniques, and reducing its effects.
4- Enhancing students' understanding of the importance of environmental balance and sustainable development.
5- Highlighting the role of renewable and green energy in reducing environmental degradation

9-Teaching and learning strategies

1- Presenting theoretical lectures to explain the basic concepts of environmental pollution.
2- Using real-world case studies to analyze various environmental problems.
3- Conducting laboratory experiments to analyze environmental pollutants and methods of measuring them.
4- Encouraging students to discuss and scientifically analyze environmental issues.
5- Assigning students tasks and reports to enhance their research and analysis skills.

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the concept of ecological balance	Introduction to ecological balance, environmental pollution, and its types	a lecture	Short test
2	3	Pollutant classification	Sources of pollution and classification of pollutants	a lecture	duty

3	3	Water pollution analysis	Physical and chemical properties of water	a lecture	duty
4	3	Understanding water pollution	Types of water pollution and methods of controlling it	a lecture	a test
5	3	Air pollution analysis	Atmospheric layers and sources of air pollution	a lecture	duty
6	3	Air pollution treatment	Primary and secondary pollutants and ways to reduce them	a lecture	duty
7	3	Knowledge assessment	Methods of controlling air and water pollution	a test	exam
8	3	Understanding Sustainability	Sustainable development, renewable energy, and their role in reducing pollution	a lecture	duty
9	3	Soil pollution analysis	Soil components and sources of pollution	a lecture	duty
10	3	Treating contaminated soil	Methods for treating contaminated land	a lecture	a test
11	3	Understanding thermal pollution	Sources of thermal pollution and their effects	a lecture	duty
12	3	Reducing thermal pollution	Ways to reduce thermal pollution	a lecture	duty
13	3	Understanding sensory pollution	Noise, visual, and light pollution	a lecture	a test

14	3	Analysis of environmental studies	General review and environmental case studies	a lecture	discussion
15	3	Course review	General review of the course	a lecture	discussion
16	3	Course evaluation	Final exam	a test	exam

11-Course Evaluation	
Quizzes, assignments, lab exercises, discussions, midterm exam, and final exam .	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Introduction to Environmental Engineerin – David A. Cornwell & Mackenzie L. Davis, 5th Edition, McGraw-Hill, 2012
Main references (sources)	Environmental Engineering: Principles an Practice – Richard O. Mines, Wiley, 2014
Recommended supporting books and references (scientific journals, reports...)	—
references , websites	N/A

Course description template

1-Course Name
Engineering Drawing
2-Course code:
ENG-101
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2032 2026
5- Available forms of attendance :
Practical Lab – Engineering Drawing Applications – E-Learning

6- Total number of study hours / Total number of units:
- Number of European units (ECTS): 3 - Total course load: 75 hours/semester - Weekly working hours: 3 hours
7-Name of the course coordinator (if there is more than one name, mention it):
Sabah Mohammed Hassan
8- Course Objectives
This course aims to : 1. Introducing students to engineering drawing equipment and tools, and their various uses . 2. Developing students' ability to prepare engineering drawings accurately according to engineering standards . 3. Training students to create basic geometric shapes and perform various geometric constructions . 4. Enabling students to use measurement methods and to place dimensions in engineering drawings. 5. Introducing students to the principles of different geometric projections, such as orthogonal and isometric projections. 6. Developing students' ability to represent two-dimensional and three-dimensional geometric objects .
9-Teaching and learning strategies
The teaching and learning strategies in this course rely on a range of practical teaching methods aimed at developing students' engineering drawing skills, including: 1- • Practical explanation of engineering drawing tools and their uses. 2- • Practical training within the laboratory on drawing geometric shapes. 3- • Solving practical exercises related to geometric projections. 4- • Using models and illustrative examples to understand three-dimensional objects. 5- • Assigning students practical tasks to enhance their drawing and accuracy skills. 6- • Cooperative learning and working in groups to solve engineering drawing problems.

10-Course Structure					
Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	3	Understanding the fundamentals of engineering drawing	Introduction to Engineering Drawing	Practical explanation	Classroom questions
2	3	Understanding the basic elements of drawing	Primary Elements of Drawings	practical application	duty
3	3	Creating basic geometric shapes	Geometrical Construction	Practical training	Short test
4	3	Understanding the concept of contact in geometric shapes	Tangency	practical application	duty
5	3	Engineering Points Location Applications	Loci Applications	Solving exercises	a test
6	3	Integrating contact and engineering site applications	Tangency and Loci Applications	Practical training	duty
7	3	Using measurement methods and setting dimensions	Dimensioning	Practical explanation	Term test
8	3	Understanding the principles of geometric projection	Theory of Projection	Explanation + Application	duty
9	3	Applying orthogonal projection	Orthographic Projections	practical application	a test
10	3	Developing orthogonal projection skills	Orthographic Projections	Practical training	duty
11	3	Understanding sections in	Sections and Sectional Views	Practical explanation	a test

		engineering drawing			
12	3	Application of sections in engineering drawings	Sections and Sectional Views	practical application	duty
13	3	Understanding isometric projection	Isometric Projections	Practical training	a test
14	3	Isometric projection application	Isometric Projections	practical application	duty
15	3	Mastering 3D object drawing	Isometric Projections	Practical training	review
16	-	Final exam	Final Exam	Written test	Final assessment

11-Course Evaluation	
Quizzes 10% – Assignments 30% – Midterm Exam 10% – Final Exam 50 % Total 100 %	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Abdul- Rassul Abdul-Hussain (1986). Engineering Drawing. University of Technology
Main references (sources)	Simmons, C., Maguire, D., & Phelps, N. (2021). Manual of Engineering Drawing. Elsevier
Recommended supporting books and references (scientific journals, reports...)	Reddy, K. (2008). Textbook of Engineering Drawing Shah, M. B., & Rana, B. C. (2007). Engineering Drawing
references , websites	Engineering drawing learning websites – educational videos – engineering learning platforms

Course description template

1-Course Name
Chemistry
2-Course code:
SE-ENG-105
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2033 2026
5- Available forms of attendance :
Theoretical lectures – Practical labs – Applied lessons – E-learning
6- Total number of study hours / Total number of units:
- Number of European units (ECTS): 2 - Total course load: 50 hours/semester - Theoretical weekly hours: 2 hours
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Saad Nahi Saleh M.M. Sabah Mohammed Hassan
8- Course Objectives
This course aims to : 1. To enable students to understand the atomic structure and electronic configuration of elements .

2. Introducing students to the concepts of chemical bonds and molecular engineering .
3. Developing students' skills in performing stoichiometric calculations for chemical reactions .
4. Understanding the laws of gases and the basic principles of thermodynamics .
5. Analysis of chemical equilibrium and reaction kinetics .
6. Studying the properties of acids, bases, and salts, and performing titration operations .
7. Understanding the basic concepts of hydrocarbons and their reactions .

9-Teaching and learning strategies

The teaching and learning strategies in this course rely on a range of educational methods aimed at developing students' scientific understanding and practical skills, including :

• Theoretical lectures to explain the basic concepts in chemistry .
• Laboratory experiments to apply theoretical concepts practically .
• Solving chemical problems and mathematical applications .
• Classroom discussions to promote scientific thinking .
• Preparing laboratory reports and analyzing results .
• Group work in the laboratory to carry out scientific experiments .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	5	Understanding the atomic structure of elements	Atomic Structure and Electron Configuration	Lecture + Discussion	Classroom questions
2	5	Understanding ionic and covalent bonds	Ionic and Covalent Bonding	Lecture + Application	duty
3	5	Analysis of molecular and polar geometry	Molecular Geometry and Polarity	Lecture + Application	Short test

4	5	Performing basic chemical calculations	Chemical Calculations and Moles	Lecture + Exercises	duty
5	5	Understanding the types of chemical reactions	Chemical Reactions and Stoichiometry	Lecture + Application	a test
6	5	Applying gas laws	Gas Laws and Phases of Matter	Lecture + Problem Solving	duty
7	5	Understanding the composition of solutions	Solution Formation	Lecture + Discussion	a test
8	—	Midterm exam	Midterm Exam	Written test	evaluation
9	5	Calculating solution concentrations	Concentration and colligative properties	Lecture + Application	duty
10	5	Analysis of oxidation-reduction reactions	Redox Reactions	Lecture + Exercises	a test
11	5	Understanding the energy of chemical reactions	Reaction Energetics and Equilibrium	a lecture	duty
12	5	Applying Le Chatelier's principle	Equilibrium Constant and Le Châtelier Principle	Lecture + Application	a test
13	5	Identifying acids and bases	Acids, Bases, and Salts	Lecture + Application	duty
14	5	Application of chemical titration	Neutralization and Titration	Lecture + Experience	a test
15	5	Introduction to Hydrocarbons	Introduction to Hydrocarbons	Lecture + Discussion	review
16	—	Final exam	Final Exam	Written test	Final assessment
11-Course Evaluation					
Quizzes 10% – Assignments 30% – Midterm Exam 10% – Final Exam 50 % Total 100 %					

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Stoker, S. H. (2010). General, Organic, ar Biological Chemistry
Main references (sources)	Bundy, R. (2014). Lab Manual for Fundamental Chemistry
Recommended supporting books and references (scientific journals, reports...)	General chemistry books and university references
references , websites	Chemistry education websites – educatior platforms – online scientific resources

Course description template

1-Course Name
Arabic Language I
2-Course code:
UOT001
3-Term/Year: Annual
Annual – First Stage / First Semester
4-Date this description was prepared
2034 2026
5- Available forms of attendance :
Theoretical lectures – Class discussions – Seminars – Self-learning
6- Total number of study hours / Total number of units:
- Number of European units (ECTS): 5 - Total course load: 125 hours/semester - Weekly hours: approximately 5 hours
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. and Sanaa Younis Abdullah M.M. Ali Qais Muhammad
8- Course Objectives
This course aims to :

1. Developing students' language skills and fostering a love of Arabic language.
2. To enable students to understand basic grammar rules and apply them in everyday life.
3. To recognize the importance of the Arabic language in various fields of life, including scientific and engineering fields.
4. Training students to use grammar rules and punctuation in writing reports and research papers.
5. To promote self-learning and independence among students and encourage them to develop their language skills.

9-Teaching and learning strategies

The teaching and learning strategies in this course rely on a range of educational methods aimed at developing students' linguistic and intellectual skills, including :

1- Theoretical lectures to explain linguistic concepts and rules .
2- Reading and analyzing Qur'anic and literary texts .
3- Classroom discussions to exchange views and deepen understanding .
4- Seminar presentations on linguistic and literary topics .
5- Homework assignments to enhance writing and linguistic analysis skills .
6- Using modern educational tools to support the learning process .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding Quranic texts	Verses 260–263 of Surah Al-Baqarah	Lecture + Discussion	Classroom questions
2	2	Analysis of religious texts	A noble prophetic hadith	Lecture + Analysis	duty
3	2	Getting acquainted with pre-Islamic poetry	The Mu'allaqa of Amr ibn Kulthum	Lecture + Reading	Short test
4	2	Analysis of poetic texts	Verses from Ibn al-Rumi's poem "Ba'iyyah"	Lecture + Discussion	duty

5	2	Understanding human values in poetry	Human values in pre-Islamic poetry	Lecture + Analysis	a test
6	2	Understanding the rules of grammar	Morphological balance	Lecture + Application	duty
7	2	Verb conjugation analysis	Verb conjugation (health and illness)	Lecture + Exercises	a test
8	—	Student level assessment	Midterm exam	Written test	evaluation
9	2	Understanding grammar rules	Parts of speech and grammatical markers	Lecture + Application	duty
10	2	Mastering correct writing	punctuation marks	Lecture + Training	a test
11	2	Applying spelling rules	Rules for writing the hamza	Lecture + Exercises	duty
12	2	Getting acquainted with Arabic dictionaries	Lexicographical Schools	Lecture + Discussion	a test
13	2	Understanding Quranic vocabulary	Unusual words in the Holy Quran	Lecture + Analysis	duty
14	2	Understanding grammatical rules	The abrogating agents	Lecture + Application	a test
15	2	Getting acquainted with Arabic rhetoric	The science of rhetoric (its definition and types)	Lecture + Discussion	review
16	—	Comprehensive assessment	Final exam	Written test	Final assessment

11-Course Evaluation
Quizzes 10% – Assignments 30% – Midterm Exam 10% – Final Exam 50 % Total 100 %

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Arabic language for non-specialized departments
Main references (sources)	Wahba al -Zuhayli – Al-Tafsir al-Wasit

Recommended supporting books and references (scientific journals, reports...)	Muhammad al-Antaki – The Curriculum i Grammar and Syntax
references , websites	Electronic Arabic language learning resources

Course description template

1-Course Name
Fluid Mechanics
2-Course code:
SE-ENG-201
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
9/9/2025
5- Available forms of attendance :
Theoretical lectures – laboratory – self-learning – classroom discussions
6- Total number of study hours / Total number of units:
Total course load: 125 hours
7-Name of the course coordinator (if there is more than one name, mention it):
M. Sinai Khodair Salman
8- Course Objectives
This course aims to :

1.Provide students with the fundamental physical and analytical principles of fluid mechanics through an understanding of the equations of conservation of mass, energy, and momentum .

2. To enable students to apply concepts to new cases to evaluate industrial applications using mathematical analysis .

3. To demonstrate the importance of studying fluids in practical life, including deriving the equations that govern their motion .

