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

Academic Program and Course Description Guide

2026-2025

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (yearly, semesters), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

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

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

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

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

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

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Mosul University
Faculty/Institute: College of Engineering
Scientific Department: Electrical Engineering
Academic or Professional Program Name: Electrical Engineering / Power and Machines
Final Certificate Name: BSc. of science in Electrical Engineering / Power and Machines
Academic System: Course System + Bologna Process
Description Preparation Date: / /2026
File Completion Date: / /2026

Signature :
Head of Department Name :
Name :Dr. Omar Sh. Alyozbaky
Date :

Signature :
Scientific Associate
Dr. Ayman T. Hameed
Date :

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance
Department : Asst. Prof. Rama Burhan Abdulrahman
Date :
Signature :

Approval of the Dean
Asst. Prof Omar M. Hamdoon

1 .Program Vision
To be distinguished in education research and community service in the field of electrical engineering.
2 .Program Mission
To provide a high-quality educational program that offers depth in the area of specialization while ensuring a strong foundation in engineering principles, to disseminate and advance engineering knowledge, and to serve industry and the wider community through academic and professional engagement.
3 .Program Objectives

1. Preparing efficient engineering staff in the field of power and Machines engineering, and power & machine engineering, as well as preparing specialized engineering staff with postgraduate degree and in the same field above in order to contribute to the comprehensive development and urban renaissance in the country.
2. Contribute to the provision of academic, scientific, practical and applied services and consultants to all sectors of the state, public, mixed and private, through cooperation agreements, as well as through consultancy bureau of College of Engineering.
3. Preparing research that works and contributes to solving engineering and industrial problems and obstacles facing industrial establishments and projects in the country.
4. Contribute to the dissemination and development of engineering knowledge and the transfer of the latest developments in the fields of electrical and electronic engineering to engineers in various fields of work through the establishment of continuing education courses and training courses, as well as through the publication of scientific research in specialized local and international scientific journals.
5. Development of academic staff by sending them in delegate scientific participation in conferences, seminars or joint workshops with Arab and international institutions and global or as well as by granting licenses to full -time work at universities outside the country, which helps in the exchange and development of expertise.
6. Participation in organizing and holding of conferences, seminars, workshops and scientific discussions inside and outside the country.

4 .Program Accreditation

The Program is under review by the National Council for Accreditation of Engineering Education (ICAEE)

5 .Other external influences

None

6 .Program Structure

Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**8**	**16**	**7.2 %**	
College Requirements	**6**	**36**	**16.3 %**	
Department Requirements	**46**	**168**	**76.5 %**	
Summer Training	**1**	None		
Other				

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

7 .Program Description

First Level

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EE101	Basics of Electrical Engineering I	93	107	8.00	C	----
EE102	Mathematics I	63	87	6.00	B	----
EE103	Engineering drawing	63	37	4.00	S	----
EE104	Physics I	33	67	4.00	B	----
EE105	Mechanics Engineering	33	42	3.00	S	----
UOM1031	Computer 1	63	12	3.00	B	----
UOM1011	Arabic Language 1	33	17	2.00	B	----

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EE108	Basics of Electrical Engineering II	93	107	8.00	C	----
EE109	Mathematics II	63	87	6.00	B	----
EE110	Computer Programming	63	87	6.00	B	----
EE111	Digital Techniques	48	27	3.00	C	----
EE112	Physics II	48	27	3.00	B	----
UOM1040	Democracy and Human Rights	33	17	2.00	B	----
UOM1021	English Language 1	33	17	2.00	B	----

Second Level

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EEPM201	Electrical Circuits Analysis I	93	32	5.00	C	----
EEPM202	Mathematics III	78	47	5.00	B	----
EEPM203	Electromagnetic Fields	63	37	4.00	C	----
EEPM204	Electrical Transformers	63	62	5.00	C	----
EEPM205	Electronics Principles	48	52	4.00	B	----
EEPM206	Electrical Engineering Lab. I	33	42	3.00	C	----
UOM2050	The crimes of the Baath regime in Iraq	33	17	2.00	B	----
UOM2012	Arabic Language 2	33	17	2.00	B	----

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EEPM208	Electrical Circuits Analysis II	93	32	5.00	C	----
EEPM209	Mathematics IV	78	47	5.00	B	----
EEPM210	DC Machines	63	62	5.00	C	----
EEPM211	Distribution Systems	63	62	5.00	B	----
EEPM212	Renewable Energies sciences	33	17	2.00	C	----
EEPM213	Electrical Engineering Lab. II	33	42	3.00	C	----
UOM2022	English language 2	33	17	2.00	B	----
UOM2032	Computer 2	63	12	3.00	B	----

