

Academic Program Description Form

University Name: Tikrit University

Facility/Institute: Collage of Engineering University

Scientific Department: Sustainable Energy Engineering Department

Academic/Professional Program Name: Bachelor of Sustainable Energy Engineering

Final Degree Title: Bachelor of Science in Sustainable Energy Engineering

Academic System: Semesters

Description Preparation Date: 12-10-2025

Form Completion Date: 15-10-2025

Signature

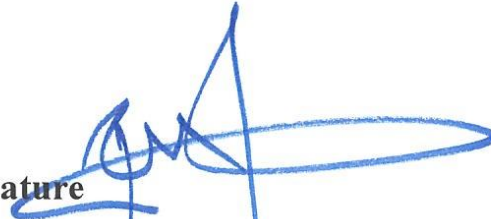


Head of Department: Asst. Prof.

Dr. Husam Sami Dhiab

Date: 15-10-2025

Signature



Associate Dean for Scientific Affairs:

Prof. Dr. Saad Mahmoud Raouf

Date: 15-10-2025

Checked by:

Quality Assurance and Performance Evaluation Division: Dr. Ahmed Yasser Radif

Date: 15-10-2025

Signature



Dean's Approval



Asst. Prof. Dr. Saad Ramadan Ahmed

Date: 15-10-2025

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



Academic Program and Course Description Guide

**College of Engineering- Tikrit University
Sustainable Energy Engineering Department
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 ECTS.

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:

Name of Scientific

Assistant:

Signature

Department Head's

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

The program is new for the academic year 2025-2026. However, the Department of Sustainable Energy Engineering has begun preparing the requirements of the National Council for Accreditation of Engineering Education (ICAEE).

5. Other external influences

College of Engineering at Tikrit University

6. Program structure

| Program structure | Number of courses | Study unit | Percentage | comments * |
|----------------------------|-------------------|------------|------------|------------|
| Institutional requirements | 8 | 18 | 7.5 | Basic |
| College requirements | 9 | 49 | 20.4 | Basic |
| Department requirements | 35 | 173 | 72.1 | Basic |
| Summer training | 1 | – | – | |
| Other | | | | |

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

7. Program Description

| Year / Level | Course code | Course Name | Credit Hours |
|--------------|-------------|--|--------------|
| First Level | SE_ENG-101 | Introduction to Sustainable Energy Engineering | 6 |
| First Level | MATH-101 | Calculus 1 | 6 |
| First Level | SE_ENG-102 | Physics | 6 |
| First Level | UOT-003 | Computer Science | 3 |
| First Level | ENG-106 | Engineering workshops | 5 |
| First Level | UOT-002 | English 1 | 2 |
| First Level | UOT-004 | Democracy and human rights | 2 |
| First Level | MATH-102 | Calculus 2 | 6 |
| First Level | ENG-102 | Engineering Mechanics | 4 |
| First Level | SE_ENG-104 | Basics of electricity | 5 |
| First Level | SE_ENG-205 | Environmental pollution | 5 |
| First Level | ENG-101 | Engineering drawing | 3 |
| First Level | SE_ENG-105 | Chemistry | 5 |

| | | | |
|--------------|------------|--|---|
| First Level | UOT-001 | Arabic language 1 | 2 |
| Second Level | SE-ENG-201 | Fluid mechanics | 5 |
| Second Level | SE-ENG-202 | Thermodynamics 1 | 5 |
| Second Level | SE-ENG-210 | Heat Transfer 1 | 5 |
| Second Level | MATH-201 | Geometric Analysis 1 | 4 |
| Second Level | SE-ENG-204 | Engineering materials | 4 |
| Second Level | ENG-105 | Computer programming | 3 |
| Second Level | UOT-011 | Arabic language 2 | 2 |
| Second Level | SE-ENG-207 | Thermodynamics 2 | 5 |
| Second Level | SE-ENG-208 | Material resistance | 5 |
| Second Level | SE-ENG-209 | The economic management and ethics of energy | 3 |
| Second Level | SE-ENG-317 | Heat Transfer 2 | 5 |
| Second Level | MATH-202 | Geometric Analysis 2 | 4 |
| Second Level | UOT-021 | English 2 | 2 |
| Second Level | UOT-109 | Determining geothermal energy | 2 |
| Third Level | SE-ENG-316 | Solar thermal energy systems | 5 |
| Third Level | MATH-301 | numerical methods | 4 |
| Third Level | SE-ENG-326 | Photovoltaic energy systems | 5 |
| Third Level | SE-ENG-311 | power plant | 4 |
| Third Level | SE-ENG-312 | Applied Electronics | 6 |
| Third Level | SE-ENG-313 | electric machine | 5 |
| Third Level | SE-ENG-301 | Turbine machines | 6 |
| Third Level | SE-ENG-302 | Principles of Combustion and Emissions | 5 |
| Third Level | SE-ENG-303 | Energy storage systems | 4 |
| Third Level | SE-ENG-304 | Computer-aided engineering design | 4 |
| Third Level | SE-ENG-305 | Geothermal energy | 5 |
| Third Level | MATH-302 | Engineering statistics | 3 |
| Fourth Level | SE-ENG-401 | Improvement | 3 |
| Fourth Level | SE-ENG-402 | Principles of fuel cell technology | 5 |
| Fourth Level | SE-ENG-403 | Designing sustainable energy systems | 4 |
| Fourth Level | SE-ENG-404 | mechanical vibrations | 6 |
| Fourth Level | SE-ENG-405 | Automated control systems | 6 |
| Fourth Level | ENG-401 | Graduation Project 1 | 3 |
| Fourth Level | SE-ENG-406 | Sustainable building design | 3 |
| Fourth Level | SE-ENG-407 | Wind power systems | 5 |
| Fourth Level | SE-ENG-408 | Biomass energy systems | 5 |
| Fourth Level | SE-ENG-409 | Smart grid systems | 5 |
| Fourth Level | SE-ENG-410 | Principles of air conditioning and refrigeration | 4 |
| Fourth Level | ENG-402 | Graduation Project 2 | 3 |

| |
|---|
| 8. Expected learning outcomes of the program |
| Knowledge |
| <ol style="list-style-type: none"> 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 |
| <ol style="list-style-type: none"> 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 |
| <ol style="list-style-type: none"> 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. |

9. Teaching and learning strategies

1. Active and Immersive Learning Approaches

- Project-Based Learning (PBL): Students actively collaborate in teams to complete full-scale feasibility studies and design viable green energy installations.
- Design Thinking Methodology: This framework forces students to tackle real-world community challenges, shifting focus from abstract theory to direct human and environmental impact.
- Digital Screencasting and Video Essays: Modern programs challenge students to generate tech-tutorials and video essays (e.g., explaining energy converter design) to cement deep conceptual understanding.

2. Practical Laboratory & Simulation Work

- Renewable Energy Laboratories: Specialized facilities allow students to design, experiment with, and optimize solar panels, wind turbines, and biomass systems.
- Thermo-Fluidic Application: Labs covering fluid dynamics and heat transfer are integrated to help students analyze and maximize the physical efficiency of energy systems.

3. Integrated Socio-Technical Perspectives

- The "3P" Assessment Filter: Engineering designs are evaluated through a triple bottom line: environmental footprint (Planet), social equity (People), and financial viability (Profit).
- Deliberative & Scenario Building: Students participate in gaming, forecasting, and policy analysis to navigate the societal resistance and market frameworks of transitioning to a low-carbon economy. [1, 2]

4. Professional Work Integration

- Industry and Community Partnerships: Collaboration with local businesses and municipalities exposes students to live engineering problems and local market rules.

- Supervised Summer Internships: Mandatory field placements test and grow students' technical, communication, and interpersonal capacities in real industrial settings.

10. Assessment methods

The Sustainable Energy Engineering Program employs a variety of assessment methods to evaluate the achievement of the intended learning outcomes, including:

- Written examinations (midterm and final examinations).
- Quizzes to assess continuous understanding of course materials.
- Laboratory reports and practical performance evaluations.
- Homework assignments and individual/group coursework.
- Engineering design projects, capstone projects, and evaluation of associated reports and presentations.
- Seminars, presentations, and scientific discussions.
- Assessment of industrial summer training through training reports and performance evaluation.
- Case studies and engineering problem-solving activities.
- Evaluation of teamwork, leadership, and communication skills through group activities and projects.
- Direct observation of practical performance during laboratory and applied activities.
- Feedback from graduates, employers, and the Industrial Advisory Board to assess the long-term achievement of program learning outcomes and educational objectives.

11. Faculty

Faculty members

| Instructor's Name | Specialization | Special requirements/ skills (if any) | Faculty preparation |
|-------------------|----------------|--|---------------------|
| | | | |

| | general | Special | | | Staff | lecturer |
|---------------------------------|------------------------|------------------------------|--|--|-----------------|-----------------|
| Prof. Dr. Fayyad Muhammad Abd | mechanical engineering | Thermals | | | Permanent staff | |
| 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 Salih 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 | |
| Lect.Dr. Jalal Nizar Abdel Baqi | Electrical Engineering | Artificial intelligence | | | Permanent staff | |
| Lect.Ashraf Abdullah Ahmed | mechanical engineering | Power engineering | | | Permanent staff | |
| Lect. Sinai Khodair Salman | mechanical engineering | Thermals | | | Permanent staff | |
| Lect. Omar Nafeh Mahmoud | Electrical Engineering | Electrical Engineering | | | Permanent staff | |

| | | | | | | |
|----------------------------------|------------------------|------------------------------|--|--|-----------------|--|
| Ass. Lect. Sabah Mohammed Hassan | Chemical Engineering | Chemical Engineering | | | Permanent staff | |
| Ass. Lect. Noor Saeed Saleh | Computer Engineering | Artificial intelligence | | | Permanent staff | |
| Ass. Lect. Ahmed Hefzy Mohsen | Electrical Engineering | electronics | | | Permanent staff | |
| Ass. Lect. Aqhwana Abdelmajid | Chemical Engineering | Industrial ECTS | | | Permanent staff | |
| Ass. Lect. Iyad Tariq Mahmoud | Electrical Engineering | control | | | Permanent staff | |
| Ass. Lect. Arjan Mosaddeq Taha | Electrical Engineering | Applied and natural sciences | | | Permanent staff | |
| Ass. Lect. Qahtan Ali Yousef | Electrical Engineering | Power systems | | | Permanent staff | |

Professional Development

Orienting new faculty members

The Sustainable Energy Engineering Department implements a systematic onboarding and mentorship framework to ensure all newly appointed, visiting, full-time, and part-time instructors successfully transition into their academic roles. This integration occurs across two synchronized levels:

1. Institutional Orientation

New personnel complete university-level onboarding programs covering:

- Core university policies, governance, and institutional regulations.
- Quality assurance benchmarks and compliance frameworks.
- Modern pedagogical strategies and effective learning management system (LMS) deployment.
- Campus administrative workflows and support services.