4. To enable students to utilize the course concepts in everyday life applications .

9-Teaching and learning strategies

The strategies rely on :

1-Theoretical lectures to explain the basic concepts .
2. Self- learning through reading and electronic resources .
2. Classroom discussions .
3. Laboratories for practical application of concepts .
4. Assignments and quizzes to measure understanding .
5. Preparing scientific reports and monitoring student performance in the laboratory .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding the principles of fluid mechanics	Introduction to Fluid Mechanics	a lecture	Classroom questions
2	2	Understanding application areas	Fluid mechanics applications	a lecture	duty
3	2	Distinguishing types of flow	Flow classification	a lecture	a test
4	2	Understanding pressure in static fluids	Pressure change in static fluids	a lecture	duty

5	2	Applying pressure concepts	Static fluids and their applications	a lecture	a test
6	2	Analysis of pressure applications	Pressure applications in fluids	a lecture	duty
7	—	Student level assessment	Midterm exam	Written test	evaluation
8	2	Analysis of forces on bodies	Forces on submerged bodies	a lecture	a test
9	2	Understanding fluid acceleration	Fluid acceleration and relative motion	a lecture	duty
10	2	Understanding Buoyancy	Buoyancy force	a lecture	a test
11	2	Stability analysis	Stability of floating and submerged objects	a lecture	duty
12	2	Understanding the motion of a rigid body	Fluids in motion of a solid body	a lecture	a test
13	2	Enhancing practical understanding	Applications of fluid motion	a lecture	duty
14	2	Understanding the continuity equation	The equation of continuity	a lecture	a test
15	2	Analysis of the equations of motion	Fluid motion equations and their applications	a lecture	review
16	—	Comprehensive assessment	Final exam	Written test	Final assessment

11-Course Evaluation
Quizzes 10 %, Assignments 10 % , Lab 15 % , Seminar 5 %, Midterm Exam 10 %, Final Exam 50 % , Total 100 %

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Fluid Mechanics Fundamentals and Applications – Yunus A. Cengel
Main references (sources)	Fluid Mechanics – Victor Lyle Streeter
Recommended supporting books and references (scientific journals, reports...)	Fluid Mechanics with Engineering Applications – Robert L. Daugherty
references , websites	Fundamentals of Fluid Mechanics – Munson, Young, Okiishi

Course description template

1-Course Name
Thermodynamics (1)
2-Course code:
SE-ENG-202
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
01/09/2025
5- Available forms of attendance :
Theoretical lectures – practical lessons – laboratory – classroom discussions
6- Total number of study hours / Total number of units:
Number of European Credit Units (ECTS): 5 Total course load: 125 hours/semester

7-Name of the course coordinator (if there is more than one name, mention it):

M.D. Israa Sami Farhan

8- Course Objectives

1- Covering the basic principles of thermodynamics.

2- Presenting realistic engineering examples to illustrate the applications of thermodynamics.

3- Developing a physical understanding of concepts by focusing on scientific analysis and interpretation.

9-Teaching and learning strategies

The strategies rely on lectures to explain basic concepts and analytical techniques, using practical examples, and allowing sufficient time for students to solve practical problems through exercises and practical lessons.

10-Course Structure

Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	2	Understanding basic concepts	Introduction to Thermodynamics	a lecture	Classroom questions
2	2	Understanding the laws of thermodynamics	Definition of laws and regulations	a lecture	duty
3	2	Distinguishing thermal systems	Systems, boundaries, and properties	a lecture	a test
4	2	Understanding pressure and temperature	Pressure, zero law, measurements	a lecture	duty
5	2	Applying basic concepts	Practical exercises (tutorial)	application	evaluation
6	2	Understanding the First Law	The first law and its applications	a lecture	a test
7	—	Interim assessment	Midterm exam	a test	evaluation

8	2	Understanding energy and specific heat	Specific heat and internal energy	a lecture	duty
9	2	Application of the first law	Non-current operations	a lecture	a test
10	2	Continuous flow applications	Energy equations for continuous flow	a lecture	duty
11	2	Understanding Steam	Two-phase steam systems	a lecture	a test
12	2	Using steam tables	Enthalpy and vapor tables	a lecture	duty
13	2	Analysis of steam properties	Steam diagrams and properties	a lecture	a test
14	2	Steam quality calculation	dry break of steam	a lecture	duty
15	2	General review	Comprehensive course review	a lecture	review
16	—	Final assessment	Final exam	a test	Final assessment

11-Course Evaluation
Quizzes 10 %, Assignments 10 % , Lab 15 % , Seminar 5 %, Midterm Exam 10 %, Final Exam 50 % , Total 100 %

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Cengel – Thermodynamics: An Engineeri Approach
Main references (sources)	Michael J. Moran – Fundamentals of Engineering Thermodynamics
Recommended supporting books and references (scientific journals, reports...)	nothing
references , websites	nothing

Course description template

1-Course Name
Heat Transfer I
2-Course code:
SE-ENG-203
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratory)
6- Total number of study hours / Total number of units:
125 hours / 5 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Tadamon Ahmed Yassin Dr. Hussam Sami Dhiab
8- Course Objectives
This course aims to: - To provide students with the basic concepts of heat transfer and its engineering applications. -Analysis of steady-state and unsteady-state heat transfer in one dimension and multiple dimensions.

-Introducing students to the mechanisms of heat conduction and the use of basic laws such as Fourier's law.

-Developing students' ability to build mathematical models and analyze thermal systems.

-To equip students with the skills to use analytical and numerical methods in heat transfer problems.

9-Teaching and learning strategies

Teaching and learning strategies are based on the following :

- Presenting the basic scientific material through theoretical lectures .
- Explaining concepts using practical, applied examples .
- Training students to solve problems through classroom exercises (Tutorials).
- Supporting self-learning through homework assignments .
- Using laboratories to illustrate the practical concepts of heat transfer .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the concepts and types of heat transfer	Introduction to Heat Transfer	a lecture	Short test
2	3	Understanding the three heat transfer modes	Introduction to Heat Transfer	a lecture	duty
3	3	Thermal conductivity analysis in a flat wall without heat generation	One-dimensional connection (flat wall)	Lecture + Exercises	duty

4	3	Conductivity analysis in cylinders and balls	Connection in cylindrical and spherical shapes	a lecture	Short test
5	3	Understanding conduction with heat generation	Conduction with heat generation (flat wall)	a lecture	duty
6	3	Conductivity analysis with heat generation in different bodies	Convection with heat generation (cylindrical and spherical)	a lecture	duty
7	3	Evaluating acquired knowledge	Midterm exam	a test	exam
8	3	Understanding and analyzing thermal fins	Extended surfaces (Fins)	a lecture	duty
9	3	Calculating fin efficiency	Fin efficiency	a lecture	Short test
10	3	Calculating fin effectiveness	Fin effectiveness	a lecture	duty
11	3	Understanding the critical fish for isolation	Critical fish for isolation	a lecture	Short test
12	3	Two-dimensional conductivity analysis	Two-dimensional connectivity (numerical methods)	a lecture	duty
13	3	Application of numerical analysis	Two-dimensional connectivity (numerical methods)	Lecture + Exercises	duty
14	3	Understanding unsteady heat transfer	Unstable connection (clumping system)	a lecture	Short test
15	3	Analysis of heat transfer in a semi-infinite medium	unstable heat transfer	a lecture	duty
16	3	Comprehensive course evaluation	Final exam	a test	final exam
11-Course Evaluation					

1. Quizzes : 10% 2. Assignments : 30% 3. Midterm exam: 10 % 4. Final exam: 50 %	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Cengel , Y., & Heat, T. M. (2003). A practical approach. *Second edi* .
Main references (sources)	Holman, J. P. (2010). Heat transfer. Bergman, T. L., Lavine, A. S., Incropera , F. P., & DeWitt, D. P. (2011). *Introduction to heat transfer* . John Wiley & Sons.
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Engineering Analysis I
2-Course code:
MATH-201
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
In-person (theoretical lectures + practical lessons + e-learning)
6- Total number of study hours / Total number of units:
150 hours / 6 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Hamza Raad Yassin

8- Course Objectives

The course aims to :

1- Developing students' mathematical knowledge to serve engineering applications
2- Enabling students to understand geometric analysis and mathematical modeling
3- To equip students with the skills necessary to analyze engineering systems
4- Linking mathematical concepts to applications in mechanical engineering
5- Preparing students for advanced courses in analysis and engineering

9-Teaching and learning strategies

1- Theoretical lectures to explain mathematical concepts
2- Solving practical problems within the classroom
3- Question and answer sessions
4- Practical lessons (tutorials)
5- e-learning
6- Practical assignments and duties

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	4	Understanding Differential Equations	First-order differential equations	a lecture	Short test
2	4	Solving separable equations	Separable equations	Lecture + Exercises	a test
3	4	Applying linear equations	linear equations	a lecture	Online assignment
4	4	Understanding perfect equations	perfect equations	a lecture	duty

5	4	Analysis of second-order equations	homogeneous equations	a lecture	a test
6	4	Solving non-homogeneous equations	Undefined transactions and parameter changes	a lecture	duty
7	4	Knowledge assessment	Midterm exam	a test	exam
8	4	Analysis of higher equations	Euler-Cauchy equations	a lecture	a test
9	4	Using power series	Sequential solutions	a lecture	a test
10	4	Solving linear systems	Simultaneous differential equations	a lecture	duty
11	4	Implementing the systems	Simultaneous differential equations	a lecture	Online assignment
12	4	Understanding special functions	gamma function	a lecture	duty
13	4	Applying special functions	gamma function	Lecture + Presentation	Seminar
14	4	Beta function analysis	Beta function	a lecture	duty
15	4	Dual Beta application	Beta function	a lecture	a test
16	4	Comprehensive assessment	Final exam	a test	final exam
11-Course Evaluation					
1- Quizzes : 10% 2- Assignments : 30% 3- Midterm exam: 10 % 4- Final exam: 50 %					
12- Learning and teaching resources					

Required textbooks (methodology, if applicable)	Advanced Engineering Analysis C. Ray Wylie
Main references (sources)	Advanced Engineering Mathematics, Kreyszig Kreyszig , 10th Edition , John Wile & Sons, Inc
Recommended supporting books and references (scientific journals, reports...)	nothing
references , websites	https://www.thriftbooks.com/w/advanced engineering-mathematics_clarence-raymond-wylie/327947/#edition=3546946&idiq=4 5961

Course description template

1-Course Name
Engineering Materials
2-Course code:
SE-ENG-204
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
In-person (theoretical lectures + practical lessons + e-learning)
6- Total number of study hours / Total number of units:
100 hours / 4 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Muhannad Latif Hamada
8- Course Objectives
The course aims to :

1- To provide students with basic knowledge about engineering materials (metals, polymers, ceramics, and nanomaterials)
2- Understanding the fundamental properties of materials and their relationship to atomic structure
3- phase diagrams and the factors affecting them
4- Identifying the mechanisms of strengthening and deformation in materials
5- Understanding the phenomena of failure and deterioration in engineering materials

9-Teaching and learning strategies

1- Theoretical lectures to explain the scientific foundations
2- Using practical application examples
3- Practical lessons (tutorials)
4- Laboratory work to clarify the properties
5- Seminars and scientific presentations
6- Solving selected problems and exercises

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Introduction to Materials Science	Introduction to Materials Science	a lecture	Short test
2	3	Understanding crystal structure	The crystalline structure of materials	a lecture	duty
3	3	Understanding the structure of polymers	Polymer structures	a lecture	a test
4	3	Crystal defect analysis	Defects in solid materials	a lecture	duty
5	3	Getting to know ceramics	Introduction to Ceramics	a lecture	a test

6	3	Understanding mechanical properties	Mechanical properties of metals	a lecture	duty
7	3	Analysis of strengthening mechanisms	Dislocations and strengthening mechanisms	a lecture	a test
8	3	Assessing understanding	Midterm exam	a test	exam
9	3	Understanding distortion	mechanical deformation	a lecture	duty
10	3	Applying strengthening mechanisms	Strengthening mechanisms	a lecture	a test
11	3	Understanding Material Failure	Material failure	a lecture	duty
12	3	Phase diagram analysis	Phase diagrams	a lecture	a test
13	3	Understanding diffusion	Spread	a lecture	duty
14	3	Study of thermal properties	thermal properties	a lecture	a test
15	3	Identifying Nanomaterials	nanomaterials	Lecture + Seminar	Seminar
16	3	Comprehensive assessment	Final exam	a test	final exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	The Science and Engineering of Materials Third Edition, Donald R. Askeland, Frank Haddleton , Phil Green, Howard Robertso

Main references (sources)	The Science and Engineering of Materials Third Edition, Donald R. Askeland, Frank Haddleton , Phil Green, Howard Robertso
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Computer Programming
2-Course code:
ENG-105
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
In-person (theoretical lectures + practical lessons + e-learning)
6- Total number of study hours / Total number of units:
75 hours / 3 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
M.D. Jalal Nizar Abdel Baqi M. Noor Saeed Saleh
8- Course Objectives
The course aims to : 1- Introducing students to the Python programming language and its basic structure 2- Enabling students to use conditional and repetitive sentences 3- Developing skills in designing and implementing software functions 4- Understanding basic data structures (lists, rows, dictionaries, collections) 5- Understanding text processing and stylistic conventions

6- Training students on how to handle files and exceptions

9-Teaching and learning strategies

1- Theoretical lectures to explain the concepts
2- Practical laboratories for direct application
3- Assignments and quizzes
4- Self-learning and research
5- Solving applied programming problems

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding the basics of Python	Introduction to Python (Syntax and Data Types)	Lecture + Lab	Short test
2	2	Applying conditional sentences	If and else conditional clauses	Lecture + Lab	duty
3	2	Using rings	While episode	Lecture + Lab	a test
4	2	Using rings	ring for	Lecture + Lab	duty
5	2	Function design	Defining functions and passing operators	Lecture + Lab	a test
6	2	Using libraries	Ready-made libraries and functions	a lecture	duty
7	2	Knowledge assessment	Midterm exam	a test	exam
8	2	Dealing with lists	Lists (Creation and Indexing)	Lecture + Lab	duty
9	2	Dealing with classes	Tuples	Lecture + Lab	a test