Third Level

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EEPM301	Mathematical Analysis	63	37	4.00	B	----
EEPM302	Transmission Systems	78	72	6.00	C	----
EEPM303	AC Machines	78	72	6.00	C	----
EEPM304	Electrical Measurements	63	37	4.00	B	----
EEPM305	Power Electronics I	63	87	6.00	C	----
EEPM306	Power and Machines Lab. I	63	37	4.00	C	----

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
EEPM307	Numerical Analysis	63	37	4.00	B	----
EEPM308	Generation Systems	63	62	5.00	C	----
EEPM309	Electrical Machines Drives	78	47	5.00	C	----
EEPM310	Power Electronics II	63	87	6.00	C	----
EEPM311	Programmable controllers	33	17	2.00	C	----
EEPM312	Power and Machines Lab. II	63	37	4.00	C	----
EEPM313	Engineering Project Design & Planning	33	17	2.00	C	
EEPM314	English language 3	33	17	2.00	S	----

Four Level

Code	Module	Theoretical	Practical	Applied	Units
EEP 407	Control Systems I	2		1	3
EEP 401	Power System Analysis I	2		1	3
EEP 402	Power System Protection I	2		1	2
EEP 404	High Voltage Engineering I	2		1	2
EEP 403	Special Electrical Machines I	2			3
EEP 406	Electrical Power Generation Station (elective subject)	2		1	2
EEP 408	Power and Machines Lab. III		4		2

Code	Module	Theoretical	Practical	Applied	Units
EEP 417	Control Systems II	2		1	3
EEP 411	Power System Analysis II	2		1	3
EEP 412	Power System Protection II	2		1	2
EEP 414	High Voltage Engineering II	2		1	2
EEP 413	Special Electrical Machines I	2			3
EEP 418	Power and Machines Lab. IV		4		2
EEP 415	Graduation Project	2			3
EEC 420	Physics III	3			3
EEC 421	Chemistry	3			3

7. Expected learning outcomes of the program

Graduate Outcomes (GOs) for engineering from ICAEE,

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

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

8. Teaching and Learning Strategies

- Power point lectures
- Whiteboard Lectures
- Tutorial
- Laboratory experiments
- Computer laboratories

- Video lectures
- Team works
- Case Studies
- On-line lectures

10. Evaluation methods

- Mid-Term and Final exams
- Quizzes
- Technical Reports and Projects
- Laboratory Reports and Exams

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements /Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Electrical Engineering/ Electronics and Communication	Solid State Electronic			1	
Professor	Electrical Engineering/ Power and Machines	Electrical Power and Machines Engineering			2	
Emeritus Professor	Electrical Engineering/ Power and Machines	Power Electronics Engineering			1	
Assist. Professor	Electrical Engineering/ Power and Machines	Automatic Control Engineering			1	
Assist. Professor	Electrical Engineering/ Electronics and Communication	Communication Engineering			1	
Assist. Professor	Electrical Engineering/ Power and Machines	Power Electronics Engineering			3	
Assist. Professor	Electrical Engineering/ Power and Machines	Electrical Power Engineering			3	
Assist. Professor	Electrical Engineering/ Electronics and Communication	Nanotechnology			1	
Assistant Professor	Electrical Engineering/ Electronics and Communication	Electronics and Communication Engineering			1	

Lecturer	Electrical Engineering/ Electronics and Communication	Electronics and Communication Engineering			1	
Lecturer	Electrical Engineering/ Power and Machines	Electrical Power Engineering			3	
Lecturer	Electrical Engineering/ Power and Machines	Power Systems Protection			1	
Lecturer	Electrical Engineering/ Electronics and Communication	Electronics Engineering			2	
Lecturer	Electrical Engineering/ Electronics and Communication	Communication and Computer Networks			2	
Lecturer	Electrical Engineering/ Power and Machines	Electrical Power and Machines Engineering			5	
Lecturer	Electrical Engineering/ Electronics and Communication	Nanotechnology			1	
Lecturer	Electrical Engineering/ Power and Machines	Electrical Stations Engineering			1	
Lecturer	Electrical Engineering/ Electronics and Communication	Microelectronics			1	
Lecturer	Electrical Engineering	Electrical Engineering			1	
Assistant Lecturer	Electrical Engineering/ Electronics and Communication	Electronics and Communication			2	
Assistant Lecturer	Electrical Engineering/ Power and Machines	Electrical Power Engineering			1	
Assistant Lecturer	Electrical Engineering/ Power and Machines	Electrical Machines Engineering			1	
Assistant Lecturer	Electrical Engineering	Electrical Engineering			7	
Assistant Lecturer	Computer and information Engineering	Computer and information Engineering			1	
Assistant Lecturer	Electrical Engineering/ Power and Machines	Power Electronics Engineering			1	