2. Departmental Mentorship

The department pairs each incoming educator with a senior faculty mentor to deliver specialized operational guidance, including:

- Academic Delivery: Collaborating on syllabus design, student evaluation methods, and classroom logistics.
- Student Success: Providing strategies for undergraduate advising and academic support.
- Research & Administration: Navigating institutional funding tracks, laboratory resource management, and internal administrative procedures.

Through scheduled progress reviews, mentors and mentees consistently evaluate instructional effectiveness, identify targets for professional growth, explore collaborative research initiatives, and accelerate the new faculty member's integration into the academic community.

Professional development of faculty members

The Department of Sustainable Energy Engineering maintains collaborative partnerships with several relevant ministries and official bodies, most notably: the Ministry of Higher Education and Scientific Research, the Ministry of Electricity, the Ministry of Environment, the Ministry of Planning, and provincial municipalities, in addition to a number of local and international companies operating in the energy sector.

These relationships contribute to providing faculty members with practical experience and field knowledge, enhancing their ability to keep pace with technological challenges in the fields of renewable energy and sustainability.

In this context, the college's Continuing Education Committee, with contributions from the department, organized several developmental activities, including:

1. Workshops on developing teaching methods and e-learning.
2. Presentation and publication of several scientific publications by faculty members.
7. Workshops on academic accreditation and quality standards.
8. Several specialized seminars in the field of sustainable energy engineering.
9. Participation in workshops, conferences, and specialized courses within Iraq. Faculty members are continuously encouraged to engage in professional development programs, which enhance their academic and research competencies, and ensure that education is aligned with the evolving demands of the labor market and the needs of sustainable development.

12. Admission standard

Based on the Iraqi Ministry of Higher Education and Scientific Research instructions, the following conditions are required to accept students:

1. The applicant must be an Iraqi citizen.
2. The applicant must hold a preparatory school certificate (scientific branch) or its equivalent.
3. The applicant must meet the minimum required grade point average set annually by the Ministry.
4. The applicant must not have been subject to disciplinary action from any government educational institution.
5. Applicants must submit a medical certificate confirming they meet the necessary health requirements.
6. The applicant must commit to full-time study.
7. The applicant cannot be enrolled in two different programs simultaneously.
8. International Students: Non-Iraqi students (internationals) holding a recognized Iraqi secondary school certificate are accepted, subject to the central admission regulations.
9. A specific percentage is allocated for the admission of gifted students according to criteria set by the Ministry.

Gifted Students: A specific percentage is allocated for the admission of gifted students according to criteria set by the Ministry.

13. Key sources of information about the program

1. University guide.
2. The department's website.

14. Program development plan

Based on the Sustainable Energy Engineering Department's commitment to providing high-quality engineering education that keeps pace with global developments in renewable energy and energy efficiency, and contributes to preparing graduates with the skills required by the job market, the department council has decided to adopt the European Bologna Process as part of its academic program development plan.

This transition includes implementing a credit transfer and accumulation system (ECTS) from the traditional system, starting from the academic year 2025-2026, in line with the national direction towards improving the quality of education and ensuring academic outcomes that are competitive both locally and internationally. Expected benefits of implementing the Bologna Process:

- 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 | | | | | | | | | | | |
| Year / Level | Course code | Course Name | Core or Elective | Knowledge | | | | Skills | | | | Values | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| Level 1 // Academic Year 2025- 2026 | SE_ENG-101 | Introduction to Sustainable Energy Engineering | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-101 | Calculus 1 | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE_ENG-102 | Physics | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | UOT-003 | Computer Science | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | ENG-106 | Engineering workshops | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | UOT-002 | English 1 | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | UOT-004 | Democracy and human rights | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-102 | Calculus 2 | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | ENG-102 | Engineering Mechanics | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE_ENG-104 | Basics of electricity | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE_ENG-205 | Environmental pollution | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| | | | | | | | | | | | | | | | |
|--|------------|---------------------|------|---|---|---|---|---|---|---|---|---|---|---|---|
| | ENG-101 | Engineering drawing | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE_ENG-105 | Chemistry | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| Program Skills Plan | | | | | | | | | | | | | | | |
|----------------------------------|--------------------|--|------------------|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------|----|----|----|
| / Year Level | code of the course | name of the course | Core or Elective | outputs Learning Required from the program | | | | | | | | | | | |
| | | | | Knowledge | | | | Skills | | | | Values | | | |
| | | | | A ¹ | A ² | A ³ | A ⁴ | B ¹ | B ² | B ³ | B ⁴ | C1 | C2 | C3 | C4 |
| Level // Two -٢٠٢٥ ٢٠٢٦ | SE_ENG-101 | Introduction to Sustainable Energy Engineering | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-201 | Fluid mechanics | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-202 | Thermodynamics ¹ | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-210 | Heat Transfer ¹ | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-201 | Geometric Analysis ¹ | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-204 | Engineering materials | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | ENG-105 | Computer programming | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | UOT-011 | Arabic language ² | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-207 | Thermodynamics ² | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-208 | Material resistance | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-209 | The economic management and ethics of energy | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-317 | Heat Transfer ² | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-202 | Geometric Analysis ² | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| Program Skills Plan | | | | | | | | | | | | | | | |
|---------------------------------------|-----------------------|--|-------------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|
| Year / Level | code of the course | name of the course | Core or Electiv e | outputs Learning Required from the program | | | | | | | | | | | |
| | | | | Knowledge | | | | Skills | | | | Values | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| Level Three // 2025- 2026 | SE-ENG-316 | Solar thermal energy systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-301 | numerical methods | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-326 | Photovoltaic energy systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-311 | power plant | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-312 | Applied Electronics | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-313 | electric machine | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-301 | Turbine machines | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-302 | Principles of Combustion and Emissions | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-303 | Energy storage systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-304 | Computer Engineering Design | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-305 | Geothermal energy | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | MATH-302 | Engineering statistics | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

| Program Skills Plan | | | | | | | | | | | | | | | |
|------------------------|--------------------|--|------------------|--|----|----|----|--------|----|----|----|--------|----|----|----|
| Year / Level | code of the course | name of the course | Core or Elective | outputs Learning Required from the program | | | | | | | | | | | |
| | | | | Knowledge | | | | Skills | | | | Values | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| Level Four / 2025-2026 | SE_ENG-101 | Introduction to Sustainable Energy Engineering | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-401 | Improvement | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-402 | Principles of fuel cell technology | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-403 | Designing sustainable energy systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-404 | mechanical vibrations | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-405 | Automated control systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | ENG-401 | First graduation project | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-406 | Sustainable building design | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-407 | Wind power systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-408 | Biomass energy systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-409 | Smart grid systems | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | SE-ENG-410 | Principles of air conditioning and refrigeration | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | ENG-402 | Second graduation project | Core | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |

Course Description Form

| | |
|--------------------------------|--|
| Course Name | Introduction to Sustainable Energy Engineering |
| Course code | SE-ENG-101 |
| Term/Year | Annual: Level 1 / First Semester |
| Description Preparation Date | 12/10/2026 |
| Available Attendance Forms | Theoretical lectures – Practical lessons – E-learning – Project |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | Prof. Dr. Manar Salih 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 | Evaluation Method | Learning Method | Unit or Subject Name | Required Learning Outcomes |
|------|-------|-------------------|-----------------|----------------------|--|
| 1 | 3 | Quiz | lecture | Basic concepts | It defines the concepts of energy, systems, and international ECTS, and explains the |

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|----|---|------------|--------------------|---------------------------|--|
| | | | | | characteristics of systems. |
| 2 | 3 | Assignment | Lecture + Exercise | energy transfer | It distinguishes forms of energy and explains how they are transferred by heat and work. |
| 3 | 3 | Test | a lecture | First Law | The first law of thermodynamics applies to simple problems. |
| 4 | 3 | Assignment | a lecture | Second Law | It explains the second law of thermodynamics and analyzes efficiency. |
| 5 | 3 | Test | Lecture + Exercise | heat transfer | It explains heat transfer patterns and applies them to elementary problems. |
| 6 | 3 | Assignment | a lecture | Fuel and combustion | It explains combustion processes and determines fuel properties. |
| 7 | - | exam | exam | Midterm exam | His comprehension is assessed through a mid-term test. |
| 8 | 3 | Test | lecture | solar thermal energy | It explains the basics of solar energy and the types of solar collectors. |
| 9 | 3 | Assignment | lecture | Photovoltaic solar energy | It explains the principle of solar cells and analyzes photovoltaic energy production. |
| 10 | 3 | Test | lecture | Wind power | It explains the basics of wind energy and identifies the components of a turbine. |
| 11 | 3 | Assignment | a lecture | hydropower | It explains the principles of hydropower and types of turbines. |
| 12 | 3 | Test | a lecture | Turbine design | It explains the fundamentals of water turbine design. |
| 13 | 3 | Assignment | a lecture | Geothermal energy | It explains geothermal energy |

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|----|---|---------|-------------------|----------------|---|
| | | | | | sources and their applications. |
| 14 | 3 | Test | a lecture | biomass | It explains biomass sources and evaluates their use. |
| 15 | 3 | Project | Lecture + Project | energy storage | It explains energy storage technologies and compares their types. |
| 16 | - | exam | exam | Final exam | It demonstrates the comprehensive understanding of the concepts through the 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) | Dincer , I., & Abu- Rayash , A. (2019). Energy Sustainability. Elsevier. |
| Main references (sources) | Kanoğlu , M., Çengel , Y. A., & Cimbala , J. (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 Form

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|---------------------------------|---|
| Course Name | CALCULUS I |
| Course code: | MATH-101 |
| Term/Year: | Annual – First Stage / First Semester |
| Description Preparation Date | 2025/2026 |
| Available Attendance Forms | Theoretical lectures – Practical lessons – E-learning – Project |
| Total study hours / Total ECTS: | Number of European ECTS (ECTS): 6 Total course load : 150 hours/semester Theoretical weekly hours : approximately 6 hours |
| Course Administrator Name | Dr. Hamza Raad Yassin Dr. Muhannad Latif Hamada |

1. 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.