10	2	Dealing with dictionaries	Dictionaries	Lecture + Lab	duty
11	2	Dealing with groups	Sets	Lecture + Lab	a test
12	2	Text processing	Strings and stereotypical expressions	Lecture + Lab	duty
13	2	Handling files	Files	Lecture + Lab	a test
14	2	Error handling	Exceptions	a lecture	duty
15	2	Numerical programming	Using the NumPy library	Lecture + Lab	a test
16	2	Comprehensive assessment	Final exam	a test	final exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	*Intro to Python ® for Computer Science a Data Science: Learning to Program with AI, Big Data and the Cloud by Paul & Harvey Deitel* , 1st Ed , Pearson Education 2020
Main references (sources)	Gerard Swain, translated by Hisham Rizkallah et al., Learning Programming with Python 3 , 2013 Yet Publications , 2012
Recommended supporting books and references (scientific journals, reports...)	Python.org, learnpython.org, realpython.com
references , websites	

Course description template

1-Course Name
Arabic language (2)
2-Course code:
UOT0011
3-Term/Year: Annual
Level Two / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
Attendance (theoretical lectures)
6- Total number of study hours / Total number of units:
50 hours / 2 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. and Wasan Younis Abdullah M.M. M.M. Ali Qais Muhammad
8- Course Objectives
The course aims to : 1- Developing students' language skills and fostering a love for the Arabic language 2- Memorizing and understanding some Quranic chapters 3- Enabling students to apply grammar rules in everyday life 4- Introducing students to linguistic terminology in the fields of engineering and science 5- Improving skills in writing scientific reports and research papers 6- Promoting self-learning and independence among students
9-Teaching and learning strategies
1- Theoretical lectures 2- classroom discussions 3- Active learning based on student participation 4- Reorganizing information and linking it to reality 5- Using modern educational methods

10-Course Structure					
Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	2	Understanding Quranic texts	Surah Al-Isra (23-29) / Yusuf (1-7)	a lecture	a test
2	2	Understanding religious texts	A noble prophetic hadith	a lecture	duty
3	2	Analysis of poetic texts	Al-Sharif Al-Radi / Al-Mutanabbi	a lecture	Short test
4	2	Literary appreciation	Al-Jawahiri and Al-Sayyab	a lecture	duty
5	2	Correcting linguistic errors	Common mistakes	a lecture	a test
6	2	Applying grammar rules	The ta, the number, and the numbered	a lecture	duty
7	2	Knowledge assessment	Midterm exam	a test	exam
8	2	Correct spelling	The letters ض and ظ / Alif	a lecture	a test
9	2	Understanding the history of language	Language and Standards Collection	a lecture	duty
10	2	Error correction	Linguistic errors	a lecture	a test
11	2	Understanding the rules	Conjugation of nouns and the present tense verb	a lecture	duty
12	2	Understanding rhetoric	The science of rhetoric	a lecture	a test
13	2	rhetorical analysis	Moral enhancements	a lecture	a test
14	2	Linguistic analysis	verbal embellishments	a lecture	duty
15	2	Final semester assessment	Review and test	a test	evaluation

16	2	Comprehensive assessment	Final exam	a test	final exam

11-Course Evaluation
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Intermediate Interpretation by Dr. Wahba -Zuhayli
Main references (sources)	The Curriculum in Grammar and Syntax: Muhammad al-Antaki
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Thermodynamics II
2-Course code:
SE-ENG-205
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + laboratory + practical exercises)
6- Total number of study hours / Total number of units:
150 hours / 6 units(ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):

Dr. Israa Sami Farhan

8- Course Objectives

The course aims to :

1- Covering the principles of the second law of thermodynamics
2- Linking theoretical concepts to real-world engineering applications
3- Developing an intuitive physical understanding of the concepts of energy and entropy
4- Enabling students to analyze engineering thermal systems
5- Study of power, steam, and gas cycles and chemical reactions

9-Teaching and learning strategies

1- Theoretical lectures to explain the foundations and concepts
2- Solving applied problems within the exercises (Tutorials)
3- Practical laboratories to link the theoretical and experimental aspects
4- classroom discussions
5- Homework and self-learning

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the Second Law	Kelvin-Planck and Clausius formulations	a lecture	a test
2	3	thermal efficiency analysis	Heat engine efficiency + Carnot cycle	a lecture	duty
3	3	Understanding reverse systems	Performance Factor + Heat Pumps	a lecture	a test
4	3	Understanding entropy	Definition of entropy and Clausius inequality	a lecture	duty

5	3	Analysis of the change in entropy	Different processes of gases	a lecture	a test
6	3	Steam cycle analysis	Rankine cycle and power station analysis	Lecture + Lab	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Understanding gas cycles	Standard air cycles	a lecture	a test
9	3	Analysis of combustion cycles	Auto and Diesel Course	a lecture	duty
10	3	Course comparison	Brighton Tournament and Double Tournament	a lecture	a test
11	3	Solving applied problems	Exercises and problems	Tutorial	duty
12	3	Understanding gas mixtures	Mass and molar fraction	a lecture	a test
13	3	Properties of gases	and Amaghat's laws	a lecture	duty
14	3	chemical reactions	Combustion and its products	Lecture + Lab	a test
15	3	Advanced Analysis	Entropy in interacting systems	a lecture	duty
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	Cengel , Y. – Thermodynamics: An Engineering Approach

Main references (sources)	Applied Thermodynamics for Engineering Technologists – TD Eastop
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Strength of Materials
2-Course code:
SE-ENG-206
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + laboratory)
6- Total number of study hours / Total number of units:
125 hours / 5 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Adel Mahmoud Bash
8- Course Objectives
The course aims to : 1- Reviewing the principles of statics and their application in determining internal loads 2- Introducing students to stresses (normal and shear) and their engineering applications 3- Developing a mathematical and physical understanding of the deformation of rigid bodies 4- Enabling students to analyze strength of materials problems systematically

5- Preparing students to design machine components and industrial applications

9-Teaching and learning strategies

1- Theoretical lectures to explain the basic concepts
2- Solving various applied problems and exercises
3- Using real-world engineering examples
4- Practical laboratories to link theory with application
5- Tests and assignments to enhance understanding

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding stress	Vertical stress	a lecture	a test
2	3	Understanding Shear Stresses	Shear stress and bearing stress	a lecture	duty
3	3	Understanding emotion	Hooke's Law and Axial Deformation	a lecture	a test
4	3	Deformity analysis	sternal deformity	a lecture	duty
5	3	Analysis of dual emotion	Poisson ratio	a lecture	a test
6	3	Analysis of non-specific systems	statically indeterminate elements	a lecture	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Understanding thermal stresses	Thermal stresses and torsion	a lecture	a test
9	3	Torsion analysis	Torsion equations	a lecture	duty
10	3	Moment analysis	Shear forces and bending moments	a lecture	a test
11	3	Drawing diagrams	Shear and moment diagrams	a lecture	duty
12	3	Stress analysis	bending stresses	a lecture	a test

13	3	Advanced Analysis	Bending stresses (continuity)	a lecture	duty
14	3	Bridge study	Asymmetrical bridges	a lecture	a test
15	3	shear analysis	Shear stresses in beams	a lecture	duty
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Mechanics of Materials – Andrew Pytel & Jaan Kiusalaas
Main references (sources)	Mechanics of Materials - R. C. Hibbeler
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name

Economic Energy Management and Ethics
2-Course code:
SE-ENG-207
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + seminar)
6- Total number of study hours / Total number of units:
100 hours / 4 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Manar Saleh Mahdi
8- Course Objectives
The course aims to : 1- To provide students with concepts of engineering economics and energy management 2- Understanding the principles of supply and demand for energy sources 3- Studying energy policies and their sustainable use 4- Enabling students to conduct economic analysis of energy projects 5- Enhancing understanding of professional ethics and engineering responsibility
9-Teaching and learning strategies
1- Theoretical lectures explaining economic concepts 2- Practical exercises (tutorials) 3- Seminars and scientific discussions 4- Analysis of real-world case studies 5- Self-learning and research
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding the basics of energy economics	Introduction to Energy Economics	a lecture	a test
2	2	Understanding energy evolution	Energy History	a lecture	duty
3	2	Understanding policies	Energy policies and strategies	a lecture	a test
4	2	Analysis of economic growth	Energy and economic growth	a lecture	duty
5	2	Crisis analysis	Energy crises and their causes	a lecture	a test
6	2	Energy forecasting	Energy demand analysis	a lecture	duty
7	2	Presentation analysis	Energy supply economics	a lecture	a test
8	2	Interim assessment	Midterm exam	a test	exam
9	2	Understanding the environment and energy	The relationship between energy and the environment	a lecture	duty
10	2	Economic Analysis	Energy investment analysis	a lecture	a test
11	2	Advanced Analysis	Energy Investment Analysis (Continued)	a lecture	duty
12	2	Understanding ethics	Ethics and general principles	a lecture	a test
13	2	Applying ethics	Engineering Ethics	a lecture	duty
14	2	The importance of ethics	The role of ethics in engineering	a lecture	a test

15	2	Professional responsibility	Engineer's responsibilities	a lecture	duty
16	2	Final assessment	Final exam	a test	final exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Energy Finance and Economics: Analysis and Valuation, Risk Management, and the Future of Energy by Betty Simkins and Russell Simkins .
Main references (sources)	
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

1-Course Name
Heat Transfer II
2-Course code:
SE-ENG-208
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratory)
6- Total number of study hours / Total number of units:
125 hours / 5 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Tadhamon Ahmed Yassin Participant: Dr. Hussam Sami Dhiab
8- Course Objectives
The course aims to : 1- Predicting forced convection heat transfer rates 2- Studying normal pregnancy and analyzing its behavior 3- Analysis and design of heat exchangers 4- Understanding heat transfer by radiation between solid objects 5- Applying mathematical and engineering models to heat transfer problems
9-Teaching and learning strategies
1- Theoretical lectures to explain the scientific foundations 2- Solving problems and practical exercises 3- Practical laboratories for representing thermal phenomena 4- Using real-world engineering examples 5- Self-learning and assignments
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	3	Understanding the basics of forced pregnancy	boundary layer and viscous flow	a lecture	a test
2	3	flow analysis	Forced load on a flat plate	a lecture	duty
3	3	The relationship between friction and heat	The relationship between friction and heat transfer	a lecture	a test
4	3	Turbulent flow analysis	Forced loading of turbulent flow	a lecture	duty
5	3	Internal flow analysis	Flow inside pipes and channels	a lecture	a test
6	3	Outflow analysis	Flow around cylinders and balls	a lecture	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Engineering applications	Flow through pipe bundles	a lecture	a test
9	3	Understanding normal pregnancy	normal pregnancy	a lecture	duty
10	3	normal pregnancy test	Normal pregnancy (continued)	a lecture	a test
11	3	Understanding heat exchangers	logarithmic temperature difference	a lecture	duty
12	3	Performance analysis	NTU Effectiveness Method	a lecture	a test
13	3	Exchanger design	Heat exchanger design	a lecture	duty
14	3	Understanding radiation	Shape factor and thermal radiation	a lecture	a test
15	3	radiation analysis	Radiative exchange between surfaces	a lecture	duty
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Cengel , Y., & Heat, T. M. (2003). A practical approach. *Second edition*.
Main references (sources)	Holman, J. P. (2010). Heat transfer. Bergman, T. L., Lavine, AS, Incropera , F. P., & DeWitt, D. P. (2011). *Introduction to heat transfer* . John Wiley & Sons.
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Engineering Analysis II
2-Course code:

MATH-202
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + exercises)
6- Total number of study hours / Total number of units:
150 hours / 6 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Hamza Raad Yassin
8- Course Objectives
The course aims to : 1- Developing mathematical knowledge related to engineering applications 2- Enabling students to analyze engineering systems using mathematical methods 3- Enhancing mathematical modeling skills and differential equation solving 4- Linking theoretical concepts to applications in mechanical engineering 5- Preparing students for advanced studies in engineering analysis
9-Teaching and learning strategies
1- Theoretical lectures to explain mathematical concepts 2- Solving practical problems inside the hall 3- Question and Answer Sessions 4- Exercises (Tutorials) 5- Problem-based learning 6- Projects and duties
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the Laplace transform	Introduction and Transformation of Laplace	a lecture	a test
2	3	Transfers application	Converting special functions	a lecture	duty
3	3	Understanding Displacement	Displacement theories	a lecture	a test
4	3	Operations application	Laplace's Differential and Integral Calculus	a lecture	duty
5	3	Solving equations	Solving differential equations	a lecture	a test
6	3	Advanced application	Solving differential equations (continued)	a lecture	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Fourier's understanding	Fourier series and Euler formulas	a lecture	a test
9	3	Fourie app	Half-field expansion	a lecture	duty
10	3	Fourier transformation	Fourier Transform Properties	a lecture	a test
11	3	Solving equations	Fourier Transform app	a lecture	duty
12	3	Advanced Analysis	Solving equations (continued)	a lecture	a test
13	3	Understanding the characteristics	Perpendicularity of sine and cosine	a lecture	duty
14	3	partial equations	Heat equation	a lecture	a test
15	3	PDE applications	Wave equation	a lecture	duty
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Advanced Engineering Analysis C. Ray Wylie
Main references (sources)	Advanced Engineering Mathematics, Kreyszig, 10th Edition, John Wiley & Sor Inc
Recommended supporting books and references (scientific journals, reports...)	
references , websites	https://www.thriftbooks.com/w/advanced-engineering-mathematics_clarence-raymond-wylie/327947/#edition=3546946&idiq=4215961