Assistant Lecturer	Communication Engineering	Communication Engineering			1	
Assistant Lecturer	Electrical Engineering/ Electronics and Communication	Electrical Engineering			1	

Professional Development

Mentoring new faculty members

The academic program is designed to comprehensively enhance the knowledge and skills of new faculty members across various educational fields. It begins by focusing on equipping faculty with the fundamental ability to effectively manage their courses. It then progresses to encompass the processes and procedures necessary to ensure the successful achievement of targeted learning outcomes in diverse programs.

To achieve these goals, the program includes the following key components:

1. **Educational Courses:** New faculty members participate in educational courses aimed at improving the quality of the educational learning process. These courses cover a range of topics, including:
    - **Training on Teaching Methods:** Instruction on effective strategies for engaging students and delivering course content.
    - **Designing Course Outlines:** Guidance on structuring and organizing course materials to optimize student learning.
    - **Modern Trends in University Teaching:** Exploration of innovative approaches to teaching and learning in higher education.
    - **Evaluating Student Learning:** Techniques for assessing student performance and understanding.
    - **Preparing Tests:** Strategies for creating fair and rigorous assessments.
    - **University Policies:** Familiarization with relevant laws, regulations, instructions, and e-learning platforms.
2. **Continuous Evaluation:** Faculty members, both full-time and part-time, undergo continuous evaluation to identify areas for development throughout their educational careers. This process helps ensure that faculty are continually improving and adapting to meet the evolving needs of students and the university.
3. **Professional Development Opportunities:** Faculty members are encouraged to participate in teaching staff development courses offered by the department or the university's continuing education unit. These courses provide

opportunities for faculty to enhance their skills, stay current with trends in education, and collaborate with colleagues.

Professional development of faculty members

Continuous Learning Committee of the Electrical Engineering Department organizes lectures and workshops for faculty members in various fields. The professional development activities held in the past five academic years are listed as follows:

- ✓ Development of education methods and E-learning/ 8
- ✓ Scientific publications/64
- ✓ Academic accreditation/3
- ✓ Miscellaneous seminars in the Renewable energy sources and technologies/50
- ✓ Participation in conferences, seminars, workshops, and training courses outside Iraq/1
- ✓ Participation in conferences, seminars, workshops, and training courses inside Iraq/20

The faculty members actively participate in various workshops and training courses that fit their teaching, quality, and research skills. Last three academic years, 15 faculty members presented a total skills development (22 workshops/20 continuous education courses). The department encourages faculty members to attend conferences, seminars, workshops, and training courses for professional development.

12. Acceptance Criterion

To be eligible for admission to the Electrical Engineering Department at the undergraduate level, applicants must meet certain requirements. The admissions process is overseen by the Ministry of Higher Education and Scientific Research, which electronically manages and allocates student admissions to government institutions and faculties based on their secondary school grades. Here are some of the key requirements for student acceptance:

A- Iraqi Nationality and Year of Birth: Applicants must hold Iraqi nationality and be born in 1999 or later.

B- Iraqi Secondary School Certificate: Applicants need to possess a certificate issued by an Iraqi secondary school that is authorized by the Ministry of Education.

C- Medical Certificate: Applicants must provide a medical certificate to demonstrate that they meet the necessary health requirements.

D- Full-Time Student: Applicants should commit to being full-time students, dedicating their time and efforts to their studies in the department.

E- Not acceptable and continues to study in another college.

F- non-Iraqi students (arrivals) who obtained a certificate of an Iraqi secondary school admitted according to the central acceptance.

G- Admission 10% of the top graduates of technical institutes.

H- Acceptance of talented students.

13. The most important sources of information about the program

Guidebook for Mosul University The departmental website:
https://uomosul.edu.iq/en/engineering/electrical-engineering-dept/

14. Program Development Plan

To enhance the quality of education, elevate graduate outcomes, and meet the competencies required by increasingly complex societies, the department council has decided to adopt the "Bologna process system of Education." This system incorporates the European Credit Transfer and Accumulation System (ECTS) instead of the traditional course-based system, aligning with the department's commitment to continuous improvement. The new system will be implemented starting in the academic year 2025-2026.