2. 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 .**

3. 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 | Assignment |
| 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 | Assignment |
| 5 | 6 | Analysis of exponential functions and their applications | Exponential Functions | Lecture + Discussion | a test |
| 6 | 6 | Applying the part-integration method | Integration by Parts | Lecture + Exercises | Assignment |
| 7 | 6 | Analysis of trigonometric functions products | Products of Trigonometric Functions | Lecture + Application | Term test |

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|----|---|---|---|---------------------------|------------------|
| 8 | 6 | Study of the pair powers of sine and cosine | Even Powers of Sine and Cosine | Lecture + Problem Solving | Assignment |
| 9 | 6 | Applying trigonometric substitutions in integration | Trigonometric Substitution | Lecture + Application | a test |
| 10 | 6 | Identifying hyperbolic functions | Hyperbolic Functions | a lecture | Assignment |
| 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 | Assignment |
| 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 |

4. Course evaluation

Quizzes 20% – Homework 10% – Online assignments 5% – Project 5% – Midterm exam 10% – Final exam 50% – Total 100 %

5. Learning and teaching resources

| | |
|---|---|
| Required textbooks (methodology, if applicable) | Thomas, GB (2010). Calculus |
| Main references (sources) | Kreyszig , E. (2011). Advanced Engineering Mathematics |

| | |
|--|--|
| <p>Recommended supporting books and references (scientific journals, reports...)</p> | <p>Stroud, K. A., & Booth, D. J. (2001). Engineering Mathematics John, B. (2010). Higher Engineering Mathematics</p> |
| <p>references , websites</p> | <p>MIT OpenCourseWare - Calculus Khan Academy – Calculus Wolfram MathWorld Paul's Online Math Notes</p> |

Course Description Form

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|---------------------------------|--|
| Course Name | Physics |
| Course code: | SE-ENG-102 |
| Term/Year: | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures – Laboratory – Practical lessons – E-learning – Laboratory reports |
| Total study hours / Total ECTS: | - Number of European ECTS (ECTS): 6 - Total course load : 150 hours/semester - Theoretical weekly hours : approximately 6 hours |
| Course Administrator Name | 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 engineering applications .
6. Developing students' skills in conducting laboratory experiments and analyzing 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 7 | 6 | Midterm exam | Midterm Exam | Written test | evaluation |

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|----|---|---|--------------------------------|---------------------------------|------------|
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 15 | 6 | Studying Kirchhoff's laws and analyzing circuits | Kirchhoff's Laws | Lecture + Discussion | review |

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|--|---|------------|--|--------------|------------------|
| 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: Principles with Applications | | |
| references , websites | | | MIT OpenCourseWare - Physics | | |

Course Description Form

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|---------------------------------|---|
| Course Name | Computer Science |
| Course code: | UOT-003 |
| Term/Year: | Annual – First Stage / First Semester |
| Description Preparation Date | 2026 |
| Available Attendance Forms | Theoretical lectures – Computer lab – Practical lessons – E-learning |
| Total study hours / Total ECTS: | - Number of European ECTS (ECTS): 3 - Total course load: 75 hours/semester - Weekly theoretical and practical hours: 3 hours |
| Course Administrator Name | Dr. Jalal Nouri Abdulbaqi, Ass. Lect. Noor 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

| Wee k | 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 | Assignment |
| 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 | Assignment |
| 5 | 3 | Understanding the fundamentals of programming languages | Programming Languages I | Lecture + Application | a test |

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|----|---|---|--------------------------------------|-----------------------|------------|
| 6 | 3 | Applying basic programming concepts | Programming Languages II | Lecture + Lab | Assignment |
| 7 | 3 | Midterm exam | Midterm Exam | Written test | evaluation |
| 8 | 3 | Understanding operating systems and their functions | Operating Systems I | a lecture | a test |
| 9 | 3 | Studying the components of operating systems | Operating Systems II | Lecture + Discussion | Assignment |
| 10 | 3 | Understanding Information Systems | Information Systems | a lecture | a test |
| 11 | 3 | Understanding artificial intelligence applications | Artificial Intelligence Applications | a lecture | Assignment |
| 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 | Assignment |
| 14 | 3 | Studying the Internet and communication protocols | Internet Technologies | Lecture + Discussion | a test |
| 15 | 3 | Understanding cybersecurity | Cybersecurity | Lecture + Application | review |

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|--|---|------------|---|--------------|------------------|
| 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 Form

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|---------------------------------|---|
| Course Name | English Language I |
| Course code: | UOT-002 |
| Term/Year: | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures, discussion groups, projects, seminars |
| Total study hours / Total ECTS: | 50 hours / 2 ECTS |
| Course Administrator Name | Dr. 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 | Assignment |

| | | | | | |
|----|---|--|--|-------------------------|-------------|
| 3 | 2 | Applying technical reading skills | Reading engineering texts | Lecture and discussion | Assignment |
| 4 | 2 | Developing proposal writing skills | Technical discussions and proposal writing | Lecture and discussion | Assignment |
| 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 | Assignment |
| 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 | Assignment |

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|---|---|---------------------------------|--|-----------------------|------------|
| 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/inx.html | | |

Course Description Form

| | |
|--------------------------------|---------------------------------------|
| Course Name | Democracy and human rights |
| Course code | UOT-004 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures |
| Total study hours / Total ECTS | 50 hours / 2 ECTS |
| Course Administrator Name | Ass. Lect. 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 | Learning method | Eva |
|------|-------|--|-----------------|-----|
| 1 | 2 | Understanding the historical roots of concepts | a lecture | S |
| 2 | 2 | Understanding human rights in Islam | a lecture | d |
| 3 | 2 | Identifying human rights sources | a lecture | As |
| 4 | 2 | Analysis of local human rights sources | a lecture | As |
| 5 | 2 | Understanding legal safeguards | a lecture | |
| 6 | 2 | Understanding international guarantees | a lecture | d |
| 7 | 2 | Understanding the role of international institutions | a lecture | d |
| 8 | 2 | Measuring academic achievement | a test | |

| | | | | |
|---|---|--|--|----|
| 9 | 2 | Analysis of the impact of technology | a lecture | As |
| 10 | 2 | Understanding globalization | a lecture | d |
| 11 | 2 | Understanding the concept of good governance | a lecture | |
| 12 | 2 | Understanding constitutional systems | a lecture | As |
| 13 | 2 | Promoting the values of equality | a lecture | d |
| 14 | 2 | Identifying crimes against humanity | a lecture | As |
| 15 | 2 | Analysis of contemporary models | a lecture | d |
| 16 | 2 | Evaluating learning outcomes | a test | |
| 11-Course Evaluation | | | | |
| Quizzes, assignments, discussions, midterm exam, and final exam | | | | |
| 12- Learning and teaching resources | | | | |
| | | | The book "Human Rights and Democracy" was authored by: Prof. Dr. Maher Saleh Alawi Al-Jubouri, Prof. Dr. Riyadh Al-Hadi, Prof. Dr. Raad Naji Al-Jada, Asst. Prof. Dr. Kamel Abdul -Ankou, Asst. Prof. Dr. Ali Abdul-Razzaq Muhammad, Prof. Dr. Hassan Muhammad Shafiq (2009) | |
| | | | Democracy, by Charles Tilly, translated by Mohamed Fad | |

| | |
|--|---|
| | Tabbakh, Egyptian General Book Organization (2010) |
| | Basic human rights and the security role in protecting the Dr. Mubarak Alawi Mohammed (2019) |
| | nothing |

Course Description Form

| | |
|--------------------------------|---|
| Course Name | Engineering Workshops |
| Course code | ENG-106 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures – practical lessons – hands-on training in workshops |
| Total study hours / Total ECTS | - Number of European ECTS (ECTS): - Total course load: 125 hours/semester - Weekly theoretical and practical hours: 5 hours |
| Course Administrator Name | 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 environment.
- 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

| Wee k | 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |

| | | | | | |
|--|---|---|---|--------------------|------------------|
| 9 | 5 | Implementing practical applications in plumbing | Plumbing Workshop | Practical training | a test |
| 10 | 5 | Understanding mechanical processing operations | Machining Workshop | Practical training | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | | |

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| 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 Form

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|--------------------------------|---|
| Course Name | CALCULUS II |
| Course code | MATH-102 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures, exercises, seminars, and practical applications |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | Dr. Hamza Raad Yassin Dr. Israa Sami Farhan |

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| 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 | a lecture | Short |