Course description template

1-Course Name

English Language II
2-Course code:
UOT-021
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + seminars + assignments)
6- Total number of study hours / Total number of units:
50 hours / 2 units(ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Ahmed Sobhi Abdullah
8- Course Objectives
The course aims to : 1- Developing English language skills in the workplace 2- Empowering students with job application skills and recruitment procedures 3- Enhance your resume and cover letter writing skills 4- Developing critical thinking and communication skills 5- Developing academic writing skills (Paragraph & Essay Writing) 6- Preparing students for job interviews and presentations
9-Teaching and learning strategies
1- Theoretical lectures to explain the basics 2- Practical exercises (tutorials) 3- Seminars 4- Interactive learning (questions and answers) 5- Preparing reports and projects 6- Practical training in writing and communication skills
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	Understanding Job Applications	Recruitment and application procedures	a lecture	a test
2	2	Acquiring terminology	Employment terminology	a lecture	duty
3	2	Writing a CV	CV design and cover letter	a lecture	evaluation
4	2	Interview skills	Preparing for interviews	a lecture	duty
5	2	Academic writing	Letter of Intent (SOP)	a lecture	a test
6	2	Understanding the recommendations	Letter of recommendation	a lecture	duty
7	2	Interim assessment	Midterm exam	a test	exam
8	2	Presentation skills	Presentation techniques	a lecture	evaluation
9	2	Display application	Display techniques (continued)	a lecture	duty
10	2	Writing	Paragraph writing basics	a lecture	a test
11	2	Developing writing	Writing the paragraph (continued)	a lecture	duty
12	2	Paragraph elements	Topic & Supporting Sentences	a lecture	evaluation
13	2	Text coherence	Unity & Coherence	a lecture	duty
14	2	Article writing	Essay Writing	a lecture	a test
15	2	Article development	Essay Writing (continued)	a lecture	duty
16	2	Final assessment	Final exam	a test	final exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Beer, D. & McMurrey , D. 2004, A Guide to Writing as an Engineer (2nd ed), New York: Wiley
Main references (sources)	Borowick , Jerome N., 2002, Technical Communication and its Applications (2nd ed), New Jersey: Prentice-Hall, Inc.
Recommended supporting books and references (scientific journals, reports...)	
references , websites	http://umich.edu/~elements/5e/lectures/index.html

Course description template

1-Course Name
Crimes of the defunct Ba'ath Party
2-Course code:

UOT-109
3-Term/Year: Annual
Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
Attendance (theoretical lectures)
6- Total number of study hours / Total number of units:
50 hours / 2 units(ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. Abdul Rahman Zeidan
8- Course Objectives
The course aims to : 1- Identifying the crimes and violations committed by the party during its rule 2- Understanding the negative psychological, social, and cultural effects on Iraqi society 3- Identifying the impact of those policies on the Iraqi environment 4- Promoting historical awareness to prevent the recurrence of negative experiences
9-Teaching and learning strategies
1- Theoretical lectures to present the basic concepts 2- classroom discussions 3- Analysis of real-life examples from Iraqi society 4- Enhancing critical thinking among students 5- Linking historical events to reality
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	2	Understanding the historical background	Political systems in Iraq (1921–2003)	a lecture	a test
2	2	Identifying violations	Violations of rights and freedoms	a lecture	duty
3	2	Impact analysis	The impact of the regime's behavior on society	a lecture	a test
4	2	Understanding the transformations	Transitional phase	a lecture	duty
5	2	Psychoanalysis	psychological impact	a lecture	a test
6	2	Social analysis	social impact	a lecture	duty
7	2	Understanding the relationship	Religion and State	a lecture	a test
8	2	Interim assessment	Midterm exam	a test	exam
9	2	Cultural analysis	Culture, media, and the militarization of society	a lecture	duty
10	2	Environmental impact	Prohibited weapons and pollution	a lecture	a test
11	2	Regime policies	scorched earth policy	a lecture	duty
12	2	Environmental analysis	draining the marshes	a lecture	a test
13	2	Documenting crimes	Mass graves and destruction of places of worship	a lecture	duty
14	2	Realistic applications	Examples from Iraqi society	a lecture	a test
15	2	General review	Comprehensive review	a lecture	duty
16	2	Final assessment	Final exam	a test	final exam
11-Course Evaluation					
1- Short tests (quizzes): 10%					

2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	A curriculum approved by the Ministry of Higher Educatio and Scientific Research
Main references (sources)	
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Thermal Solar Energy Systems
2-Course code:
SE-ENG-301
3-Term/Year: Annual

Level 3 / First Semester

4-Date this description was prepared

1/9/2026

5- Available forms of attendance :

My attendance (theoretical lectures + exercises + lab + seminar)

6- Total number of study hours / Total number of units:

150 hours / 6 units (ECTS)

7-Name of the course coordinator (if there is more than one name, mention it):

Prof. Dr. Manar Saleh

8- Course Objectives

The course aims to :

1- Understanding Solar Thermal Energy Systems
2- Developing engineering skills in modeling solar thermal systems
3- Understanding the mathematical models of solar energy systems
4- Design of solar thermal energy systems
5- Calculating the efficiency and performance of solar thermal systems

9-Teaching and learning strategies

1- Theoretical lectures to explain the basics
2- Practical exercises (tutorials)
3- Practical laboratories
4- Scientific seminars
5- Solving applied engineering problems
6- Problem-based learning

10-Course Structure

Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	3	Understanding the basics of solar energy	Introduction to Solar Energy	a lecture	a test

2	3	radiation analysis	Types of solar radiation and how to measure it	a lecture	duty
3	3	Understanding complexes	Flat plate solar collectors (water)	a lecture	a test
4	3	Application of complexes	Flat-plate solar collectors (air)	a lecture	duty
5	3	Understanding the focus	Parabolic Dish Complexes	a lecture	a test
6	3	Advanced Analysis	trough complexes	a lecture	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Advanced technologies	Combined Compounds (CPCs)	a lecture	evaluation
9	3	CPC application	Combined complexes (continued)	a lecture	duty
10	3	Modern technologies	Frenell complexes	a lecture	a test
11	3	Centralized systems	Sun signs	a lecture	duty
12	3	Home applications	solar cooker	a lecture	a test
13	3	Agricultural applications	solar dryers	a lecture	duty
14	3	Water treatment	solar distillers	a lecture	a test
15	3	energy storage	Solar thermal energy storage	a lecture	duty
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**-John A. Duffie - Solar Engineering of Thermal Processes** **- Sathyajith Mathew - Wind Energy**
Main references (sources)	**-John Twidell , Tony Weir - Renewable Energy Resources**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Numerical Methods
2-Course code:
MATH-301
3-Term/Year: Annual
Level 3 / First Semester

4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons)
6- Total number of study hours / Total number of units:
100 hours / 4 units (ECTS)
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Ibrahim Thamer Nazzal
8- Course Objectives
The course aims to : 1- Introducing students to the fundamentals of numerical analysis 2- Developing skills in solving linear and nonlinear equations numerically 3- Applying methods of approximation, integration, and numerical differentiation 4- Solving differential equations using numerical methods 5- Developing programming skills and applying numerical algorithms 6- Error analysis and evaluation of the accuracy of results.
9-Teaching and learning strategies
1- Theoretical lectures to explain the concepts 2- Solving practical problems inside the hall 3- Practical laboratories for applying algorithms 4- Exercises (Tutorials) 5- Seminars and projects 6- Problem-based learning
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the basics	arrays and operations on them	a lecture	a test
2	3	Calculating determinants	Determinants and matrix inverses	a lecture	duty

3	3	Systems Solution	Gauss deletion method	a lecture	a test
4	3	numerical methods	Gauss-Seidel method	a lecture	duty
5	3	Finding the roots	Newton-Raphson and Secant	a lecture	a test
6	3	approximation	Curve Fitting and Interpolation	a lecture	duty
7	3	Interim assessment	Midterm exam	a test	exam
8	3	Fulfillment	Lagrange Interpolation	a lecture	evaluation
9	3	numerical integration	trapezoid base	a lecture	a test
10	3	Advanced integration	The Simpsons Rules	a lecture	duty
11	3	numerical differentiation	Richardson Extrapolation	a lecture	a test
12	3	Differential equations	Euler method	a lecture	duty
13	3	Advanced methods	Runge- Kutta	a lecture	a test
14	3	PDE	Specific differences method	a lecture	duty
15	3	PDE applications	Parabolic equations	a lecture	evaluation
16	3	Final assessment	Final exam	a test	final exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	Numerical Methods for Engineers. By Stephen Chapra

Main references (sources)	Numerical Methods for Engineers and Scientists: An Introduction with Applications Using MATLAB by Amos Gilat
Recommended supporting books and references (scientific journals, reports...)	
references , websites	http://umich.edu/~elements/5e/lectures/index.html

Course description template

1-Course Name
Photovoltaic Energy Systems
2-Course code:
SE-ENG-302
3-Term/Year: Annual
Level 3 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures, exercises, discussion sessions, laboratory)
6- Total number of study hours / Total number of units:
125 hours / 5 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Khalaf Salloum Ka'id
8- Course Objectives
This course aims to : 1. To provide students with comprehensive knowledge about solar radiation, photovoltaic energy system design, and energy storage . 2. Developing students' skills in designing and analyzing solar energy systems for various applications .

3. Understanding the principles of the photovoltaic effect, analyzing solar data, and linking components to obtain an efficient, economical, and reliable system for producing clean energy .

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures supported by practical examples .
2- Question and answer sessions .
3- Solving exercises and applied problems .
4- Seminars .
5- Practical applications and projects .
6- Training on the use of relevant software .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding the basic concepts of solar energy	Introduction and History of Solar Energy	a lecture	Short test
2	3	Solar radiation analysis	Solar radiation and the movement of the sun	Lecture + Exercises	duty
3	3	Understanding how solar cells work	Physics of photovoltaic cells	a lecture	a test
4	3	System Components Analysis	Solar panels and arrays	a lecture	duty
5	3	Identifying system components	System components (Inverter , batteries ...)	Lecture + Discussion	a test
6	3	Systems design	Design and calculation of loads	Lecture + Applicatio n	duty

7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Understanding the structure	Electrical installation and connection	a lecture	duty
9	3	Completing the applied understanding	Systems integration	a lecture	a test
10	3	Maintenance skills	Maintenance and troubleshooting	Lecture + Application	duty
11	3	Economic Analysis	Economics and network connectivity	a lecture	a test
12	3	Recent developments	Advanced technologies	a lecture	duty
13	3	Performance improvement	Efficiency and MPPT	a lecture	a test
14	3	practical application	Projects and discussion panels	Seminar	Show rating
15	3	Final assessment	Final exam	a test	exam
16	-	-	-	-	-

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	**Antonio Luque , Handbook of Photovoltaic Science and Engineering. John Wiley & Sons Ltd, 2003**
Main references (sources)	**-John Twidell , Tony Weir – Renewable Energy Resources**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Power Plants
2-Course code:
SE-ENG-303
3-Term/Year: Annual
Level 3 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures, discussions, exercises, seminars)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Thamer Khalil Ibrahim
8- Course Objectives
This course aims to : 1- Providing a simplified understanding of power plant engineering . 2- Presenting real-world engineering examples to demonstrate how power plants are implemented in practice . 3- Developing a physical and intuitive understanding of how power plants work by focusing on basic physical principles .
9-Teaching and learning strategies
The teaching and learning strategies in this course are based on : 1- Presenting the theoretical and analytical fundamentals through lectures . 2- Use real-life, practical examples to illustrate the concepts . 3- Involving students in classroom discussions . 4- Solve carefully selected problems and exercises . 5- Giving students sufficient time for training and application .
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding energy concepts	Introduction and Steam Power Stations	a lecture	Short test
2	3	Understanding ability cycles	Boilers, turbines, and the Rankine cycle	a lecture	duty
3	3	Component function analysis	Types of boilers and turbines	a lecture	a test
4	3	Understanding cooling systems	Condensers and cooling towers	a lecture	duty
5	3	Analysis of combustion systems	Compressors and combustion chambers	a lecture	a test
6	3	Performance evaluation	Analysis of gas station performance	a lecture	duty
7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Understanding modern systems	Combined cycle stations	a lecture	duty
9	3	thermal analysis	Combined Cycle Analysis	a lecture	a test
10	3	Understanding hydropower	Hydroelectric power stations	a lecture	duty
11	3	Understanding Nuclear Energy	nuclear reactors	a lecture	a test
12	3	Understanding solar energy	solar thermal energy	a lecture	duty
13	3	Analysis of hybrid systems	Solar-gas hybrid power plants	a lecture	a test
14	3	Deepening nuclear understanding	Nuclear power plants	a lecture	duty

15	3	Economic Analysis	Economics and energy storage	a lecture	a test
16	-	-	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Cengel , Y., & Thermodynamics: An engineering approach, Seventh *edition*.
Main references (sources)	Applied thermodynamics for engineering technologists, third edi , by TD EASTOP
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Applied Electronics
2-Course code:
SE-ENG-304
3-Term/Year: Annual
Level 3 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
150 hours / 6 units

7-Name of the course coordinator (if there is more than one name, mention it):

M.M. Omar Nafeh Mahmoud

8- Course Objectives

This course aims to :

1- Introducing students to Field Effect Transistors (FETs) of different types (JFETs and MOSFETs).
2- Analysis of the electrical characteristics of transistors and their use as amplifiers, switches, and current sources .
3- A study of multistage amplifiers and their different types .
4- Identifying four-layer electronic components such as (SCR, DIAC, TRIAC, GTO).
5- Developing students' skills in analyzing and designing applied electronic circuits .