The adoption of the Bologna process is expected to yield several benefits:

- **Student-Centered Learning:** The system places students at the core of the learning process, enhancing the overall education system.
- **Increased Class Interaction:** The constant engagement between teachers and students promotes a more dynamic learning environment.
- **Focus on Professional and Practical Skills:** Emphasis is placed on acquiring practical skills relevant to professional development.
- **Opportunity for Continuous Learning:** Students will have the opportunity for ongoing learning, assessment, and feedback.
- **Biannual Performance Evaluation:** The system allows for the evaluation of student performance twice a year, providing more comprehensive feedback.
- **Enhanced Subject Understanding:** The system is expected to facilitate a deeper understanding of subjects among students.

Program Skills Outline										
		Learning outcomes required from the program								
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills		Values
				GO1	GO2	GO3	GO6	GO4	GO7	GO5
1	EE101	Basics of Electrical Engineering I	Core	✓						
	EE102	Mathematics I	Basic	✓						
	EE103	Engineering drawing	Support	✓						
	EE104	Physics I	Basic	✓						
	EE105	Mechanics Engineering	Support	✓						
	UOM1031	Computer 1	Basic	✓			✓			
	UOM1011	Arabic Language 1	Basic	✓						
	EE108	Basics of Electrical Engineering II	Core	✓						
	EE109	Mathematics II	Basic	✓						
	EE110	Computer programming	Basic	✓			✓			
	EE111	Digital Techniques	Core	✓						
	EE112	Physics II	Basic	✓						
	UOM1040	Democracy and human rights	Basic	✓						
	UOM1021	English language 1	Basic	✓				✓		

Program Skills Outline										
				Learning outcomes required from the program						
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills		Values
				GO1	GO2	GO3	GO6	GO4	GO7	GO5
2	EEEC201	Electrical Circuits Analysis I	Core	✓						
	EEEC202	Mathematics III	Basic	✓						
	EEEC203	Electromagnetic Fields	Core	✓						
	EEEC204	Electrical Transformers	Core	✓						
	EEEC205	Electronics Principles	Basic	✓						
	EEEC206	Electrical Engineering Lab. I	Core	✓		✓			✓	
	UOM2050	The crimes of the Baath regime in Iraq	Basic	✓						
	UOM2012	Arabic Language 2	Basic	✓						
	EEEC208	Electrical Circuits Analysis II	Core	✓						
	EEEC209	Mathematics IV	Basic	✓						
	EEEC210	DC Machines	Core	✓						
	EEEC211	Distribution Systems	Basic	✓						
	EEEC212	Renewable Energies Systems	Core	✓						
	EEEC213	Electrical Engineering Lab. II	Core	✓		✓			✓	
	UOM2022	English language 2	Basic	✓				✓		
	UOM2032	Computer 2	Basic	✓			✓			

Program Skills Outline										
				Learning outcomes required from the program						
Year/Level	**Course Code**	**Course Name**	**Basic or optional**	**Knowledge**				**Skills**		**Values**
				GO1	**GO2**	**GO3**	**GO6**	**GO4**	**GO7**	**GO5**
3	EEEC301	Mathematics Analysis	Basic	✓						
	EEEC302	Transmission Systems	Core	✓						
	EEEC303	AC Machines	Core	✓						
	EEEC304	Electrical Measurements	Basic	✓						
	EEEC305	Power Electronics I	Core	✓						
	EEEC306	Power and Machines Lab. I	Core	✓		✓			✓	
	EEEC307	Numerical Analysis	Basic	✓						
	EEEC308	Generation Systems	Core	✓						
	EEEC309	Electrical Machines Drives	Core	✓						
	EEEC310	Power Electronics II	Core	✓						
	EEEC311	Programmable controllers	Core	✓						
	EEEC312	Power and Machines Lab. II	Core	✓		✓			✓	
	EEEC313	Engineering Project Design & Planning	Core	✓						
	EEEC314	English language 3	Support	✓				✓		

Program Skills Outline										
				Learning outcomes required from the program						
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills		Values
				GO1	GO2	GO3	GO6	GO4	GO7	GO5
4	EEP 407	Control systems I	Core	✓	✓					
	EEP 401	Power System Analysis I	Core	✓						
	EEP 402	Power System Protection I	Core	✓						
	EEP 404	High Voltage Engineering I	Core	✓						
	EEP 403	Special Electrical Machines I	Core	✓		✓			✓	
	EEP 406	Electrical Power Generation Stations (Elective Subject)	Core	✓						
	EEP 408	Power and Machines Lab. III	Core	✓						
	EEP 417	Control systems II	Support	✓	✓					
	EEP 411	Power System Analysis II	Core	✓						
	EEP 412	Power System Protection II	Core	✓						
	EEP 414	High Voltage Engineering II	Core	✓		✓			✓	
	EEP 413	Special Electrical Machines II	Core	✓						
	EEP 418	Power and Machines Lab. IV	Core	✓						
	EEP 415	Graduation Project	Core	✓				✓	✓	
	EEP 420	Physics III	Core	✓						
	EEP 421	Chemistry	Core	✓						