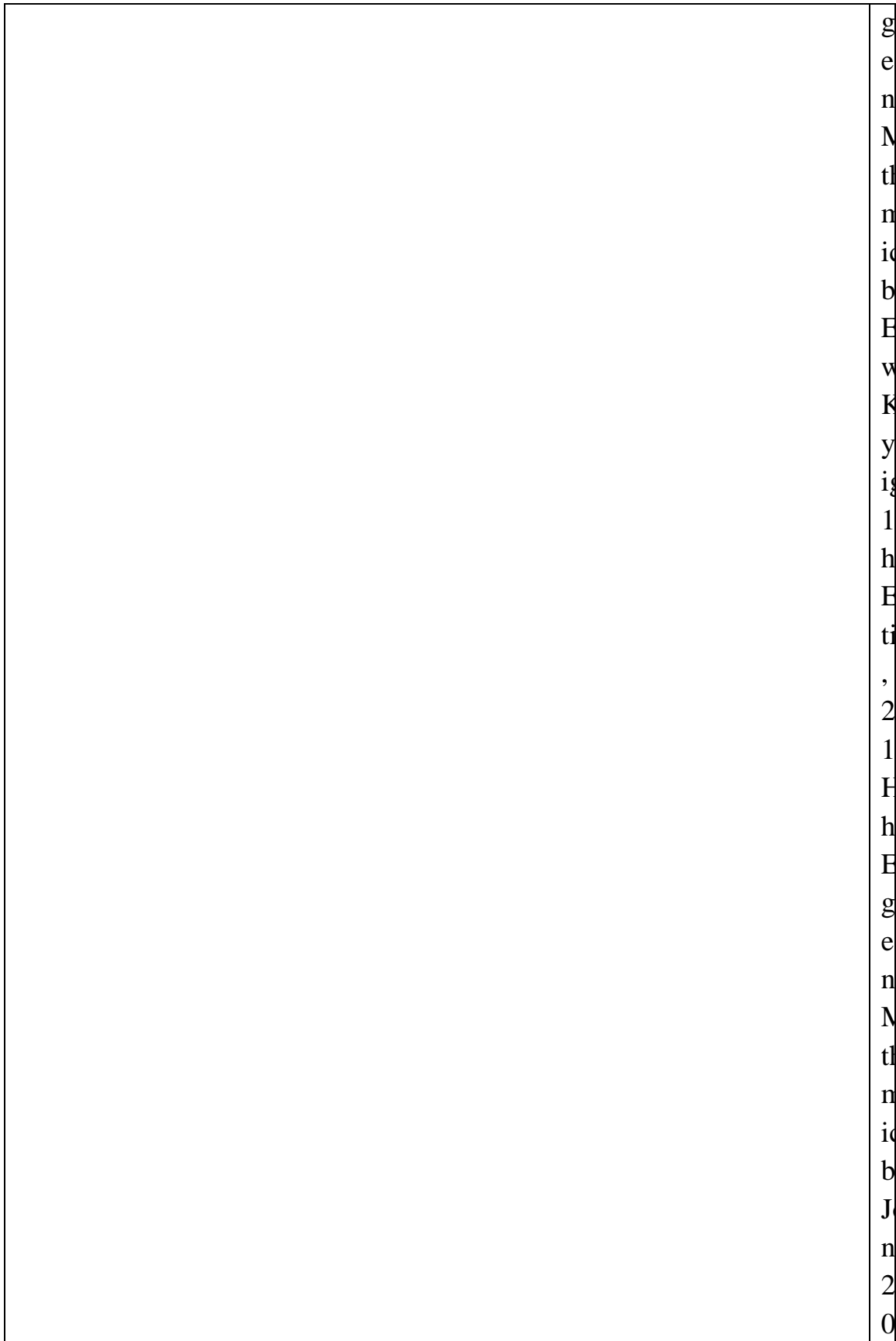
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| | | | vector multiplication | | t t e s t |
| 2 | 3 | Determining the equations of lines and planes | Equations of lines and planes in space | a lecture | A s s i g n m e n t |
| 3 | 3 | Understanding multivariable functions | Functions with two variables and partial derivatives | a lecture | A s s i g n m e n t |
| 4 | 3 | Calculating partial derivatives | Partial derivatives with constant variables | a lecture | a t e s t |
| 5 | 3 | Gradient calculation and directional differentiation | slope and directional derivation | a lecture | A s s i g n |

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| | | | | | n e n t |
| 6 | 3 | Finding tangent levels | tangent plane and vertical line | a lecture | A s s i g n m e n t |
| 7 | 3 | Applications of partial derivatives | Maximum and minimum values and saddle points | a lecture | a t e s t |
| 8 | 3 | Understanding Multiple Integrations | Binary integration | a lecture | A s s i g n m e n t |
| 9 | 3 | Applying polar coordinates | Bilateral integration in polar coordinates | a lecture | A s s i g n m e n t |

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| | | | | | e n t |
| 10 | 3 | Coordinate conversion | Cartesian integrals to polarity | a lecture | a t e s t |
| 11 | 3 | Tripartite integration | Triple integration in different coordinates | a lecture | A s s i g n m e n t |
| 12 | 3 | Understanding complex numbers | Addition and subtraction of complex numbers | a lecture | a t e s t |
| 13 | 3 | Performing operations on complex numbers | Multiplication and division | a lecture | A s s i g n m e n t |
| 14 | 3 | Representing complex numbers | Polar representation of complex numbers | a lecture | A s s |

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| | | | | | i g n n e n t |
| 15 | 3 | Finding the roots of complex numbers | Roots | a lecture | a t e s t |
| 16 | 3 | Evaluating learning outcomes | Final exam | a test | e x a m |
| 11-Course Evaluation | | | | | |
| Quizzes, assignments, projects, classwork, midterm exam, final exam | | | | | |
| 12- Learning and teaching resources | | | | | |
| Required textbooks (methodology, if applicable) | | | | | C c u b C o e B I o a J 2 O |
| Main references (sources) | | | | | E g e |

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| | n M th n ic b K A S o & D x J E o 5 e ic L u ia P s L , N w Y k 2 1 |
| Recommended supporting books and references (scientific journals, reports...) | A v c E |



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Course Description Form

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|--------------------------------|---|
| Course Name | Engineering Mechanics |
| Course code | ENG-102 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures, exercises, seminars |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Applying the resultant force | The outcome of the power system | a lecture | Assignment |
| 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 | Assignment |
| 6 | 3 | Equilibrium analysis | Equilibrium in two dimensions and equilibrium equations | a lecture | Assignment |
| 7 | 3 | Measuring the level of achievement | Midterm exam | a test | exam |
| 8 | 3 | spatial equilibrium analysis | Balance in three dimensions | a lecture | Assignment |
| 9 | 3 | Analysis of facilities | Trusses and frames | a lecture | discussion |
| 10 | 3 | Facilities applications | Truss and frame analysis | a lecture | a test |

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| 11 | 3 | Understanding the center of mass | Center of mass and center of gravity | a lecture | Assignment |
| 12 | 3 | Calculating engineering centers | Centers for lines, spaces, and volumes | a lecture | Assignment |
| 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 | Assignment |
| 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 Form

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|--------------------------------|--|
| Course Name | Basics of Electricity |
| Course code | SE-ENG-103 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures, exercises, and practical laboratories |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | Ass. Lect. Ahmed Hadhfi Mohsen Ass. Lect. 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 |
|------|-------|----------------------------|--------------------|-----------------|-------------------|
|------|-------|----------------------------|--------------------|-----------------|-------------------|

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|----------------------|---|---|---|-----------|------------|
| 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 | Assignment |
| 3 | 3 | Understanding electrical networks | Bridge networks and star-delta diversions | a lecture | Assignment |
| 4 | 3 | Analysis of electrical circuits | (Mesh) method | a lecture | a test |
| 5 | 3 | electrical contract analysis | Nodal Contract Method | a lecture | Assignment |
| 6 | 3 | Application of circuit theories | Superposition theory in DC circuits | a lecture | Assignment |
| 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 | Assignment |
| 9 | 3 | Understanding alternating current circuits | Basic elements of alternating current circuits and sine waves | a lecture | Assignment |
| 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 | Assignment |
| 12 | 3 | Circuit analysis | Loop currents method in AC circuits | a lecture | Assignment |
| 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 | Assignment |
| 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 | | | | | |

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| 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 Form

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|--------------------------------|---|
| Course Name | Environmental Pollution |
| Course code | SE-ENG-104 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures, exercises, seminars, and practical laboratories |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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

| Wee k | Hours | Required learning outcomes | Unit or topic name | Learning method | Evaluation Method |
|------------------|--------------|---|-------------------------------|----------------------------|------------------------------|
|------------------|--------------|---|-------------------------------|----------------------------|------------------------------|

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|----|---|---|---|-----------|------------|
| 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 | Assignment |
| 3 | 3 | Water pollution analysis | Physical and chemical properties of water | a lecture | Assignment |
| 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 | Assignment |
| 6 | 3 | Air pollution treatment | Primary and secondary pollutants and ways to reduce them | a lecture | Assignment |
| 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 | Assignment |
| 9 | 3 | Soil pollution analysis | Soil components and sources of pollution | a lecture | Assignment |
| 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 | Assignment |

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| 12 | 3 | Reducing thermal pollution | Ways to reduce thermal pollution | a lecture | Assignment |
| 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

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| Required textbooks (methodology, if applicable) | Introduction to Environmental Engineering – David A. Cornwell & Mackenzie L. Davis, 5th Edition, McGraw-Hill, 2012 |
| Main references (sources) | Environmental Engineering: Principles and Practice – Richard O. Mines, Wiley, 2014 |
| Recommended supporting books and references (scientific journals, reports...) | — |
| references , websites | N/A |

Course Description Form

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|--------------------------------|---|
| Course Name | Engineering Drawing |
| Course code | ENG-101 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Practical Lab – Engineering Drawing Applications – E-Learning |
| Total study hours / Total ECTS | - Number of European ECTS (ECTS): 3 |

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|---------------------------|---|
| | <ul style="list-style-type: none"> - Total course load: 75 hours/semester - Weekly working hours: 3 hours |
| Course Administrator Name | Ass. Lect. 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 9 | 3 | Applying orthogonal projection | Orthographic Projections | practical application | a test |
| 10 | 3 | Developing orthogonal projection skills | Orthographic Projections | Practical training | Assignment |
| 11 | 3 | Understanding sections in engineering drawing | Sections and Sectional Views | Practical explanation | a test |
| 12 | 3 | Application of sections in | Sections and Sectional Views | practical application | Assignment |

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| | | engineering drawings | | | |
| 13 | 3 | Understanding isometric projection | Isometric Projections | Practical training | a test |
| 14 | 3 | Isometric projection application | Isometric Projections | practical application | Assignment |
| 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 Form