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures to explain the basic concepts of electronics .
2- Use practical examples to illustrate how electronic circuits work .
3- Conducting laboratory experiments to enhance practical understanding .
4- Solving problems and practical exercises .
5- Training students in the analysis and design of electronic circuits .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	4	Understanding Engineering Ethics	Engineering Ethics	a lecture	a test
2	4	FET identification	Introduction to JFET	a lecture	duty
3	4	Characteristics analysis	MOSFETs and their types	a lecture	a test

4	4	Circuit analysis	Continuous analysis (DC)	a lecture	duty
5	4	Using amplifiers	FET as an amplifier	a lecture	a test
6	4	graphical analysis	Load Line	a lecture	duty
7	4	Understanding the models	Small FET models	a lecture	a test
8	4	Knowledge assessment	Midterm exam	a test	exam
9	4	Connection analysis	CS, CD, CG configurations	a lecture	duty
10	4	FET applications	As a switch and power source	a lecture	a test
11	4	Amplifier analysis	Multistage amplifiers	a lecture	duty
12	4	Types of amplifiers	BJT and RC Coupled	a lecture	a test
13	4	Performance improvement	Multi- FET amplifiers	a lecture	duty
14	4	elements of capability	SCR	a lecture	a test
15	4	Additional elements	DIAC, TRIAC, GTO	a lecture	duty
16	-	-	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	"Electronic Devices & circuit theory" by Robert L Boylestad and Louis Nashelsky , 11th ed. Taylor & Francis, 2013, ISBN-10: 0-13-262226-2, ISBN-13: 9 0-13-262226-4.
Main references (sources)	1. ELECTRONIC DEVICES by Thomas L. Floyd, Ninth Edition, 2012.

	Charles E. Harris, Michael S. Pritchard and Michael Rabins , "Engineering Ethics – Concepts and Cases Cengage Learning, 2009.
Recommended supporting books and references (scientific journals, reports...)	
references , websites	http://www.pearsonhighered.com/electron s

Course description template

1-Course Name
Electrical Machines
2-Course code:
SE-ENG-305
3-Term/Year: Annual
Level 3 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
125 hours / 5 units
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. Omar Nafeh Mahmoud
8- Course Objectives
This course aims to : 1- Introducing students to the basic principles of electric and magnetic fields at low frequencies . 2- Understanding the operating principles of transformers and DC electrical machines . 3- Study of the structure of electrical machines and rotor armature reactions. 4- Identifying the types and characteristics of direct current electrical machines .

5- Developing students' skills in numerical and applied analysis and laboratory work .

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures to explain basic and analytical principles.
2- Use practical examples to illustrate the concepts.
3- Solve selected analytical problems and exercises.
4- Conduct laboratory experiments to enhance practical understanding.
5- Give students enough time for training and application.

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding general principles	General principles of electrical machines	a lecture	a test
2	3	Identifying the structure	DC machine installation	a lecture	duty
3	3	Analyzing relationships	Equations of driving force and torque	a lecture	a test
4	3	Understanding connections	Types of rotor coils	a lecture	duty
5	3	Impact analysis	Rotating organ reaction	a lecture	a test
6	3	Magnetic calculations	Demagnetizing forces	a lecture	duty
7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Machine classification	Types of DC generators	a lecture	duty
9	3	Performance analysis	Generator characteristics	a lecture	a test
10	3	Operating conditions	Building voltage in generators	a lecture	duty

11	3	Mathematical analysis	Equations of different generators	a lecture	a test
12	3	parallel operation	Operating generators in parallel	a lecture	duty
13	3	Efficiency	Losses and efficiency	a lecture	a test
14	3	Effort organization	Effort organization	a lecture	duty
15	3	General review	Comprehensive review	a lecture	a test
16	-	-	Final exam	a test	exam

11-Course Evaluation
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Electrical Machinery Fundamentals, Stephen J Chapmans, 4th edition, MicGraw Hill, 2005.
Main references (sources)	2-Electrical Machines, D. P. Kothari, and I. J. Nagrath , 4th edition, MicGraw Hill, 2010
Recommended supporting books and references (scientific journals, reports...)	
references , websites	http://umich.edu/~elements/5e/lectures/index.hl

Course description template

1-Course Name
Turbomachinery

2-Course code:
SE-ENG-306
3-Term/Year: Annual
Level 3 / Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Ali Ahmed Kitan
8- Course Objectives
This course aims to : 1- Developing an understanding of the physical principles that govern the operation and performance of turbine machinery . 2- Clarifying the application of similarity and modeling laws to pumps and turbines . 3- Developing skills in analysis and problem-solving related to the performance of pumps, turbines, and compressors . 4- Introducing students to the design principles and performance characteristics of various types of turbine machines . 5- Enabling students to apply theoretical concepts in energy systems and real-world engineering applications .
9-Teaching and learning strategies
The teaching and learning strategies in this course are based on : 1- Theoretical lectures using modern presentation methods . 2- Practical exercises for problem-solving and performance analysis . 3- Case studies to link concepts to real-world applications . 4- Presentations (Seminars). 5- Self-learning through assignments and reports .

6- (When available) Laboratory work to monitor the performance of pumps and turbines .					
10-Course Structure					
Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	3	Understanding basic concepts	Introduction to turbine machinery and its classification	a lecture	a test
2	3	Energy transfer analysis	Euler's equation and energy transfer	a lecture	duty
3	3	Enforcement of laws	Dimensional analysis and laws of similarity	a lecture	a test
4	3	Performance analysis	Impulse turbines (Pelton)	a lecture	duty
5	3	Efficiency Calculation	Impulse turbine performance	a lecture	a test
6	3	Understanding Operation	reactive turbines	a lecture	duty
7	3	Type analysis	Francis & Kaplan Turbines	a lecture	a test
8	3	Knowledge assessment	Midterm exam	a test	exam
9	3	Understanding systems	Centrifugal pumps	a lecture	duty
10	3	Efficiency analysis	Efficiency and cavitation in pumps	a lecture	a test
11	3	operational applications	Multistage pumps	a lecture	duty
12	3	Performance analysis	Pump characteristic curves	a lecture	a test
13	3	Understanding compressors	axial compressors	a lecture	duty
14	3	Systems analysis	Centrifugal compressors	a lecture	a test

15	3	Energy applications	gas turbines	a lecture	duty
16	-	-	Final exam	a test	exam
11-Course Evaluation					
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%					
12- Learning and teaching resources					
Required textbooks (methodology, if applicable)			A text book of hydraulic machines, RS Khurmi		
Main references (sources)			1. Turbomachinery Design and Theory, Rama S. R. Gorla & Aijaz A. Khan. 2. Thermal and Hydraulic machines, RK Singal & Rishi Singal .		
Recommended supporting books and references (scientific journals, reports...)					
references , websites			https://www.youtube.com/@ivsl77		

1-Course Name
Principles of Combustion and Emissions
2-Course code:
SE-ENG-307
3-Term/Year: Annual
Level 3 / Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Khalaf Ibrahim Hamada
8- Course Objectives
This course aims to : 1- Developing a comprehensive understanding of combustion processes, fuel types, and resulting emissions . 2- Understanding the theoretical and technical principles of combustion phenomena, including physical processes and chemical reactions . 3- To enable students to use stoichiometry and thermodynamic concepts to analyzing combustion problems . 4- Studying different types of fuel and their roles in achieving sustainability . 5- Understanding the sources of emissions and ways to reduce them, with a focus on environmental impacts and greenhouse gases .
9-Teaching and learning strategies
The teaching and learning strategies in this course are based on : 1- Theoretical lectures to explain the concepts of combustion and emissions . 2- Practical exercises for solving problems using thermal and chemical laws . 3- Seminars to promote understanding and analysis .

4- Laboratory experiments to study fuel properties and emissions .
5- Self-learning through assignments and reports .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding fuel types	Fuel chemistry and properties	a lecture	a test
2	3	Application of thermodynamics	Gas Dynamics Review	a lecture	duty
3	3	Combustion analysis	Stokometry in combustion	a lecture	a test
4	3	gas analysis	Analysis of combustion gases	a lecture	duty
5	3	Application of the first law	Analysis of interacting systems	a lecture	a test
6	3	Energy calculation	Heat of combustion and fuel values	a lecture	duty
7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Calculating temperatures	adiabatic combustion temperature	a lecture	a test
9	3	chemical equilibrium	Disintegration and balance	a lecture	duty
10	3	Understanding emissions	Pollution and emissions	a lecture	a test
11	3	Pollution analysis	Air pollution from combustion	a lecture	duty
12	3	Environmental laws	Pollution legislation	a lecture	a test
13	3	Composition of pollutants	mechanisms of pollutant formation	a lecture	duty
14	3	Reducing emissions	Emission reduction technologies	a lecture	a test
15	3	Sustainability	Global warming and ways to reduce it	a lecture	duty

16	-	-	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	-John A. Duffie - Solar Engineering of Thermal Processes
Main references (sources)	- Sathyajith Mathew - Wind Energy
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Energy Storage Systems
2-Course code:
SE-ENG-308
3-Term/Year: Annual
Level 3 / Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
125 hours / 5 units
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Hussam Sami Dhiab
8- Course Objectives
This course aims to :

1- To provide students with a comprehensive understanding of the various energy storage systems .
2- Developing the technical knowledge and skills necessary to analyze, evaluate, and design energy storage systems .
3- Understanding the scientific principles that govern the operation of different energy storage systems .
4- Enabling students to address the problem of intermittent renewable energy sources using storage technologies .
5- Enhancing teamwork through the application of knowledge in practical projects .

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures are explaining the basics of energy storage.
2- Practical exercises for analyzing the performance of storage systems .
3- Discussion sessions to present and discuss modern applications .
4- Self-learning through assignments and reports .
5- Implementing group projects to enhance the practical aspect .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Understanding basic concepts	Introduction to Energy Storage	a lecture	a test
2	3	Systems classification	Types of energy storage systems	a lecture	duty
3	3	thermal analysis	Thermal storage (sensible heat) 1	a lecture	a test
4	3	thermal analysis	Thermal storage (sensible heat) 2	a lecture	duty
5	3	thermal analysis	Thermal storage (latent heat) 1	a lecture	a test
6	3	thermal analysis	Thermal storage (latent heat) 2	a lecture	duty

7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Understanding systems	Mechanical storage (water pumping)	a lecture	a test
9	3	Systems analysis	Compressed air storage	a lecture	duty
10	3	Practical applications	Storage with flywheels	a lecture	a test
11	3	Chemical understanding	Chemical energy storage (hydrogen)	a lecture	duty
12	3	Chemical applications	Industrial natural gas	a lecture	a test
13	3	Electrochemical analysis	Batteries and supercapacitors	a lecture	duty
14	3	Advanced systems	Fuel cells and hydrogen systems	a lecture	a test
15	3	Modern technologies	Superconducting magnetic storage	a lecture	duty
16	-	-	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	**- Robert A. Huggins, Energy storage, Springer Science & Business Media (2010)**
Main references (sources)	**Ralph Zito, Energy storage: A new approach, Wiley (2010)**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Computer Engineering Design
2-Course code:
SE-ENG-309
3-Term/Year: Annual
Level 3 / Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (theoretical lectures + practical lessons + laboratories)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
M.M. Omar Jamal Abdel Karim
8- Course Objectives
This course aims to : 1- Developing students' skills in reading, analyzing and preparing engineering drawings according to international standards (ISO and ASTM). 2- To enable students to understand the basics of engineering drawing, measurement methods, and dimensions . 3- Training students to design mechanical parts using computer-aided design (CAD) software . 4- Enabling students to draw and assemble mechanical parts and display detailed sections . 5- To equip students with 3D modeling skills using **SolidWorks software** .
9-Teaching and learning strategies
The teaching and learning strategies in this course are based on :

1- Theoretical lectures to explain the basic concepts of drawing and engineering design .
2- Practical training using SolidWorks software.
3- Solve the practical exercises to enhance design skills .
4- Conduct practical experiments and exercises to reinforce the concepts .
5- Self-learning through assignments and projects .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	Getting to know the program	Program Introduction and Interface	Lecture + Practical	a test
2	3	Understanding modeling	Parametric design and basic modeling	Lecture + Practical	duty
3	3	drawing skills	2D drawing	practical	a test
4	3	Dimension application	Drawing tools and dimensions	practical	duty
5	3	Parts modeling	Extrude and Revolve operations	practical	a test
6	3	Improving models	Fillet , Chamfer and shape characteristics	practical	duty
7	3	Knowledge assessment	Midterm exam	a test	exam
8	3	Advanced modeling	Advanced modeling of parts	practical	a test
9	3	Material preparation	Materials and design schedules	practical	duty
10	3	Assembly	Assembly basics	practical	a test
11	3	cluster analysis	Relationships (Mates) and Advanced Grouping	practical	duty
12	3	Engineering drawing	Creating drawings from models	practical	a test
13	3	Preparing the plans	Dimensions, comments, and tables	practical	duty

14	3	Surface modeling	Surface modeling and sheet metal	practical	a test
15	3	Advanced applications	Additional Modules (Weldment, Routing)	practical	duty
16	-	-	Final exam	a test	Exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology if applicable)	Engineering Design with SOLIDWORKS 2021: A Step-by-Step Project Based Approach Utilizing 3 Solid Modeling 1st Edition
Main references (sources)	Learn SOLIDWORKS: Get up to speed with key concepts and tools to become an accomplished SOLIDWORKS Associate and Professional, 2nd Edition.
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Geothermal Energy
2-Course code:
SE-ENG-310
3-Term/Year: Annual

Level 3 / Second Semester

4-Date this description was prepared

1/9/2026

5- Available forms of attendance :

My attendance (theoretical lectures + practical lessons + laboratories)

6- Total number of study hours / Total number of units:

125 hours / 5 units

7-Name of the course coordinator (if there is more than one name, mention it):

Prof. Dr. Fayyad Muhammad Abd

8- Course Objectives

This course aims to :

1- To provide students with a solid scientific foundation in the concepts of geothermal energy .
2- Introducing students to the scientific, technological and economic aspects of the geothermal energy industry .
3- Developing the technical skills necessary to utilize geothermal energy in heating and cooling applications .
4- Understanding the role of geothermal energy in the transition towards sustainable energy and the reduction of carbon emissions .