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="2">Basics of Electrical Engineering I</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">Core</td><td colspan="3" rowspan="4">☒ Theory
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<tr><td>Module Code</td><td colspan="2">EE101</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">8</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="2">200</td></tr>
<tr><td colspan="2">Module Level</td><td>UGI</td><td colspan="2">Semester of Delivery</td><td>1</td></tr>
<tr><td colspan="2">Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader’s Acad. Title</td><td>Professor</td><td colspan="2">Module Leader’s Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Dr. Omar Muwafaq Mahmood</td><td>e-mail</td><td colspan="2">omer_alyousif@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td>Version Number</td><td colspan="2">1.0</td></tr>
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<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of DC circuit theory through the application of techniques. 2. To understand voltage, current and power from a given DC circuit. 3. This course deals with the basic concept of DC electrical circuits. 4. This is the basic subject for all DC electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. 7. To perform Thevenin and superposition theory.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Describe electrical voltage, current and power. 5. Define Ohm's law. 6. Identify the basic circuit passive and active elements and their applications. 7. Discuss the various properties of resistors. 8. Explain the two Kirchhoff's laws used in circuit analysis. 9. Explain the Analysis Methods used in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Components and values</u> DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] <u>Part B- Circuit reduction</u> combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.]

	Part C- Circuit Theory Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Lab.	2	30% (12)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Basic Concept & Units: Electricity & atomic structure of substance, current and current density, current flow, electric circuit, E.M. F& potential difference
Week 2	international system of unit, abbreviation for multiples & sub-multiples, quantities derived from SI units, units of force-energy-torque and power, relation between energy and heat, electric units, efficiency & percentage efficiency, electromechanical equivalent of element
Week 3	Ohm’s law, resistivity & conductivity
Week 4	temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	equivalent resistance: Series-parallel-circulating current method-floating source method & grouping of E.M.F. sources, double subscript
Week 6	power calculation in D.C circuit
Week 7	Kirchhoff's laws: KVL-KCL
Week 8	Mid-term Exam

Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Maxwell's circulating currents (mesh analysis)
Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin's theorem and Norton's theorem
Week 14	maximum power transfer theorem
Week 15	millman theorem, substitution theorem and reciprocity theorem
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm's Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law
Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell's circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis

Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin's / Norton's Theorem
Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">Mathematics I</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Basic</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EE102</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td colspan="2">UGI</td><td colspan="2">Semester of Delivery</td><td>1</td></tr>
<tr><td>Administering Department</td><td colspan="2">2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td colspan="2">Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Dr. Mohammed Abdulmalek Ahmed</td><td>e-mail</td><td colspan="2">Ahmedm86@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td>Version Number</td><td colspan="2">1.0</td></tr>
</table>

<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	8. Student be able to solve simultaneous liner equations and inequalities involving the square root and modulus function. 9. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 10. Student be able to recognize odd, even, periodic, increasing, decreasing functions. 11. understand the operation of composition of functions and the concept of functional inverse. 12. recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 13. be able to calculate limits by substitution and by eliminating zero denominators. 14. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 15. know the basic rules of differentiation and use them to find derivatives of products and quotients. 16. know the chain rule and use it to find derivatives of composite functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be expected to 10. be able to solve algebraic equations and inequalities involving the square root and modulus function. 11. understand the difference between equations and identities, and be able to prove simple identities and inequalities. 12. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 13. be able to recognize odd, even, periodic, increasing, decreasing functions. 14. understand the operation of composition of functions and the concept of functional inverse. 15. to able to recognize linear, quadratic, power, polynomial, algebraic, rational,

	trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 16. be able to calculate limits by substitution and by eliminating zero denominators. 17. be able to calculate limits at infinity of rational functions. 18. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 19. know the basic rules of differentiation and use them to find derivatives of products and quotients. 20. know the chain rule and use it to find derivatives of composite functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Matrices Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Cramers Rule, Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method. [8 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.] Part B - Coordinates and Graphs in the Plane Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and ( )/ , Limits Involving Infinity, Continuous Functions.. [14 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] Part C- Derivatives Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity,

	Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses, Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	1	5% (5)	7	LO #2, 3, 4, 5 and 6
	Homework	3	12% (12)	4,8,10	LO #2-3, 4-7 and 8-9
	Report	1	8% (8)	8	
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 1-9
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Matrices: Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Creamers Rule.
Week 2	Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method.
Week 3	Coordinates and Graphs in the Plane: Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing.
Week 4	Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations.