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| Course Name | Chemistry |
| Course code | SE-ENG-105 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures – Practical labs – Applied lessons – E-learning |
| - Total study hours / Total ECTS | - Number of European ECTS (ECTS): 2 - Total course load: 50 hours/semester - Theoretical weekly hours: 2 hours |
| Course Administrator Name | Ass. Prof. Dr. Saad Nahi Saleh Ass. Lect. 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 5 | Analysis of oxidation-reduction reactions | Redox Reactions | Lecture + Exercises | a test |

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| 11 | 5 | Understanding the energy of chemical reactions | Reaction Energetics and Equilibrium | a lecture | Assignment |
| 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 | Assignment |
| 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, and 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 – educational platforms – online scientific resources | | |

Course Description Form

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|--------------------------------|---|
| Course Name | Arabic Language I |
| Course code | UOT001 |
| Term/Year | Annual – First Stage / First Semester |
| Description Preparation Date | 2025-2026 |
| Available Attendance Forms | Theoretical lectures – Class discussions – Seminars – Self-learning |
| Total study hours / Total ECTS | <ul style="list-style-type: none"> - Number of European ECTS (ECTS): 5 - Total course load: 125 hours/semester - Weekly hours: approximately 5 hours |
| Course Administrator Name | Ass. Lect. and Sanaa Younis Abdullah Ass. Lect. 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 | Assignment |
| 3 | 2 | Getting acquainted with pre-Islamic poetry | The Mu'allaha 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 2 | Mastering correct writing | punctuation marks | Lecture + Training | a test |
| 11 | 2 | Applying spelling rules | Rules for writing the hamza | Lecture + Exercises | Assignment |
| 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 | Assignment |
| 14 | 2 | Understanding grammatical rules | The abrogating agents | Lecture + Application | a test |

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| 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 : Grammar and Syntax | | |
| references , websites | | | Electronic Arabic language learning resources | | |

Course Description Form

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|--------------------------------|---|
| Course Name | Fluid Mechanics |
| Course code | SE-ENG-201 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 9/9/2025 |
| Available Attendance Forms | Theoretical lectures – laboratory – self-learning – classroom discussions |
| Total study hours / Total ECTS | Total course load: 125 hours |
| Course Administrator Name | Lect. 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 2 | Understanding Buoyancy | Buoyancy force | a lecture | a test |
| 11 | 2 | Stability analysis | Stability of floating and submerged objects | a lecture | Assignment |
| 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 | Assignment |
| 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 Form

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|--------------------------------|---|
| Course Name | Thermodynamics (1) |
| Course code | SE-ENG-202 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 01/09/2025 |
| Available Attendance Forms | Theoretical lectures – practical lessons – laboratory – classroom discussions |
| Total study hours / Total ECTS | Number of European Credit ECTS (ECTS): 5 Total course load: 125 hours/semester |
| Course Administrator Name | Lect.Dr. 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 | Assignment |
| 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 | Assignment |

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|--|---|--|---|-------------|------------------|
| 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 | Assignment |
| 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 | Assignment |
| 11 | 2 | Understanding Steam | Two-phase steam systems | a lecture | a test |
| 12 | 2 | Using steam tables | Enthalpy and vapor tables | a lecture | Assignment |
| 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 | Assignment |
| 15 | 2 | General review | Comprehensive course review | a lecture | review |
| 16 | — | Final assessment | Final exam | a test | Final assessment |
| 11-Course Evaluation | | | | | |
| <p>Quizzes 10 %, Assignments 10 % , Lab 15 % , Seminar 5 %, Midterm Exam 10 %, Final Exam 50 % , Total 100 %</p> | | | | | |
| 12- Learning and teaching resources | | | | | |
| Required textbooks (methodology, if applicable) | | | Cengel – Thermodynamics: An Engineering Approach | | |
| Main references (sources) | | | Michael J. Moran – Fundamentals of Engineering Thermodynamics | | |

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|---|---------|
| Recommended supporting books and references (scientific journals, reports...) | nothing |
| references , websites | nothing |

Course Description Form

| | |
|--------------------------------|---|
| Course Name | Heat Transfer I |
| Course code | SE-ENG-203 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 2026 |
| Available Attendance Forms | My attendance (theoretical lectures + practical lessons + laboratory) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Thermal conductivity analysis in a flat wall without heat generation | One-dimensional connection (flat wall) | Lecture + Exercises | Assignment |
| 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 | Assignment |
| 6 | 3 | Conductivity analysis with heat generation in different bodies | Convection with heat generation (cylindrical and spherical) | a lecture | Assignment |
| 7 | 3 | Evaluating acquired knowledge | Midterm exam | a test | exam |
| 8 | 3 | Understanding and analyzing thermal fins | Extended surfaces (Fins) | a lecture | Assignment |
| 9 | 3 | Calculating fin efficiency | Fin efficiency | a lecture | Short test |
| 10 | 3 | Calculating fin effectiveness | Fin effectiveness | a lecture | Assignment |
| 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 | Assignment |

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|----|---|---|--|---------------------|------------|
| 13 | 3 | Application of numerical analysis | Two-dimensional connectivity (numerical methods) | Lecture + Exercises | Assignment |
| 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 | Assignment |
| 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. <i>Second edi</i> . |
| Main references (sources) | Holman, J. P. (2010). Heat transfer. Bergman, T. L., Lavine, A. S., Incropera , F. P., & DeWitt, D. P. (2011). <i>Introduction to heat transfer</i> . John Wiley & Sons. |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

| | |
|--------------------------------|---|
| Course Name | Engineering Analysis I |
| Course code | MATH-201 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | In-person (theoretical lectures + practical lessons + e-learning) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 11 | 4 | Implementing the systems | Simultaneous differential equations | a lecture | Online assignment |
| 12 | 4 | Understanding special functions | gamma function | a lecture | Assignment |
| 13 | 4 | Applying special functions | gamma function | Lecture + Presentation | Seminar |
| 14 | 4 | Beta function analysis | Beta function | a lecture | Assignment |
| 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 Wiley & 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&idq=45961 |

Course Description Form

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|--------------------------------|---|
| Course Name | Engineering Materials |
| Course code | SE-ENG-204 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | In-person (theoretical lectures + practical lessons + e-learning) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Understanding the structure of polymers | Polymer structures | a lecture | a test |
| 4 | 3 | Crystal defect analysis | Defects in solid materials | a lecture | Assignment |
| 5 | 3 | Getting to know ceramics | Introduction to Ceramics | a lecture | a test |
| 6 | 3 | Understanding mechanical properties | Mechanical properties of metals | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Applying strengthening mechanisms | Strengthening mechanisms | a lecture | a test |
| 11 | 3 | Understanding Material Failure | Material failure | a lecture | Assignment |
| 12 | 3 | Phase diagram analysis | Phase diagrams | a lecture | a test |
| 13 | 3 | Understanding diffusion | Spread | a lecture | Assignment |
| 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% | | | | | |

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

Course Description Form

| | |
|--------------------------------|---|
| Course Name | Computer Programming |
| Course code | ENG-105 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | In-person (theoretical lectures + practical lessons + e-learning) |
| Total study hours / Total ECTS | 75 hours / 3 ECTS |
| Course Administrator Name | Lect.Dr. Jalal Nizar Abdel Baqi Ass. Lect. 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 |

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|--|---|--------------------------------|--|---------------|------------|
| 2 | 2 | Applying conditional sentences | If and else conditional clauses | Lecture + Lab | Assignment |
| 3 | 2 | Using rings | While episode | Lecture + Lab | a test |
| 4 | 2 | Using rings | ring for | Lecture + Lab | Assignment |
| 5 | 2 | Function design | Defining functions and passing operators | Lecture + Lab | a test |
| 6 | 2 | Using libraries | Ready-made libraries and functions | a lecture | Assignment |
| 7 | 2 | Knowledge assessment | Midterm exam | a test | exam |
| 8 | 2 | Dealing with lists | Lists (Creation and Indexing) | Lecture + Lab | Assignment |
| 9 | 2 | Dealing with classes | Tuples | Lecture + Lab | a test |
| 10 | 2 | Dealing with dictionaries | Dictionaries | Lecture + Lab | Assignment |
| 11 | 2 | Dealing with groups | Sets | Lecture + Lab | a test |
| 12 | 2 | Text processing | Strings and stereotypical expressions | Lecture + Lab | Assignment |
| 13 | 2 | Handling files | Files | Lecture + Lab | a test |
| 14 | 2 | Error handling | Exceptions | a lecture | Assignment |
| 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) | <i>Intro to Python[®] for Computer Science and Data Science: Learning to Program with AI, Big Data and the Cloud</i> 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 Form

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|--------------------------------|--|
| Course Name | Arabic language (2) |
| Course code | UOT0011 |
| Term/Year | Level Two / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures) |
| Total study hours / Total ECTS | 50 hours / 2 ECTS |
| Course Administrator Name | Ass.Lect.Wasan Younis Abdullah Ass.Lect.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 | Assignment |
| 3 | 2 | Analysis of poetic texts | Al-Sharif Al-Radi / Al-Mutanabbi | a lecture | Short test |

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|--|---|---------------------------------------|--|-----------|------------|
| 4 | 2 | Literary appreciation | Al-Jawahiri and Al-Sayyab | a lecture | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | | |

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| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

| | |
|--------------------------------|--|
| Course Name | Thermodynamics II |
| Course code | SE-ENG-205 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + laboratory + practical exercises) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | Lect. 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 | Assignment |

| | | | | | |
|--|---|-----------------------------------|---|---------------|------------|
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 3 | Course comparison | Brighton Tournament and Double Tournament | a lecture | a test |
| 11 | 3 | Solving applied problems | Exercises and problems | Tutorial | Assignment |
| 12 | 3 | Understanding gas mixtures | Mass and molar fraction | a lecture | a test |
| 13 | 3 | Properties of gases | and Amaghat's laws | a lecture | Assignment |
| 14 | 3 | chemical reactions | Combustion and its products | Lecture + Lab | a test |
| 15 | 3 | Advanced Analysis | Entropy in interacting systems | a lecture | Assignment |
| 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 | | | | | |