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures to explain the scientific foundations of geothermal energy .
2- Laboratories and practical experiments to enhance applied understanding .
3- Practical exercises (tutorials) for solving geometric problems .
4- Seminars for developing scientific analysis and criticism skills .
5- Self-learning through assignments and research .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	4	Understanding the basics	Origins and Principles of Geothermal Energy	a lecture	a test
2	4	Identifying the technologies	Geothermal energy technologies	a lecture	duty
3	4	Flow analysis	Fluid flow and geochemistry	Lecture + Exercise	a test
4	4	Tank analysis	Underground reservoir engineering	a lecture	duty
5	4	Generation applications	Flash steam power plants	a lecture	a test
6	4	Deepening understanding	Flash steam power plants (advanced)	a lecture	duty
7	4	evaluation	Midterm exam	a test	exam
8	4	Systems development	Twin- flash steam power plants	a lecture	a test
9	4	Systems analysis	Dual steam power plants (advanced)	a lecture	duty
10	4	Types of stations	Dry steam stations	a lecture	a test
11	4	Modern applications	Dual cycle stations	a lecture	duty
12	4	practical application	Installation procedures (1)	Lecture + Practical	a test
13	4	practical application	Installation procedures (2)	Lecture + Practical	duty
14	4	Economic Analysis	Cost analysis	a lecture	a test
15	4	Sustainability	Environmental benefits and challenges	Lecture + Discussion	duty
16	-	-	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%

3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**“Geothermal Power Plants”, Ronald DiPippo , 2nd Edition, Elsevier, 2008**
Main references (sources)	**Solar and Geothermal Energy, John Tabak, Facts On File, 2009**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Engineering Statistics
2-Course code:
Math-302
3-Term/Year: Annual
Level 3 / Second Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Naseer Damen Mukhlif
8- Course Objectives
This course aims to : 1- Introducing students to the concept of statistics and its importance in engineering applications .

2- Explaining the methods of collecting, organizing, and representing data .
3- Training students to prepare statistical tables and analyze data .
4- Explanation of descriptive statistics and measures of central tendency and dispersion .
5- Introducing students to the principles and laws of probability .
6- Developing statistical analysis and decision-making skills .
7- Introduction to inferential statistics and hypothesis testing

9-Teaching and learning strategies

The teaching and learning strategies in this course are based on :

1- Theoretical lectures to explain basic statistical concepts .
2- Solving exercises and applied problems (Tutorials).
3- Classroom discussions to promote understanding and analysis .
4- Using statistical software such as SPSS to analyze the data .
5- Self-learning through assignments and practical applications .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
	3	Understanding basic concepts	General principles of statistics	a lecture	a test
2	3	Data collection	Data collection and representation	Lecture + Exercise	duty
3	3	Data analysis	Measures of central tendency	a lecture	a test
4	3	Comparing the measures	Comparison of central metrics	a lecture	duty
5	3	Measuring dispersion	Measures of variance and dispersion	a lecture	a test
6	3	Analysis of variance	Coefficient of variation and analysis of dispersion	a lecture	duty

7	3	Deeper analysis	Applications of contrast	a lecture	a test
8	3	evaluation	Midterm exam	a test	exam
9	3	Understanding possibilities	Principles of Probability Theory	a lecture	a test
10	3	Applying probabilities	Laws of Probability	a lecture	duty
11	3	Distributions	Probability distributions	a lecture	a test
12	3	Distribution application	Applications on distributions	a lecture	duty
13	3	Preview	Inspection and assessment	a lecture	a test
14	3	Tests	Hypothesis testing	a lecture	duty
15	3	Advanced Analysis	Fit tests	a lecture	a test
16	-	-	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Introduction to Statistics - Dr. Khashaa Mahmoud Al-Rawi - University of Mosul/College Agriculture and Forestry - 1984.
Main references (sources)	- Principles of Engineering Statistics, Dr. Basim Nuzhat Al-Samarrai, Dr. Muthanna Jabr, University of Technology, Dar Al-Hikma for Printing and Publishing, Baghdad, 1990

	- Statistical methods in administrative sciences, applications using (SPSS), Dr. Salah Al-Din Hassan Al-Ilahiti, Mu'tah University, Dar Al-Wael for Printing and Publishing, Amman 2004. Introduction to Statistics, Dr. Ali Muhammad Al-Jumah, 2007
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Engineering Optimization
2-Course code:
SE-ENG-401
3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises, discussions)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
Dr. Muhannad Latif Hamada
8- Course Objectives
This course aims to :

1- To provide students with a solid foundation in the concepts and techniques of engineering optimization .
2- Developing students' ability to formulate engineering problems as mathematical models .
3- Introducing students to analytical and numerical problem-solving methods, such as linear programming and the simplex method.
4- Developing skills in interpreting optimization results to support engineering decision-making .
5- Enhancing analytical thinking and problem-solving skills in energy and engineering applications .

9-Teaching and learning strategies

Teaching and learning strategies are based on :

1- The lectures explain the theoretical and mathematical foundations .
2- Practical exercises for solving numerical problems .
3- Discussions for analyzing engineering models .
4- based learning .
5- Using mathematical and graphical tools .
6- Self-learning through assignments .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	The concept of optimization is defined, and its importance in engineering applications is explained.	Introduction to Optimalism	a lecture	a test
2	3	It formulates geometric problems as mathematical optimization models.	Mathematical formulation of problems	Lecture + Exercise	duty
3	3	It distinguishes between types of	optimization problems	a lecture	a test

		optimization problems (linear, non-linear , true)			
4	3	He applies problem-solving skills to practical examples.	Applications of drafting	an exercise	duty
5	3	It solves linear programming problems using the graphical method.	graphical solution	Lecture + Exercise	a test
6	3	It converts problems to standard form using help variables.	Standard formula	a lecture	duty
7	3	His understanding of basic concepts is assessed through a midterm exam.	Midterm exam	a test	exam
8	3	the Big-M method to find possible initial solutions.	Big-M Method	a lecture	a test
9	3	It represents problems using matrix format and solves them.	Matrix representation	Lecture + Exercise	duty
10	3	The simplex method and applies it to practical problems.	Simplex method	a lecture	a test
11	3	The first stage of the simplex is applied to solve problems.	Simplex (Phase 1)	an exercise	duty

12	3	It applies the two-stage method to solve problems with industrial variables.	Two-stage method	a lecture	a test
13	3	optimization issues Nonlinearity of a single variable	Optimality Nonlinearity	a lecture	duty
14	3	It applies sequential search techniques to find the optimal solution.	Research techniques	a lecture	a test
15	3	It explains the properties of convex functions and their relationship to optimization.	convex functions	Lecture + Discussion	duty
16	-	The acquisition of optimization skills is demonstrated through the final exam.	Final exam	a test	Test that

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**Hillier, F.S. & Lieberman, G.J. Introduction to Operations Research.**
Main references (sources)	**Bazaraa , MS, Sherali , CM, & Shetty, CM Nonlinear Programming: Theory and Algorithms.**
Recommended supporting books and references (scientific journals, reports...)	

references , websites	

Course description template

1-Course Name
Principle of Fuel Cell Technology
2-Course code:
SE-ENG-402
3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises, discussions)
6- Total number of study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Tadamon Ahmed Yassin
8- Course Objectives
This course aims to : 1- To provide students with advanced knowledge of fuel cells and hydrogen technologies . 2- Understanding the role of fuel cells in achieving sustainability and in the transition towards a hydrogen economy. 3- Analysis of methods for producing, storing, and using hydrogen in engineering applications . 4- Developing the ability to diagnose energy system problems, and propose appropriate engineering solutions . 5- Evaluating the performance, economic and environmental feasibility of fuel cell systems .
9-Teaching and learning strategies

Teaching and learning strategies are based on :

1- Theoretical lectures to explain basic and advanced concepts .
2- Laboratories to promote a practical understanding of fuel cell technologies .
3- Practical exercises for performance analysis and modeling .
4- Discussion sessions to evaluate modern applications .
5- Self-learning and scientific research .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	4	The concept of fuel cells is defined, and its importance in sustainable energy systems is explained.	Introduction to Fuel Cells	a lecture	a test
2	4	It explains the electrochemical principles of fuel cell operation.	Electrochemistry	a lecture	duty
3	4	It identifies the components of a fuel cell and explains the function of each part.	Fuel cell components	a lecture	a test
4	4	It distinguishes between different types of fuel cells and their characteristics.	Fuel cell classification	a lecture	duty
5	4	PEM cells and compares them to other types.	PEM cells	Lecture + Practical	a test
6	4	SOFC cells work and evaluate their efficiency.	SOFC cells	a lecture	duty
7	4	It compares DMFC and AFC cells in terms of performance and application.	DMFC and AFC cells	a lecture	a test
8	4	His understanding of the concepts is assessed through a midterm exam.	Midterm exam	a test	exam
9	4	It explains methods of hydrogen production	Hydrogen production and storage	a lecture	a test

		and storage and analyzes their efficiency.			
10	4	It analyzes fuel cell performance using engineering standards.	Fuel cell performance	Lecture + Exercise	duty
11	4	He designs a prototype fuel cell system.	Systems design	Lecture + Practical	a test
12	4	Evaluates fuel cell applications in different systems	Applications	a lecture	duty
13	4	Analyzes the integration of fuel cells with renewable energy sources	Integration with renewable energies	a lecture	a test
14	4	It explains the materials and manufacturing techniques used in fuel cells.	Materials and manufacturing	a lecture	duty
15	4	It assesses future challenges and modern trends in the field.	Challenges and future trends	Lecture + Discussion	a test
16	-	Demonstrates the acquisition of skills in analyzing and designing fuel cell systems.	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	**Fuel Cells and Hydrogen: From Fundamentals to Applied Research, Editors: Viktor Hacker, Shigenori Mitsushima , 1st Edition, 2018**
Main references (sources)	
Recommended supporting books and references (scientific journals, reports...)	

references , websites	

Course description template

1-Course Name
Design of Sustainable Energy Systems
2-Course code:
SE-ENG-403
3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises)
6- Total number of study hours / Total number of units:
125 hours / 5 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Manar Saleh Dr. Hussam Sami Dhiab
8- Course Objectives
This course aims to : 1- To provide students with a solid scientific foundation for the design of sustainable energy systems. 2- Developing the ability to analyze and evaluate different renewable energy technologies . 3- Enabling students to design highly efficient integrated energy systems . 4- Understanding the technical, economic, and environmental challenges associated with sustainable energy.

5- Enhancing decision-making skills for selecting appropriate energy systems.

9-Teaching and learning strategies

Teaching strategies are based on :

1- Theoretical lectures to explain basic and advanced concepts .
2- Practical exercises for systems analysis and performance calculation .
3- Discussion sessions to analyze environmental and economic issues .
4- Seminars to present real-life case studies .
5- Self-learning and scientific research .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	4	The concept of sustainable energy is defined, and its role in reducing emissions and achieving sustainability is explained.	Introduction to Sustainable Energy	a lecture	a test
2	4	It explains the operating principle of non-concentrated solar systems and analyzes their efficiency.	Non-concentrated solar systems	a lecture	duty
3	4	It distinguishes between concentrated solar power systems and evaluates their performance.	Concentrated solar systems	a lecture	a test
4	4	It explains the principles of operation of photovoltaic cells and analyzes their characteristics.	Photovoltaic cells (1)	Lecture + Exercise	duty
5	4	PV systems and evaluates the factors affecting them.	Photovoltaic cells (2)	a lecture	a test

6	4	It explains the principle of hydroelectric power generation and analyzes its components.	Hydroelectric power (1)	a lecture	duty
7	4	It compares different types of hydroelectric power plants and evaluates their efficiency.	Hydroelectric power (2)	a lecture	a test
8	4	His level of understanding of the concepts is assessed through a midterm test.	Midterm exam	a test	exam
9	4	It explains the principles of wind energy and analyzes the factors that affect its production.	Wind energy (1)	a lecture	a test
10	4	It analyzes the performance of wind turbines and compares their designs.	Wind energy (2)	Lecture + Exercise	duty
11	4	It explains biomass-to-energy conversion techniques and evaluates their efficiency.	Biomass (1)	a lecture	a test
12	4	It analyzes biomass applications and compares their technologies.	Biomass (2)	a lecture	duty
13	4	It explains the operating principle of fuel cells and assesses their role in sustainable systems.	fuel cells	a lecture	a test
14	4	It analyzes the environmental impact of energy systems and assesses their sustainability.	Environmental impact and sustainability	Lecture + Discussion	duty
15	4	It assesses the economic viability of energy systems and	Economic analysis and finance	a lecture	a test

		applies financial analysis methods.			
16	-	He demonstrates his ability to analyze and design integrated sustainable energy systems.	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**Dincer , I. and Abu- Rayash , A., 2019. Energy sustainability. AcademicPress.**
Main references (sources)	**Dincer , I. and Zamfirescu , C., 2011. Sustainable energ systems and applications. Springer Science & Business Media.**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Mechanical Vibration
2-Course code:
SE-ENG-404
3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises)
6- Total number of study hours / Total number of units:
150 hours / 6 units

7-Name of the course coordinator (if there is more than one name, mention it):

Prof. Dr. Adel Mahmoud Bash

8- Course Objectives

This course aims to :

1- To provide students with a solid scientific foundation in the dynamics and vibration of mechanical systems .
2- Enabling students to analyze the behavior of vibrating bodies using mathematical models .
3- Developing the ability to derive equations of motion for different systems .
4- Applying vibration concepts to solving engineering problems using software .
5- Understanding the effect of damping and multi-degrees of freedom vibrations .