Week 5	Functions and their Graphs: Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces.
Week 6	Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas.
Week 7	A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions.
Week 8	Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and ( )/ , Limits Involving Infinity, Continuous Functions.
Week 9	Derivatives: Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines The Derivative of a function, The Slope of Lines.
Week 10	Differentiation Rules: Integer Powers, Multiples, Sums, and Differences Second and Higher Order Derivatives, Negative Integer Powers of x.
Week 11	Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration
Week 12	Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions.
Week 13	The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule.
Week 14	Implicit Differentiation: Lenses, Tangents, and Normal Lines Using Implicit Differentiation to Find Derivatives of Higher Order.
Week 15	Fractional Powers: Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes

Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://www.khanacademy.org)	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">Engineering Drawing</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Support</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EE103</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">4</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">100</td></tr>
<tr><td colspan="2">Module Level</td><td>UGI</td><td colspan="2">Semester of Delivery</td><td>1</td></tr>
<tr><td colspan="2">Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Sura Mohammad Adil Alhayali</td><td>e-mail</td><td colspan="2">sura_alhayali@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
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</table>

<table>
<tr><th colspan="4">Relation with other Modules

العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>17. To develop the engineer's ability to imagine projections and their models.
18. Engineering drawing exercises hand movement to complete quick sketches.
19. This course deals with theory of Orthographic Projection.
20. This is the basic subject for isometric drawing.
21. To teach students engineering drawings using AutoCAD program, and this includes both theoretical lectures and Lab.
22. To help students to use AutoCAD for engineering drawings efficiently in their designs & projects.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>21. Absorbing all the engineering characteristics of an object or a product in a clear manner.
22. Know the tools used in engineering drawing and how to use them correctly
23. understand and apply the basics of engineering processes.
24. Conclude projections and isometric for each geometric figure and recognize its dimensions.
25. students will be able to use AutoCAD commands to make drawings
26. create & insert symbols, dimension in a drawing, create blocks, and plot drawings with certain scales.</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td>Indicative content includes the following.

<u>Part A – tools, lines, scale, Engineering processes (part 1) & getting started, view commands</u>

Introduction to engineering drawing, learn about engineering tools and how to use them. Types of pens, Billboard layout and address field preparation, Types of lines [3 hrs.]

Classwork 1. [2 hrs.]

Defining the drawing scale and its types, apply and draw engineering processes [3 hrs.]

Classwork 2. [2 hrs.]

Lab: Getting started, view Commands [10 hrs.]

Quizzes [1 hr.]

<u>Part B- Engineering processes (part 2) , Orthographic Projection (part 1) &Drawing , modify I Commands</u>

Draw tangents, Types of projections resulting from vertical projection. [6 hrs.]</td></tr>
</table>

	Classwork 3. [2 hrs.] , Classwork 4. [2 hrs.] Lab: Drawing Commands, modify I Commands [10 hrs.] Quizzes [1 hr.] Part C- Orthographic Projection (part 2) , Isometric Drawing & Modify II, Dimensions , text Commands Arrangement and drawing of projections, draw the isometrically axis, Imagine and draw the isometrically body [8 hrs.] Classwork 5. [2 hrs.] , Classwork 6. [2 hrs.] Lab: Modify II Commands, Dimension Commands, Text Commands [8 hrs.] Quizzes [1 hr.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية						
		Time/Number	(Marks)	Weight	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	2×4=8	8%		LO #1, 5, 8 and 9
	Assignments (H.W)	4	4×2=8	8%		LO #1, 2, 4, 6 7, 8 and 9
	Assignments (C.W)	2	2×2=4	4%		
	Lab.	4	4×5=20	20%		All
	Report	0	0	0%		----
Summative assessment	Midterm Exam	2 hr	10	10%		LO # 1-5
	Final Exam	3hr	50	50%		All
Total assessment			100% (100 Marks)			

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and definition of engineering drawing, learn about engineering tools, Types of pens used, Drawing board layout
Week 2	Types of lines in engineering drawing, Defining the drawing scale and its types
Week 3	Classwork 1
Week 4	Engineering processes (part 1): Teaching students how to apply and draw line relationships
Week 5	Classwork 2
Week 6	Engineering processes (part 2): Making tangents, reverse curves