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|---|--|
| 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 Form

| | |
|--------------------------------|--|
| Course Name | Strength of Materials |
| Course code | SE-ENG-206 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | attendance (theoretical lectures + laboratory) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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 | Assignment |

| | | | | | |
|--|---|--------------------------------------|--|-----------|------------|
| 3 | 3 | Understanding emotion | Hooke's Law and Axial Deformation | a lecture | a test |
| 4 | 3 | Deformity analysis | sternal deformity | a lecture | Assignment |
| 5 | 3 | Analysis of dual emotion | Poisson ratio | a lecture | a test |
| 6 | 3 | Analysis of non- specific systems | statically indeterminate elements | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Moment analysis | Shear forces and bending moments | a lecture | a test |
| 11 | 3 | Drawing diagrams | Shear and moment diagrams | a lecture | Assignment |
| 12 | 3 | Stress analysis | bending stresses | a lecture | a test |
| 13 | 3 | Advanced Analysis | Bending stresses (continuity) | a lecture | Assignment |
| 14 | 3 | Bridge study | Asymmetrical bridges | a lecture | a test |
| 15 | 3 | shear analysis | Shear stresses in beams | a lecture | Assignment |
| 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 Form

| | |
|--------------------------------|--|
| Course Name | Economic Energy Management and Ethics |
| Course code | SE-ENG-207 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + seminar) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | Prof. Dr. Manar Salih 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 | Assignment |

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|---|---|--|--|-----------|------------|
| 3 | 2 | Understanding policies | Energy policies and strategies | a lecture | a test |
| 4 | 2 | Analysis of economic growth | Energy and economic growth | a lecture | Assignment |
| 5 | 2 | Crisis analysis | Energy crises and their causes | a lecture | a test |
| 6 | 2 | Energy forecasting | Energy demand analysis | a lecture | Assignment |
| 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 | Assignment |
| 10 | 2 | Economic Analysis | Energy investment analysis | a lecture | a test |
| 11 | 2 | Advanced Analysis | Energy Investment Analysis (Continued) | a lecture | Assignment |
| 12 | 2 | Understanding ethics | Ethics and general principles | a lecture | a test |
| 13 | 2 | Applying ethics | Engineering Ethics | a lecture | Assignment |
| 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 | Assignment |
| 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 | | |

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|---|---|
| | Future of Energy by Betty Simkins and Russell Simkins . |
| Main references (sources) | |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|---|
| Course Name | Heat Transfer II |
| Course code | SE-ENG-208 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratory) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | Prof. Dr. Tadhamon Ahmed Yassin Ass. Prof. 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 | Assignment |

| | | | | | |
|--|---|--|--|-----------|------------|
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 3 | normal pregnancy test | Normal pregnancy (continued) | a lecture | a test |
| 11 | 3 | Understanding heat exchangers | logarithmic temperature difference | a lecture | Assignment |
| 12 | 3 | Performance analysis | NTU Effectiveness Method | a lecture | a test |
| 13 | 3 | Exchanger design | Heat exchanger design | a lecture | Assignment |
| 14 | 3 | Understanding radiation | Shape factor and thermal radiation | a lecture | a test |
| 15 | 3 | radiation analysis | Radiative exchange between surfaces | a lecture | Assignment |
| 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. <i>Second edition</i> . | | |

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| Main references (sources) | Holman, J. P. (2010). Heat transfer. Bergman, T. L., Lavine, AS, Incropera , F. P., & DeWitt, D. P. (2011). <i>Introduction to heat transfer</i> . John Wiley & Sons. |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|---|
| Course Name | Engineering Analysis II |
| Course code | MATH-202 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + exercises) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Assignment |

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|--|---|-----------------------------------|--|-----------|------------|
| 3 | 3 | Understanding Displacement | Displacement theories | a lecture | a test |
| 4 | 3 | Operations application | Laplace's Differential and Integral Calculus | a lecture | Assignment |
| 5 | 3 | Solving equations | Solving differential equations | a lecture | a test |
| 6 | 3 | Advanced application | Solving differential equations (continued) | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Fourier transformation | Fourier Transform Properties | a lecture | a test |
| 11 | 3 | Solving equations | Fourier Transform app | a lecture | Assignment |
| 12 | 3 | Advanced Analysis | Solving equations (continued) | a lecture | a test |
| 13 | 3 | Understanding the characteristics | Perpendicularity of sine and cosine | a lecture | Assignment |
| 14 | 3 | partial equations | Heat equation | a lecture | a test |
| 15 | 3 | PDE applications | Wave equation | a lecture | Assignment |
| 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 | | |

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| Main references (sources) | Advanced Engineering Mathematics, Kreyszig, 10th Edition, John Wiley & Son 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&idq=4215961 |

Course Description Form

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|--------------------------------|--|
| Course Name | English Language II |
| Course code | UOT-021 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + seminars + assignments) |
| Total study hours / Total ECTS | 50 hours / 2 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 2 | Writing a CV | CV design and cover letter | a lecture | evaluation |

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|--|---|-----------------------------------|--|-----------|------------|
| 4 | 2 | Interview skills | Preparing for interviews | a lecture | Assignment |
| 5 | 2 | Academic writing | Letter of Intent (SOP) | a lecture | a test |
| 6 | 2 | Understanding the recommendations | Letter of recommendation | a lecture | Assignment |
| 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 | Assignment |
| 10 | 2 | Writing | Paragraph writing basics | a lecture | a test |
| 11 | 2 | Developing writing | Writing the paragraph (continued) | a lecture | Assignment |
| 12 | 2 | Paragraph elements | Topic & Supporting Sentences | a lecture | evaluation |
| 13 | 2 | Text coherence | Unity & Coherence | a lecture | Assignment |
| 14 | 2 | Article writing | Essay Writing | a lecture | a test |
| 15 | 2 | Article development | Essay Writing (continued) | a lecture | Assignment |
| 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. | | |

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| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | http://umich.edu/~elements/5e/lectures/index.html |

Course Description Form

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|--------------------------------|------------------------------------|
| Course Name | Crimes of the defunct Ba'ath Party |
| Course code | UOT-109 |
| Term/Year | Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures) |
| Total study hours / Total ECTS | 50 hours / 2 ECTS |
| Course Administrator Name | Ass.Lect. 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 | Assignment |
| 3 | 2 | Impact analysis | The impact of the regime's behavior on society | a lecture | a test |

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|--|---|-----------------------------------|---|-----------|------------|
| 4 | 2 | Understanding the transformations | Transitional phase | a lecture | Assignment |
| 5 | 2 | Psychoanalysis | psychological impact | a lecture | a test |
| 6 | 2 | Social analysis | social impact | a lecture | Assignment |
| 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 | Assignment |
| 10 | 2 | Environmental impact | Prohibited weapons and pollution | a lecture | a test |
| 11 | 2 | Regime policies | scorched earth policy | a lecture | Assignment |
| 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 | Assignment |
| 14 | 2 | Realistic applications | Examples from Iraqi society | a lecture | a test |
| 15 | 2 | General review | Comprehensive review | a lecture | Assignment |
| 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 Education and Scientific Research | | |
| Main references (sources) | | | | | |
| Recommended supporting books and references (scientific journals, reports...) | | | | | |
| references , websites | | | | | |

Course Description Form

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|--------------------------------|---|
| Course Name | Thermal Solar Energy Systems |
| Course code | SE-ENG-301 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + exercises + lab + seminar) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | Prof. Dr. Manar Salih Mahdi |

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 | Assignment |

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|--|---|---------------------------|---|-----------|------------|
| 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 | Assignment |
| 5 | 3 | Understanding the focus | Parabolic Dish Complexes | a lecture | a test |
| 6 | 3 | Advanced Analysis | trough complexes | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Modern technologies | Frenell complexes | a lecture | a test |
| 11 | 3 | Centralized systems | Sun signs | a lecture | Assignment |
| 12 | 3 | Home applications | solar cooker | a lecture | a test |
| 13 | 3 | Agricultural applications | solar dryers | a lecture | Assignment |
| 14 | 3 | Water treatment | solar distillers | a lecture | a test |
| 15 | 3 | energy storage | Solar thermal energy storage | a lecture | Assignment |
| 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 | | |

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| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|---|
| Course Name | Numerical Methods |
| Course code | MATH-301 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Systems Solution | Gauss deletion method | a lecture | a test |

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|--|---|---------------------------|--|-----------|------------|
| 4 | 3 | numerical methods | Gauss-Seidel method | a lecture | Assignment |
| 5 | 3 | Finding the roots | Newton-Raphson and Secant | a lecture | a test |
| 6 | 3 | approximation | Curve Fitting and Interpolation | a lecture | Assignment |
| 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 | Assignment |
| 11 | 3 | numerical differentiation | Richardson Extrapolation | a lecture | a test |
| 12 | 3 | Differential equations | Euler method | a lecture | Assignment |
| 13 | 3 | Advanced methods | Runge- Kutta | a lecture | a test |
| 14 | 3 | PDE | Specific differences method | a lecture | Assignment |
| 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 Form

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|--------------------------------|---|
| Course Name | Photovoltaic Energy Systems |
| Course code | SE-ENG-302 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures, exercises, discussion sessions, laboratory) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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 | Assignment |
| 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 | Assignment |
| 5 | 3 | Identifying system components | System components (Inverter , batteries ...) | Lecture + Discussion | a test |
| 6 | 3 | Systems design | Design and calculation of loads | Lecture + Application | Assignment |
| 7 | 3 | Knowledge assessment | Midterm exam | a test | exam |
| 8 | 3 | Understanding the structure | Electrical installation and connection | a lecture | Assignment |
| 9 | 3 | Completing the applied understanding | Systems integration | a lecture | a test |
| 10 | 3 | Maintenance skills | Maintenance and troubleshooting | Lecture + Application | Assignment |
| 11 | 3 | Economic Analysis | Economics and network connectivity | a lecture | a test |
| 12 | 3 | Recent developments | Advanced technologies | a lecture | Assignment |
| 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 Form

| | |
|--------------------------------|---|
| Course Name | Power Plants |
| Course code | SE-ENG-303 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures, discussions, exercises, seminars) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Assignment |