9-Teaching and learning strategies

The strategies depend on :

1- Theoretical lectures to explain the basic concepts .
2- Practical exercises for solving differential equations and analyzing systems .
3- Laboratories to demonstrate vibrational behavior practically .
4- Using software such as MATLAB for analysis .
5- Seminars to discuss engineering applications .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	4	It reviews and applies basic mathematical concepts to motion analysis.	Sports background	a lecture	a test
2	4	It defines and explains the concepts of vibration (displacement, mass, stiffness,and damping).	Basic Vibration Concepts	a lecture	duty
3	4	It analyzes connected spring systems (series and parallel) using energy	Spring systems	Lecture + Exercise	a test

4	4	and compares the motion of rotational and translational mass systems .	block systems	a lecture	duty
5	4	It applies the concepts to real-world geometric problems in vibrations.	Applications	a lecture	a test
6	4	The equation of motion for a system with one degree of freedom is derived, and the normal frequency is calculated.	Equations of motion (DOF one)	a lecture	duty
7	4	It analyzes the response of the undamped free system and evaluates its dynamic behavior.	Undamped free vibration	a lecture	a test
8	4	He solves equations of motion using analytical methods and evaluates the results.	Solving equations	Lecture + Exercise	duty
9	4	The equation of motion for the damped system is derived, and the damping coefficient is determined.	damped vibration	a lecture	a test
10	4	It distinguishes between systems (partial damped, critical, excessive) and analyzes their responses.	Types of damping	a lecture	duty
11	4	Analyzes the response of the damped system using mathematical solutions.	Damping systems solution	Lecture + Exercise	a test
12	4	Damping is measured using the logarithmic decrement method and applied practically.	Damping measurement	Lecture + Lab	duty

13	4	It applies vibration concepts to advanced engineering applications.	Advanced applications	a lecture	a test
14	4	It analyzes multi-degree-of-freedom systems and calculates natural frequencies.	DOF systems	a lecture	duty
15	4	It identifies vibration modes and assesses system stability .	Vibration patterns	a lecture	a test
16	-	He demonstrates his ability to analyze vibrational systems and solve advanced problems.	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**Theory of Vibration with Application by William T. Thomson** **Mechanical Vibration by Rao**
Main references (sources)	**Fundamentals of Vibrations by Leonard Meirovitch**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Automatic Control Systems
2-Course code:
SE-ENG-405

3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises)
6- Total number of study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Khalaf Salloum Ka'id
8- Course Objectives
This course aims to : 1- Understanding the behavior of dynamic systems and analyzing their responses . 2- Representing systems using mathematical models (Laplace & Transfer Function). 3- Analysis of open and closed control systems . 4- Studying the stability and dynamic performance of systems . 5- Designing control systems using classic methods such as PID and Root Locus. 6- Developing the ability to analyze multi-input and multi-output systems .
9-Teaching and learning strategies
The strategies depend on : 1- Theoretical lectures to explain mathematical and geometric concepts . 2- Practical exercises for systems analysis and problem solving . 3- Solving problems using the Laplace transform . 4- Analysis of block diagrams . 5- Self-learning and continuous training .
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	4	The concept of control systems is defined, and its basic components are explained.	introduction	a lecture	a test
2	4	It distinguishes between open and closed systems and analyzes their characteristics.	Control systems	a lecture	duty
3	4	The transformation function of a dynamic system is derived using mathematical modeling.	Conversion function	Lecture + Exercise	a test
4	4	He formulates mathematical models of mechanical systems using equations of motion.	Mechanical systems	a lecture	duty
5	4	He formulates mathematical models of electrical systems and compares them to mechanical ones.	electrical systems	a lecture	a test
6	4	The Laplace transform is applied in solving differential equations of systems	Laplace transformation	Lecture + Exercise	duty
7	4	Analyzes the response of systems using the Laplace transform	Laplace applications	a lecture	a test
8	4	His understanding of the concepts is assessed through a midterm exam.	Midterm exam	a test	exam
9	4	He develops mathematical models for multiple dynamic systems.	Mathematical modeling	a lecture	duty
10	4	It represents systems using block diagrams and defines the relationships between them.	Block diagrams	a lecture	a test

11	4	It reduces complex block diagrams to an equivalent system.	Simplifying diagrams	Lecture + Exercise	duty
12	4	It analyzes systems using signal flowcharts.	Signal Flow Graph	a lecture	a test
13	4	It determines the stability of the system using the Roth-Hrowitz criterion.	Stability	a lecture	duty
14	4	It analyzes the temporal response of first- and second-order systems.	Time analysis	Lecture + Exercise	a test
15	4	The system's performance is evaluated in terms of transient and stable response.	Performance evaluation	a lecture	duty
16	-	He demonstrates his ability to analyze and design control systems.	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	Perry's Mechanical Engineers' Handbook, Ninth Edition. Don W. Green , Marylee Z. Southard McGraw Hill Professional, Jul 13, 2018 - Technology & Engineering - 2352 pages.
Main references (sources)	Coulson Richardson's Mechanical Engineering Vol.6 Mechanical Engineering Design 4th Edition. RK SINNOTT , JM COULSON , JF RICHARDSON . ELSEVIER BUTTERWORTH-HEINEMANN, OXFORD, 2005
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Graduation Project I
2-Course code:
ENG-401
3-Term/Year: Annual
Level 4 / First Semester
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (supervision, discussion groups, seminars)
6- Total number of study hours / Total number of units:
75 hours / 3 units
7-Name of the course coordinator (if there is more than one name, mention it):
All faculty members in the department
8- Course Objectives
This course aims to : 1- Preparing students to carry out a complete graduation project using the scientific method . 2- Developing scientific research skills, data collection, and analysis . 3- Enabling students to prepare a clear and comprehensive project plan . 4- Enhancing academic and technical writing skills . 5- Training students in scientific presentation and discussion .
9-Teaching and learning strategies
The strategies depend on : 1- Direct supervision by faculty members . 2- Discussion sessions to monitor the project's progress . 3- Seminars to present the work stages . 4- Self-learning and scientific research . 5- Training in academic writing and report writing .

10-Course Structure					
Week	**Hours**	**Required learning outcomes**	**Unit or topic name**	**Learning method**	**Evaluation Method**
1	3	Identify a suitable research problem and formulate a clear project title.	Choosing a project topic	Supervision + Discussion	evaluation
2	3	It outlines the general framework of the project and defines the research problem.	Project framework	supervision	evaluation
3	3	It defines the concepts and terms related to the project topic.	Concepts and terminology	Research + Supervision	evaluation
4	3	It defines the project's objectives and its scientific and practical importance.	Objectives and Importance	supervision	evaluation
5	3	It defines the scope of the study and the appropriate research methodology.	methodology	supervision	evaluation
6	3	Develops a timeline for project implementation (Schedule)	workplan	supervision	evaluation
7	3	It analyzes the research methodology and justifies its selection scientifically.	Methodology development	supervision	evaluation
8	3	He presents the project plan and responds to the supervisor's feedback.	Present the research plan	Seminar	an offer
9	3	The project plan is modified based on feedback.	Plan modification	supervision	evaluation
10	3	He gathers and analyzes recent scientific sources.	Source Collection	research	evaluation
11	3	The theoretical framework is written in a systematic, scientific manner.	Theoretical background	writing	evaluation

12	3	It reviews previous studies and compares their results.	Previous studies	Research + Writing	evaluation
13	3	It analyzes previous studies and identifies research gaps.	Analysis of studies	supervision	evaluation
14	3	The project proposal is completed and presented in a scientific format.	Writing the proposal	writing	evaluation
15	3	The project features a structured oral presentation.	presentation	Seminar	an offer
16	-	He defends his project before a scientific committee and answers questions.	Final Seminar	an offer	Final assessment

11-Course Evaluation
Ongoing discussions: 30% Seminars : 10% Final assessment (discussion): 60%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Perry's Mechanical Engineers' Handbook, Ninth Edition. Don W. Green , Marylee Z. Southard McGraw Hill Professional, Jul 13, 2018 - Technology & Engineering - 2352 pages.
Main references (sources)	Coulson Richardson's Mechanical Engineering Vol.6 Mechanical Engineering Design 4th Edition. RK SINNOTT , JM COULSON , JF RICHARDSON . ELSEVIER BUTTERWORTH-HEINEMANN, OXFORD, 2005
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Sustainable Building Design

2-Course code:
SE-ENG-406
3-Term/Year: Annual
Level 4 / Semester 2
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises, practical applications, seminars)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Raed Rashad, Prof. Dr. Jassim
8- Course Objectives
This course aims to : 1- Introducing students to the concepts of sustainable and low-energy buildings . 2- Reducing environmental impacts through energy-efficient design . 3- Enabling students to analyze energy consumption in buildings . 4- Developing the ability to assess and improve the performance of existing buildings . 5- Using engineering software in the analysis and design of sustainable buildings .
9-Teaching and learning strategies
The strategies depend on : 1- Theoretical lectures to explain the basic concepts . 2- Practical exercises for solving engineering problems . 3- Using real-life, practical examples . 4- Learning based on analysis and modeling . 5- Seminars to showcase modern applications .
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method

1	3	It explains the impact of climate change on building energy consumption and analyzes its environmental effects.	Introduction and Climate Change	a lecture	Short test
2	3	It distinguishes between sustainable, low-energy, and zero-energy buildings and identifies the characteristics of each.	Sustainable building concepts	a lecture	duty
3	3	It follows the basic steps for calculating air conditioning. heat loads.	Calculating heat loads	Lecture + Exercise	duty
4	3	It analyzes and calculates the components of thermal loads for a typical building.	Calculating heat loads	an exercise	a test
5	3	It uses preliminary analysis tools to assess building performance.	Initial analysis tools	Lecture + Application	duty
6	3	It explains the flow of energy and exothermic energy in thermal systems.	Energy flow and exergi	a lecture	a test
7	3	It analyzes the properties of physical systems (such as moments) and their impact on design.	Physical properties	a lecture	a test
8	3	It applies the concepts of static and dynamic analysis in buildings.	Static and dynamic analysis	a lecture	duty
9	-	He assesses his knowledge through a midterm test.	Midterm exam	a test	exam
10	3	It analyzes systems using the economic and environmental exergi methodology.	Economic Exergence Analysis	a lecture	duty
11	3	It compares alternative energy	alternative energy sources	a lecture	a test

		sources and their effects on buildings.			
12	3	Evaluates the applications of solar, wind, and geothermal energy in buildings.	Renewable energy applications	a lecture	duty
13	3	SPECO methods are applied in exergi cost analysis.	Economic analysis of exergy	a lecture	a test
14	3	It analyzes the cost of exergi and evaluates the efficiency of systems.	Economic analysis of exergy	an exercise	duty
15	3	It uses computer programs to analyze and design sustainable buildings.	Engineering programs	practical application	Practical assessment
16	-	He demonstrates his comprehensive understanding of the course through the final exam.	Final exam	a test	exam

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	**Hand book of Green Building Design and Construction Leed , Breeam , and Green Globes., 2nd Edition , 2017.**
Main references (sources)	• Exergy Energy, Environment and Sustainable Development, Ibrahim Dicer, and Marc A. Rosen, Elsiver , 2nd edition 2013. • Thermodynamics an Engineering Approaches, Cengel and Bolis , 2008 AHSRAE Handbook, 2013
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name

Wind Energy Systems

2-Course code:

SE-ENG-407

3-Term/Year: Annual

Level 4 / Semester 2

4-Date this description was prepared

1/9/2026

5- Available forms of attendance :

My attendance (lectures, labs, exercises, seminars)

6- Total number of study hours / Total number of units:

150 hours / 6 units

7-Name of the course coordinator (if there is more than one name, mention it):

Dr. Ali Ahmed

8- Course Objectives

This course aims to :

1- Introducing students to wind energy sources and their characteristics .
2- Understanding the components of wind energy systems and how they work .
3- Studying the different types of wind turbines .
4- Aerodynamic analysis of turbine rotors .
5- Enabling students to design and analyze wind energy systems .

9-Teaching and learning strategies

The strategies depend on :

1- Theoretical lectures to explain the basic concepts .
2- Laboratories for understanding the practical performance of systems .
3- Arithmetic exercises to apply geometric concepts .
4- Seminars to discuss modern applications .
5- Problem-based learning .

10-Course Structure

Evaluation Method	**Learning method**	**Unit or topic name**	**Required learning outcomes**	**Hours**	**Week**

Short test	a lecture	Historical applications	It explains the historical development of wind energy use and analyzes its applications.	3	1
duty	a lecture	Power generation and batteries	It explains how electricity is generated from wind and storage systems.	3	2
a test	Lecture + Exercise	Conversion systems	It analyzes systems for converting wind energy into electricity.	3	3
duty	a lecture	System components	It identifies the components of a wind power system and explains the function of each part.	3	4
evaluation	Lecture + Exercise	Turbine components	It compares the different components of turbines and evaluates their performance.	3	5
a test	an exercise	Performance analysis	It applies concepts of wind power system performance analysis.	3	6
exam	a test	Midterm exam	He assesses his knowledge through a midterm test.	-	7
a test	a lecture	Physical principles	It explains the physical principles of wind energy conversion.	3	8
duty	an exercise	Energy conversion	It analyzes energy conversion equations and applies them to real-world systems.	3	9
a test	a lecture	Types of turbines	It explains the different types of wind turbines.	3	10
duty	Lecture + Exercise	Turbine Aerodynamics	It analyzes the aerodynamics of the turbine rotor and evaluates its efficiency.	3	11
evaluation	a lecture	Turbine design	Applying wind turbine design steps	3	12

			according to engineering standards		
a test	a lecture	Turbine control	It explains turbine control systems and analyzes their performance.	3	13
duty	a lecture	Onshore vs Offshore	It compares onshore and offshore turbines and evaluates the advantages of each.	3	14
Seminar	a lecture	Cost and environmental impact	It analyzes the cost of wind energy systems and their environmental impacts.	3	15
exam	a test	Final exam	He demonstrates his comprehensive understanding through the final exam.	-	16

11-Course Evaluation

1- Short tests (quizzes): 10%
2- Duties (Assignments): 30%
3- Midterm exam : 10%
4- Final exam: 50%

12- Learning and teaching resources

Wind Energy Explained: Theory, Design and Applicat by JF Manwell , JG McGowan, AL Rogers.	Required textbooks (methodology, if applicable)
Wind Turbine Control Systems Principles, Modeling a Gain Scheduling Design, by Fernando D. Bianchi, Herr De Battista and Ricardo J. Mantz .	Main references (sources)
	Recommended supporting books and references (scientific journals, reports...)
	references , websites

Course description template

1-Course Name
Biomass Energy Systems
2-Course code:

SE-ENG-408

3-Term/Year: Annual

Level 4 / Semester 2

4-Date this description was prepared

1/9/2026

5- Available forms of attendance :

My attendance (lectures, labs, exercises, seminars)

6- Total number of study hours / Total number of units:

150 hours / 6 units

7-Name of the course coordinator (if there is more than one name, mention it):

Prof. Dr. Salwa Hadi Ahmed

8- Course Objectives

This course aims to :

1- Introducing students to the concepts and sources of biomass energy .
2- Studying technologies for converting biomass into energy (thermal, electrical, biofuel) .
3- Developing laboratory skills in the analysis and production of biofuels .
4- Evaluating the environmental and economic aspects of bioenergy systems .
5- Developing skills in analysis, design, and innovative thinking in the field of bioenergy .