Week 7	Classwork 3
Week 8	Mid-term Exam
Week 9	Orthographic Projection (part 1): theory of Orthographic Projection, combination of views
Week 10	Classwork 4
Week 11	Orthographic Projection (part 1): Arrangement and drawing of projections
Week 12	Classwork 5
Week 13	Isometric Drawing, I: draw the isometrically axis, Imagine and draw the isometrically body
Week 14	Classwork 6
Week 15	Isometric Drawing II: isometric circles
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: start a new drawing, user Interface, units, limits
Week 2	Lab 2: grid, snap, absolute & relative coordinate system, ortho.
Week 3	Lab 3: zoom, pan, osnap, polar tracking
Week 4	Lab 4: pline, pedit, selecting object, erase
Week 5	Lab 5: Itype, Itscale.
Week 6	Lab 6: line, arc, circle, ellipse
Week 7	Lab 7: polygon, rectangle
Week 8	Lab 8: copy, move, mirror, trim, rotate
Week 9	Lab 9: scale, undo, redo, stretch, divide

Week 10	Lab 10: extend, offset.
Week 11	Lab 11: array, Lweight , Measure
Week 12	Lab 12: Fillet , Chamfer, Explode
Week 13	Lab 13: Text, Mtext, Area
Week 14	Lab 14: Dimensions & Leaders, color
Week 15	Lab 15: Block, plot.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering Drawing and Graphic Technology , By French & Vierk , Steven Durbin , Twelve Edition	No
	كتاب الرسم الهندسي المساعد تأليف : أ.م. ثامر محمد نوري & م. سرى عبد الرزاق مجيد , 2021	
Recommended Texts	كتاب الرسم الهندسي تأليف : الأستاذ عبد الرسول الخفاف , 1986	No
	الرسم المعماري والهندسي بمساعدة الحاسوب تأليف : د. عماد هاني العلاف , 2018	No
	اساسيات الرسم الهندسي تأليف : احمد نظام محمد الحيالي , 2022	No
Websites	دروس تعليم اوتوكاد 2014 : https://www.dailymotion.com/video/x31bg6x	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Physics I**	Module Delivery	
Module Type	**Basic**	☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**EE104**		
ECTS Credits	**4**		
SWL (hr./sem)	**100**		
Module Level	1	Semester of Delivery	1
Administering Department	(Electrical Engineering)	College	(Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	Mr. Ahmad Abduljabbar Ismael	e-mail	a.a.ismail@uomosul.edu.iq
Peer Reviewer Name	Mr. Omar Turath	e-mail	omartawfeeq_1981@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	23. To understand many principles and units and their abbreviations correctly in the physics, such as State SI units, determine whether a physical quantity is a vector or a scalar, and distinguish between kinematic and kinetic energy. 24. To understand Differentiate between static and kinetic friction, and solve friction problems; State and apply Hooke's law for ideal springs; Define work, and calculate the work done by a constant force in one and two dimensions. 25. This course deals with Define, calculate, and distinguish between distance and displacement, average and instantaneous speed and velocity, and average and instantaneous acceleration; State, explain, and apply Newton's three laws of motion. 26. This course deals with the basic concept of the State the work–energy theorem, and use it to solve problems; Apply the principle of conservation of mechanical energy to solve simple problems in mechanics; Calculate both kinetic and potential energy; Calculate the power. 27. To develop problem, solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations (i.e., Earth, Moon, Sun and etc.); Derive the equation of continuity for fluids. 28. To perform and analysis of heat transfer through the facades of the buildings; Define and describe the flow of heat through a material by direct molecular contact (conduction); Derive the equation of heat transfer by conduction. 29. To understand energy level and atomic structure through energy-band theory of materials; Internal structure of materials of materials including metals, insulators and semiconductors; Electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission. 30. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 31. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	27. Determine whether a physical quantity is a vector or a scalar; State, explain, and apply Newton's three laws of motion; State and apply Hooke's law for ideal springs; State the work–energy theorem, and use it to solve problems; Express Newton's laws in terms of rates of change of linear momentum; Calculate the pressure and density of fluid at different depth. 28. Define and describe the Bohr model of an atom; Define electron, proton, neutron, and nucleus; Explain electron shells and orbits; Explain insulators, conductors, and semiconductors and how they differ; Define valence band and conduction band Compare a semiconductor atom to a conductor atom. 29. Understanding of the fundamental concepts of current and voltage; Explain the of electrical circuit element and its objects; Define Ohm's Law; Define