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|--|---|---------------------------------|--|-----------|------------|
| 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 | Assignment |
| 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 | Assignment |
| 7 | 3 | Knowledge assessment | Midterm exam | a test | exam |
| 8 | 3 | Understanding modern systems | Combined cycle stations | a lecture | Assignment |
| 9 | 3 | thermal analysis | Combined Cycle Analysis | a lecture | a test |
| 10 | 3 | Understanding hydropower | Hydroelectric power stations | a lecture | Assignment |
| 11 | 3 | Understanding Nuclear Energy | nuclear reactors | a lecture | a test |
| 12 | 3 | Understanding solar energy | solar thermal energy | a lecture | Assignment |
| 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 | Assignment |
| 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 <i>edition</i> . | | |

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| 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 Form

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|--------------------------------|--|
| Course Name | Applied Electronics |
| Course code | SE-ENG-304 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | Lect. 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 | Assignment |
| 3 | 4 | Characteristics analysis | MOSFETs and their types | a lecture | a test |
| 4 | 4 | Circuit analysis | Continuous analysis (DC) | a lecture | Assignment |
| 5 | 4 | Using amplifiers | FET as an amplifier | a lecture | a test |
| 6 | 4 | graphical analysis | Load Line | a lecture | Assignment |
| 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 | Assignment |
| 10 | 4 | FET applications | As a switch and power source | a lecture | a test |
| 11 | 4 | Amplifier analysis | Multistage amplifiers | a lecture | Assignment |
| 12 | 4 | Types of amplifiers | BJT and RC Coupled | a lecture | a test |
| 13 | 4 | Performance improvement | Multi- FET amplifiers | a lecture | Assignment |
| 14 | 4 | elements of capability | SCR | a lecture | a test |
| 15 | 4 | Additional elements | DIAC, TRIAC, GTO | a lecture | Assignment |
| 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/electros |

Course Description Form

| | |
|--------------------------------|--|
| Course Name | Electrical Machines |
| Course code | SE-ENG-305 |
| Term/Year | Level 3 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | Lect. 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 | Assignment |

| | | | | | |
|----|---|---------------------------|---------------------------------------|-----------|------------|
| 3 | 3 | Analyzing relationships | Equations of driving force and torque | a lecture | a test |
| 4 | 3 | Understanding connections | Types of rotor coils | a lecture | Assignment |
| 5 | 3 | Impact analysis | Rotating organ reaction | a lecture | a test |
| 6 | 3 | Magnetic calculations | Demagnetizing forces | a lecture | Assignment |
| 7 | 3 | Knowledge assessment | Midterm exam | a test | exam |
| 8 | 3 | Machine classification | Types of DC generators | a lecture | Assignment |
| 9 | 3 | Performance analysis | Generator characteristics | a lecture | a test |
| 10 | 3 | Operating conditions | Building voltage in generators | a lecture | Assignment |
| 11 | 3 | Mathematical analysis | Equations of different generators | a lecture | a test |
| 12 | 3 | parallel operation | Operating generators in parallel | a lecture | Assignment |
| 13 | 3 | Efficiency | Losses and efficiency | a lecture | a test |
| 14 | 3 | Effort organization | Effort organization | a lecture | Assignment |
| 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

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|---|---|
| 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 |

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| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | http://umich.edu/~elements/5e/lectures/index.h 1 |

Course Description Form

| | |
|--------------------------------|--|
| Course Name | Turbomachinery |
| Course code | SE-ENG-306 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Enforcement of laws | Dimensional analysis and laws of similarity | a lecture | a test |
| 4 | 3 | Performance analysis | Impulse turbines (Pelton) | a lecture | Assignment |
| 5 | 3 | Efficiency Calculation | Impulse turbine performance | a lecture | a test |
| 6 | 3 | Understanding Operation | reactive turbines | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Efficiency analysis | Efficiency and cavitation in pumps | a lecture | a test |
| 11 | 3 | operational applications | Multistage pumps | a lecture | Assignment |
| 12 | 3 | Performance analysis | Pump characteristic curves | a lecture | a test |
| 13 | 3 | Understanding compressors | axial compressors | a lecture | Assignment |
| 14 | 3 | Systems analysis | Centrifugal compressors | a lecture | a test |
| 15 | 3 | Energy applications | gas turbines | a lecture | Assignment |
| 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 |

Course Description Form

| | |
|--------------------------------|--|
| Course Name | Principles of Combustion and Emissions |
| Course code | SE-ENG-307 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | Combustion analysis | Stokometry in combustion | a lecture | a test |
| 4 | 3 | gas analysis | Analysis of combustion gases | a lecture | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 3 | Understanding emissions | Pollution and emissions | a lecture | a test |
| 11 | 3 | Pollution analysis | Air pollution from combustion | a lecture | Assignment |
| 12 | 3 | Environmental laws | Pollution legislation | a lecture | a test |
| 13 | 3 | Composition of pollutants | mechanisms of pollutant formation | a lecture | Assignment |
| 14 | 3 | Reducing emissions | Emission reduction technologies | a lecture | a test |
| 15 | 3 | Sustainability | Global warming and ways to reduce it | a lecture | Assignment |
| 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 | | | | | |

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|---|--|
| 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 Form

| | |
|--------------------------------|--|
| Course Name | Energy Storage Systems |
| Course code | SE-ENG-308 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 3 | thermal analysis | Thermal storage (sensible heat) 1 | a lecture | a test |
| 4 | 3 | thermal analysis | Thermal storage (sensible heat) 2 | a lecture | Assignment |
| 5 | 3 | thermal analysis | Thermal storage (latent heat) 1 | a lecture | a test |
| 6 | 3 | thermal analysis | Thermal storage (latent heat) 2 | a lecture | Assignment |
| 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 | Assignment |
| 10 | 3 | Practical applications | Storage with flywheels | a lecture | a test |
| 11 | 3 | Chemical understanding | Chemical energy storage (hydrogen) | a lecture | Assignment |
| 12 | 3 | Chemical applications | Industrial natural gas | a lecture | a test |
| 13 | 3 | Electrochemical analysis | Batteries and supercapacitors | a lecture | Assignment |
| 14 | 3 | Advanced systems | Fuel cells and hydrogen systems | a lecture | a test |
| 15 | 3 | Modern technologies | Superconducting magnetic storage | a lecture | Assignment |
| 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 Form

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|--------------------------------|--|
| Course Name | Computer Engineering Design |
| Course code | SE-ENG-309 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | Ass.Lect. 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 | Assignment |
| 3 | 3 | drawing skills | 2D drawing | practical | a test |
| 4 | 3 | Dimension application | Drawing tools and dimensions | practical | Assignment |
| 5 | 3 | Parts modeling | Extrude and Revolve operations | practical | a test |
| 6 | 3 | Improving models | Fillet , Chamfer and shape characteristics | practical | Assignment |
| 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 | Assignment |
| 10 | 3 | Assembly | Assembly basics | practical | a test |
| 11 | 3 | cluster analysis | Relationships (Mates) and Advanced Grouping | practical | Assignment |
| 12 | 3 | Engineering drawing | Creating drawings from models | practical | a test |
| 13 | 3 | Preparing the plans | Dimensions, comments, and tables | practical | Assignment |
| 14 | 3 | Surface modeling | Surface modeling and sheet metal | practical | a test |
| 15 | 3 | Advanced applications | Additional Modules (Weldment, Routing) | practical | Assignment |
| 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 3D Solid Modeling 1st Edition | | |

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| 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 Form

| | |
|--------------------------------|--|
| Course Name | Geothermal Energy |
| Course code | SE-ENG-310 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (theoretical lectures + practical lessons + laboratories) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | 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 | Assignment |
| 3 | 4 | Flow analysis | Fluid flow and geochemistry | Lecture + Exercise | a test |
| 4 | 4 | Tank analysis | Underground reservoir engineering | a lecture | Assignment |
| 5 | 4 | Generation applications | Flash steam power plants | a lecture | a test |
| 6 | 4 | Deepening understanding | Flash steam power plants (advanced) | a lecture | Assignment |
| 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 | Assignment |
| 10 | 4 | Types of stations | Dry steam stations | a lecture | a test |
| 11 | 4 | Modern applications | Dual cycle stations | a lecture | Assignment |
| 12 | 4 | practical application | Installation procedures (1) | Lecture + Practical | a test |
| 13 | 4 | practical application | Installation procedures (2) | Lecture + Practical | Assignment |
| 14 | 4 | Economic Analysis | Cost analysis | a lecture | a test |
| 15 | 4 | Sustainability | Environmental benefits and challenges | Lecture + Discussion | Assignment |
| 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 | | | | | |

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|---|--|
| 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 Form

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|--------------------------------|----------------------------------|
| Course Name | Engineering Statistics |
| Course code | Math-302 |
| Term/Year | Level 3 / Second Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Assignment |

| | | | | | |
|--|---|-----------------------------|---|-----------|------------|
| 3 | 3 | Data analysis | Measures of central tendency | a lecture | a test |
| 4 | 3 | Comparing the measures | Comparison of central metrics | a lecture | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 11 | 3 | Distributions | Probability distributions | a lecture | a test |
| 12 | 3 | Distribution application | Applications on distributions | a lecture | Assignment |
| 13 | 3 | Preview | Inspection and assessment | a lecture | a test |
| 14 | 3 | Tests | Hypothesis testing | a lecture | Assignment |
| 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. | | |

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|---|---|
| Main references (sources) | <ul style="list-style-type: none"> - 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. <p>Introduction to Statistics, Dr. Ali Muhammad Al-Jumah, 2007</p> |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

| | |
|--------------------------------|---|
| Course Name | Engineering Optimization |
| Course code | SE-ENG-401 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises, discussions) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 | Introduction to Optimism | a lecture | a test |

| | | | | | |
|----|---|---|--------------------------------------|--------------------|------------|
| | | engineering applications is explained. | | | |
| 2 | 3 | It formulates geometric problems as mathematical optimization models. | Mathematical formulation of problems | Lecture + Exercise | Assignment |
| 3 | 3 | It distinguishes between types of optimization problems (linear, non-linear , true) | optimization problems | a lecture | a test |
| 4 | 3 | He applies problem-solving skills to practical examples. | Applications of drafting | an exercise | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 10 | 3 | The simplex method and | Simplex method | a lecture | a test |