9-Teaching and learning strategies

The strategies depend on :

1- Interactive lectures to explain basic concepts .
2- Laboratory experiments to apply concepts practically .
3- Project-based learning and case studies .
4- Self-learning using electronic resources .
5- Teamwork in preparing scientific reports and presentations .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	It explains the concepts of biomass energy and compares	Introduction to Bioenergy	a lecture	Short test

		them with other energy sources.			
2	3	It identifies biomass sources and evaluates their characteristics.	Biomass sources	a lecture	duty
3	3	It analyzes the physical and chemical properties of biomass.	Biomass characteristics	Lecture + Lab	Practical assessment
4	3	It explains the stages of anaerobic digestion and the mechanisms of biogas production.	Anaerobic digestion (1)	a lecture	a test
5	3	It compares different types of bioreactors and evaluates their performance.	Anaerobic digestion (2)	Lecture + Lab	duty
6	3	It analyzes aerobic decomposition and fertilization processes.	Aerobic decomposition	Lecture + Lab	Practical assessment
7	-	He assesses his knowledge through a midterm test.	Midterm exam	a test	exam
8	3	It explains the pyrolysis process and analyzes its products.	Heat conversion (1)	a lecture	a test
9	3	It compares gasification and combustion and evaluates the efficiency of each.	Heat conversion (2)	a lecture	duty
10	3	It applies the steps of bioethanol production and analyzes its efficiency.	Ethanol production	Lecture + Lab	Practical assessment
11	3	It applies the biodiesel production process and evaluates its characteristics.	Biodiesel production	Lecture + Lab	Practical assessment
12	3	It analyzes the life cycle of bioenergy systems using analytical tools.	Life cycle analysis (LCA)	Lecture + Application	duty
13	3	It assesses the economic aspects of bioenergy systems.	Bioeconomy	a lecture	a test
14	3	It analyzes the environmental and	Environmental and social impact	a lecture	Seminar

		social impacts of bioenergy			
15	3	It presents a case study or applied project in bioenergy	Case studies and projects	Seminar	an offer
16	-	He demonstrates his comprehensive understanding through the final exam.	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	• Zhu, D., Dar, M. A., & Shahnawaz, M. (Eds.). (2024). Biofuels and Sustainability: Life -Cycle Assessments, System Biology, Policies, and Emerging Technologies. Woodhead Publishing. mitpressbookstore Tripathi, M., & Kaur, S. (Eds.). (2025). Biotechnological Advances in Biomass to Bioenergy Biotransformation: Sustainable Implications in Circular Economy. Springer Singapore.
Main references (sources)	Singh, P. (Ed.). (2024). Emerging Trends and Techniques Biofuel Production from Agricultural Waste. Springer Singapore. SpringerLink
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Intelligent Network Systems
2-Course code:
SE-ENG-409

3-Term/Year: Annual
Level 4 / Semester 2
4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (lectures, exercises)
6- Total number of study hours / Total number of units:
150 hours / 6 units
7-Name of the course coordinator (if there is more than one name, mention it):
Prof. Dr. Khalaf Saad Kaid
8- Course Objectives
This course aims to : 1- Introducing students to the basics of modern networks, the Internet of Things (IoT) , and 6G . 2- Understanding the principles of artificial intelligence, machine learning, and their applications in networks . 3- Developing the ability to analyze and design intelligent network systems . 4- Applying optimization and search algorithms to solve network problems . 5- cybersecurity skills using artificial intelligence technologies
9-Teaching and learning strategies
The strategies depend on : 1- Theoretical lectures to explain the basic concepts . 2- Practical exercises for solving network and artificial intelligence problems . 3- Seminars to showcase modern applications . 4- Problem-based and project-based learning .
10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	It explains the basic concepts of network theory and analyzes its structure.	Networking basics	a lecture	Short test
2	3	It explains modern network architectures	Modern networks and IoT	a lecture	duty

		and evaluates the role of the Internet of Things.			
3	3	(6G) network technologies and their applications.	6G networks	a lecture	a test
4	3	It applies the principles of network planning and design.	Network planning	Lecture + Exercise	duty
5	3	It explains the concepts of artificial intelligence and intelligent agent systems.	Introduction to Artificial Intelligence	a lecture	a test
6	3	It distinguishes between types of machine learning and applies them to network problems.	Machine learning	Lecture + Exercise	duty
7	3	Analyzes machine learning applications in smart networks	ML applications	Seminar	evaluation
8	-	He assesses his knowledge through a phased test.	a test	a test	exam
9	3	Neural networks and fuzzy logic are applied in intelligent systems.	Neural networks and fuzzy logic	a lecture	a test
10	3	It analyzes optimization algorithms and applies them to network problems.	Optimization algorithms	Lecture + Exercise	duty
11	3	It applies smart routing strategies in networks	Smart guidance	a lecture	a test
12	3	It explains and analyzes the behavior of multi-agent systems.	Multi-agent systems	a lecture	duty
13	3	Evaluates cybersecurity applications using artificial intelligence	Cybersecurity	a lecture	a test
14	3	He is developing an applied project using	Applied project	Seminar	an offer

		artificial intelligence techniques in networks.			
15	3	He presents the results of his project and analyzes the system's performance.	Project presentation	Seminar	evaluation
16	-	He demonstrates his comprehensive understanding through the final exam.	Final exam	a test	exam

11-Course Evaluation	
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%	
12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	**Russell, S. and Norvig , P.: "Artificial Intelligence modern approach", Ed. Prentice Hall, 1995**
Main references (sources)	**J. Harju, T. Karttunen & O. Martikainen "Introductio to intelligent networks " 2025**
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Principles of Air Conditioning and Refrigeration
2-Course code:
SE-ENG-410
3-Term/Year: Annual
Level 4 / Semester 2

4-Date this description was prepared

1/9/2026

5- Available forms of attendance :

My attendance (lectures, lab, discussions)

6- Total number of study hours / Total number of units:

100 hours / 4 units

7-Name of the course coordinator (if there is more than one name, mention it):

Dr. Saad Sami Farhan

8- Course Objectives

This course aims to :

1- Introducing students to the basic concepts of air conditioning and refrigeration systems .
2- Analysis of humid air properties and psychrometric processes .
3- Derivation of the relationships specific to relative humidity and moisture content .
4- Studying the processes of humidification and dehumidification .
5- Developing skills in calculating heating and cooling loads.
6- Analysis of the impact of solar heat and energy sources .
7- Designing air distribution systems and selecting appropriate air conditioning systems .

9-Teaching and learning strategies

1- Theoretical lectures to explain the scientific principles .
2- Laboratories for applying concepts practically .
3- Assignments and tests to reinforce understanding .
4- Projects to link the theoretical aspect with engineering applications.
5- Scientific visits to applied sites .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	3	It explains the properties of air and flow behavior and analyzes its physical variables.	Basic concepts of adaptation	a lecture	Short test

2	3	adiabatic processes and the dew point, and uses a psychrometric chart.	psychrometric properties	Lecture + Exercise	duty
3	3	It calculates relative humidity and component pressures and solves humid air problems.	humidity calculation	a lecture	a test
4	3	It applies the principles of air mixing and determines the conditions of the air supply.	air mixing	Lecture + Exercise	duty
5	3	Calculate the total heat transfer coefficient and surface temperature	heat transfer	a lecture	a test
6	3	It analyzes and evaluates comfort conditions and indoor air quality.	thermal comfort	a lecture	duty
7	-	His level of understanding is assessed through a mid-term test.	Midterm exam	a test	exam
8	3	It specifies the internal and external design temperatures.	Design temperatures	a lecture	a test
9	3	The heat loads for heating are calculated using basic equations.	Convection (Heating)	Lecture + Exercise	duty
10	3	It analyzes heat loss through buildings and air leakage.	heat loss	a lecture	a test
11	3	It calculates the cooling load and evaluates different heat sources.	cooling load	Lecture + Exercise	duty
12	3	Explaining the effect of solar radiation and renewable energy on convection	solar gain	a lecture	a test
13	3	It analyzes and calculates pressure loss in the airways.	Flow within the channels	a lecture	duty

14	3	It explains the phenomenon of cavitation and its effect on internal flow.	cavity	a lecture	a test
15	3	A suitable air conditioning system is designed, and its components are selected according to engineering standards.	Air conditioning system design	Lecture + Project	Project evaluation
16	-	He demonstrates his comprehensive understanding through the final exam.	Final exam	a test	exam

11-Course Evaluation
1- Short tests (quizzes): 10% 2- Duties (Assignments): 30% 3- Midterm exam : 10% 4- Final exam: 50%

12- Learning and teaching resources	
Required textbooks (methodology, if applicable)	Refrigeration and Air-Conditioning, By Stoecher , First edition, McGraw-Hill, 2006.
Main references (sources)	1. Air-Conditioning and Refrigeration, By Jones, First edition, McGraw-Hill, 1983. 2. PRINCIPLES OF AIR CONDITIONING AND REFRIGERATION ENGINEERING , DR. KHALED AL -JOUDI , 1986 A text book of hydraulic machines, R. S. Khurmi .
Recommended supporting books and references (scientific journals, reports...)	
references , websites	

Course description template

1-Course Name
Graduation Project II
2-Course code:
ENG-402
3-Term/Year: Annual
Level 4 / Semester 2

4-Date this description was prepared
1/9/2026
5- Available forms of attendance :
My attendance (supervision, discussions, seminars)
6- Total number of study hours / Total number of units:
100 hours / 4 units
7-Name of the course coordinator (if there is more than one name, mention it):
All faculty members
8- Course Objectives
This course aims to : 1- Preparing students to carry out a comprehensive engineering project . 2- Developing scientific research and analytical skills . 3- Enabling students to design and implement realistic engineering solutions . 4- Enhancing technical report writing skills . 5- Training students in presentations, discussions, and scientific defense .
9-Teaching and learning strategies
1- Direct supervision by instructors . 2- Project- Based Learning . 3- Ongoing scientific discussions . 4- Seminars and presentations . 5- Self-learning and research in scientific sources .

10-Course Structure

Week	Hours	Required learning outcomes	Unit or topic name	Learning method	Evaluation Method
1	2	It identifies a clear engineering research problem and formulates it scientifically.	Choosing a research problem	supervision	Initial assessment
2	2	It outlines the overall framework of the project and defines the research	Project framework	Supervision + Discussion	evaluation

		hypotheses or questions.			
3	2	It defines scientific concepts and terms accurately.	Concepts and terminology	supervision	evaluation
4	2	It defines the project's objectives and its practical importance.	Objectives and Importance	supervision	evaluation
5	2	He defines the study's scope and selects the appropriate methodology.	Scope and methodology of the research	Supervision + Discussion	evaluation
6	2	He applies the research methodology and justifies its selection scientifically.	Research Methodology	supervision	evaluation
7	2	He analyzes data collection tools and selects the most suitable one.	Search tools	discussion	evaluation
8	2	He presents the research plan in an organized manner and responds to the supervisor's feedback.	Present the research plan	Seminar	evaluation
9	2	It gathers and critically analyzes modern scientific sources.	literature review	self-search	evaluation
10	2	The project's theoretical framework is developed using reputable scientific sources.	Theoretical framework	supervision	evaluation
11	2	It analyzes previous studies and links them to the project topic.	Previous studies	discussion	evaluation
12	2	It assesses the research gap and identifies the project's contribution.	Research gap analysis	supervision	evaluation
13	2	The project draft is written according to the scientific method.	Report writing	supervision	evaluation
14	2	The project reviews and improves the	Project review	supervision	evaluation

		quality of scientific and technical content.			
15	2	The project presents itself professionally using appropriate presentation methods.	presentation	Seminar	Show rating
16	2	He defends the project scientifically and answers the discussion panel's questions confidently.	Final discussion	Committee	Final assessment

11-Course Evaluation

Ongoing discussions: 30%
Seminars : 10%
Final assessment (discussion): 60%

12- Learning and teaching resources

Required textbooks (methodology, if applicable)	Perry's Mechanical Engineers' Handbook, Ninth Edition. Don W. Green , Marylee Z. Southard McGraw Hill Professional, Jul 13, 2018 - Technology & Engineering - 2352 pages.
Main references (sources)	Coulson Richardson's Mechanical Engineering Vol.6 Mechanical Engineering Design 4th Edition. RK SINNOTT , JM COULSON , JF RICHARDSON . ELSEVIER BUTTERWORTH-HEINEMANN, OXFORD, 2005
Recommended supporting books and references (scientific journals, reports...)	
references , websites	