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|---|---|--|--|----------------------|------------|
| | | applies it to practical problems. | | | |
| 11 | 3 | The first stage of the simplex is applied to solve problems. | Simplex (Phase 1) | an exercise | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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. | | |

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| 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 Form

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|--------------------------------|---|
| Course Name | Principle of Fuel Cell Technology |
| Course code | SE-ENG-402 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises, discussions) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Electrochemistry | a lecture | Assignment |

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|----|---|---|-------------------------------------|----------------------|------------|
| | | principles of fuel cell operation. | | | |
| 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 | Assignment |
| 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 | Assignment |
| 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 and storage and analyzes their efficiency. | Hydrogen production and storage | a lecture | a test |
| 10 | 4 | It analyzes fuel cell performance using engineering standards. | Fuel cell performance | Lecture + Exercise | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 15 | 4 | It assesses future challenges and modern trends in the field. | Challenges and future trends | Lecture + Discussion | a test |

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| 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 Form

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|--------------------------------|--|
| Course Name | Design of Sustainable Energy Systems |
| Course code | SE-ENG-403 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises) |
| Total study hours / Total ECTS | 125 hours / 5 ECTS |
| Course Administrator Name | Prof. Dr. Manar Salih 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 | Introduction to Sustainable Energy | a lecture | a test |

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| | | sustainability is explained. | | | |
| 2 | 4 | It explains the operating principle of non-concentrated solar systems and analyzes their efficiency. | Non-concentrated solar systems | a lecture | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 11 | 4 | It explains biomass-to-energy conversion techniques and | Biomass (1) | a lecture | a test |

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| | | evaluates their efficiency. | | | |
| 12 | 4 | It analyzes biomass applications and compares their technologies. | Biomass (2) | a lecture | Assignment |
| 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 | Assignment |
| 15 | 4 | It assesses the economic viability of energy systems and applies financial analysis methods. | Economic analysis and finance | a lecture | a test |
| 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 energy systems and applications. Springer Science & Business Media. |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|----------------------------------|
| Course Name | Mechanical Vibration |
| Course code | SE-ENG-404 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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, | Basic Vibration Concepts | a lecture | Assignment |

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| | | stiffness, and damping). | | | |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Damping measurement | Lecture + Lab | Assignment |

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| | | and applied practically. | | | |
| 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 | Assignment |
| 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

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| 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 Form

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|--------------------------------|----------------------------------|
| Course Name | Automatic Control Systems |
| Course code | SE-ENG-405 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 | Control systems | a lecture | Assignment |

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|----|---|---|------------------------|--------------------|------------|
| | | closed systems and analyzes their characteristics. | | | |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 14 | 4 | It analyzes the temporal response of | Time analysis | Lecture + Exercise | a test |

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|----|---|--|------------------------|-----------|------------|
| | | first- and second-order systems. | | | |
| 15 | 4 | The system's performance is evaluated in terms of transient and stable response. | Performance evaluation | a lecture | Assignment |
| 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

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|---|---|
| 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 Form

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|--------------------------------|--|
| Course Name | Graduation Project I |
| Course code | ENG-401 |
| Term/Year | Level 4 / First Semester |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (supervision, discussion groups, seminars) |
| Total study hours / Total ECTS | 75 hours / 3 ECTS |
| Course Administrator Name | 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 |

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| 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 |

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| 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 Form

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|--------------------------------|---|
| Course Name | Sustainable Building Design |
| Course code | SE-ENG-406 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises, practical applications, seminars) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | Prof. Dr. Raed Rashad 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, | Sustainable building concepts | a lecture | Assignment |

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| | | low-energy, and zero-energy buildings and identifies the characteristics of each. | | | |
| 3 | 3 | It follows the basic steps for calculating air conditioning heat loads. | Calculating heat loads | Lecture + Exercise | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 11 | 3 | It compares alternative energy sources and their effects on buildings. | alternative energy sources | a lecture | a test |
| 12 | 3 | Evaluates the applications of solar, wind, and geothermal energy in buildings. | Renewable energy applications | a lecture | Assignment |
| 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 | Economic analysis of exergy | an exercise | Assignment |

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| | | the efficiency of systems. | | | |
| 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 , Bream , and Green Globes., 2nd^{Edition} , 2017. | | |
| Main references (sources) | | | <ul style="list-style-type: none"> • Exergy Energy, Environment and Sustainable Development, Ibrahim Dicer, and Marc A. Rosen, Elsevier , 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 Form

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|--------------------------------|---|
| Course Name | Wind Energy Systems |
| Course code | SE-ENG-407 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, labs, exercises, seminars) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 |
| Assignment | a lecture | Power generation and batteries | It explains how electricity is | 3 | 2 |

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| | | | generated from wind and storage systems. | | |
| a test | Lecture + Exercise | Conversion systems | It analyzes systems for converting wind energy into electricity. | 3 | 3 |
| Assignment | 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 |
| Assignment | 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 |
| Assignment | 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 according to engineering standards | 3 | 12 |
| a test | a lecture | Turbine control | It explains turbine control systems and analyzes their performance. | 3 | 13 |
| Assignment | 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 | 3 | 15 |

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|---|--------|------------|---|---|----|
| | | | and their environmental impacts. | | |
| 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 Application by JF Manwell , JG McGowan, AL Rogers. | | | Required textbooks (methodology, if applicable) | | |
| Wind Turbine Control Systems Principles, Modeling and Gain Scheduling Design, by Fernando D. Bianchi, Heriberto De Battista and Ricardo J. Mantz . | | | Main references (sources) | | |
| | | | Recommended supporting books and references (scientific journals, reports...) | | |
| | | | references , websites | | |

Course Description Form

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|--------------------------------|---|
| Course Name | Biomass Energy Systems |
| Course code | SE-ENG-408 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, labs, exercises, seminars) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 them with other energy sources. | Introduction to Bioenergy | a lecture | Short test |
| 2 | 3 | It identifies biomass sources and evaluates their characteristics. | Biomass sources | a lecture | Assignment |

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| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 13 | 3 | It assesses the economic aspects of bioenergy systems. | Bioeconomy | a lecture | a test |
| 14 | 3 | It analyzes the environmental and social impacts of bioenergy | Environmental and social impact | a lecture | Seminar |
| 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 |

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| 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) | <ul style="list-style-type: none"> Zhu, D., Dar, M. A., & Shahnawaz, M. (Eds.). (2024). <i>Biofuels and Sustainability: Life -Cycle Assessments, System Biology, Policies, and Emerging Technologies</i>. Woodhead Publishing. mitpressbookstore Tripathi, M., & Kaur, S. (Eds.). (2025). <i>Biotechnological Advances in Biomass to Bioenergy Biotransformation: Sustainable Implications in Circular Economy</i>. Springer Singapore. |
| Main references (sources) | Singh, P. (Ed.). (2024). <i>Emerging Trends and Techniques Biofuel Production from Agricultural Waste</i> . Springer Singapore. SpringerLink |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|----------------------------------|
| Course Name | Intelligent Network Systems |
| Course code | SE-ENG-409 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, exercises) |
| Total study hours / Total ECTS | 150 hours / 6 ECTS |
| Course Administrator Name | 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 and evaluates the role of the Internet of Things. | Modern networks and IoT | a lecture | Assignment |
| 3 | 3 | (6G) network technologies and their applications. | 6G networks | a lecture | a test |

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| 4 | 3 | It applies the principles of network planning and design. | Network planning | Lecture + Exercise | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 13 | 3 | Evaluates cybersecurity applications using artificial intelligence | Cybersecurity | a lecture | a test |
| 14 | 3 | He is developing an applied project using artificial intelligence techniques in networks. | Applied project | Seminar | an offer |
| 15 | 3 | He presents the results of his project and analyzes the system's performance. | Project presentation | Seminar | evaluation |
| 16 | - | He demonstrates his comprehensive | Final exam | a test | exam |

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| | | understanding through the 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) | | | Russell, S. and Norvig , P.: “Artificial Intelligence modern approach”, Ed. Prentice Hall, 1995 | | |
| Main references (sources) | | | J. Harju, T. Karttunen & O. Martikainen “Introduction to intelligent networks ” 2025 | | |
| Recommended supporting books and references (scientific journals, reports...) | | | | | |
| references , websites | | | | | |

Course Description Form

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|--------------------------------|--|
| Course Name | Principles of Air Conditioning and Refrigeration |
| Course code | SE-ENG-410 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (lectures, lab, discussions) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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, | psychrometric properties | Lecture + Exercise | Assignment |

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|----|---|--|--------------------------|--------------------|------------|
| | | and uses a psychrometric chart. | | | |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 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 | Assignment |
| 14 | 3 | It explains the phenomenon of cavitation and its effect on internal flow. | cavity | a lecture | a test |

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|----|---|---|--------------------------------|-------------------|--------------------|
| 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) | <ol style="list-style-type: none"> 1. Air-Conditioning and Refrigeration, By Jones, First edition, McGraw-Hill, 1983. 2. PRINCIPLES OF AIR CONDITIONING AND REFRIGERATION ENGINEERING , DR. KHALED AL -JOURDI , 1986 A text book of hydraulic machines, R. S. Khurmi . |
| Recommended supporting books and references (scientific journals, reports...) | |
| references , websites | |

Course Description Form

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|--------------------------------|--|
| Course Name | Graduation Project II |
| Course code | ENG-402 |
| Term/Year | Level 4 / Semester 2 |
| Description Preparation Date | 1/9/2026 |
| Available Attendance Forms | Attendance (supervision, discussions, seminars) |
| Total study hours / Total ECTS | 100 hours / 4 ECTS |
| Course Administrator Name | 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 |

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| | | 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 quality of scientific and technical content. | Project review | supervision | evaluation |
| 15 | 2 | The project presents itself professionally | presentation | Seminar | Show rating |

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| | | using appropriate presentation methods. | | | |
| 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 | | | | | |