	Power and Energy; Calculate Power and Energy. 30. Describe Analysis the Electric Circuits in Parallel and Series connection; Define Kirchhoff's law; Analysis the Electric Circuits using Kirchhoff's law; Solve problems using Kirchhoff's law; Explain the electrical symbol for a diode; Define bias and its effect on the depletion region; Define barrier potential and its effects; Several Diode Applications. 31. Discuss the various properties of diodes and transistors. 32. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors. 33. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Introduction to physics</u> Physics quantities, Length, mass and time; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion. Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power. Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion. [8 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.] <u>Part B- Atoms:</u> Atoms Structure; Atomic Energy Level; and Materials Used in Electronics. Current and Voltage; electrical circuit; and Ohm's Law. Power and Energy; and Parallel and Series Networks. Kirchhoff's Law. [8 hrs.] Quizzes [1 hr.] <u>Part C- Diode Circuit Applications:</u> p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode

	and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of Operation and type, Transistor biasing circuits, Application Circuit. [8 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15 % (15)	Continuous	LO #1, 4, 6 and 7
	Assignments	3	12% (12)	Continuous	LO #1, 2, 3, 4, 5 and 7
	Onsite Assignments	1	5% (5)	Continuous	-----
	Report	1	8% (8)	Continuous	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to physics; Standards of length, mass and time; Scalar and Vector quantities; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion.
Week 2	Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power.
Week 3	Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion.

Week 4	Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations.
Week 5	Fluid mechanics; Pressure and density of fluid at different depth; Hydrostatic pressure; Pascal's principle and the operation of a hydraulic lift; Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation.
Week 6	Basic of Architectural Physics; and Solar Radiation.
Week 7	Basic of Architectural Physics; and Solar Radiation.
Week 8	Sound; Noise; Sound Intensity
Week 9	Sound Insulation; and Thermal Behavior of Materials
Week 10	Atoms Structure; Atomic Energy Level; and Materials Used in Electronics.
Week 11	Current and Voltage; electrical circuit; and Ohm's Law.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes

Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Mechanics Engineering**		Module Delivery	
Module Type	**Support**		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**EE105**			
ECTS Credits	**4**			
SWL (hr./sem)	**100**			
Module Level	UGI		Semester of Delivery	1
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor
Module Tutor	Dr.ammar younis Ibrahim		e-mail	drammar2020@uomosul.edu.iq
Peer Reviewer Name	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026		Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	32. The module aims of Mechanical and Thermodynamics typically include providing students with a comprehensive understanding of the principles and applications of mechanical engineering and thermodynamics. The specific aims may vary depending on the educational institution or course, but here are some common objectives: 33. Understanding Fundamental Concepts: The module aims to introduce students to the fundamental concepts and principles of mechanical engineering and thermodynamics. This includes topics such as mechanics, kinematics, dynamics, energy, heat transfer, and thermodynamic processes. 34. Analytical and Problem-Solving Skills: The module aims to develop students' analytical and problem-solving skills related to mechanical and thermodynamic systems. This involves teaching them how to apply mathematical and scientific principles to solve engineering problems, analyze mechanical systems, and evaluate thermodynamic processes. 35. Thermodynamic Systems: The module aims to familiarize students with the behavior of thermodynamic systems and their applications. This includes studying topics such as the laws of thermodynamics, properties of pure substances, gas laws, energy conversion processes, power cycles, and refrigeration cycles. 36. Heat Transfer: The module aims to teach students about the principles of heat transfer and its applications in engineering. This involves studying modes of heat transfer, including conduction, convection, and radiation, as well as heat exchangers, thermal insulation, and heat transfer analysis in various systems. 37. Mechanical Systems and Dynamics: The module aims to provide students with an understanding of mechanical systems and their dynamics. This includes topics such as statics, dynamics, forces, motion, and mechanical components like gears, bearings, and linkages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Mechanical Engineering: 34. Apply fundamental principles of mechanics to analyze and solve engineering problems. 35. analyze mechanical components and systems considering factors such as strength, stiffness, and safety. 36. knowledge of thermodynamics and fluid mechanics to analyze energy conversion systems. Thermodynamics: 37. Understand the basic concepts and laws of thermodynamics, including energy, entropy, and the First and Second Laws of Thermodynamics. 38. Apply thermodynamic principles to analyze and solve problems related to heat transfer, work, and energy conversion. 39. Analyze thermal systems, including power cycles, refrigeration cycles, and heat

	exchangers. 40. Apply thermodynamic principles to analyze combustion processes and internal combustion engines. 41. Apply thermodynamic principles to analyze renewable energy systems, such as solar and wind power systems. 42. Understand the impact of thermodynamics on environmental sustainability and energy efficiency.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Static: Force system, Units system, Forces + Components, Resultant, Moment and Couples, Equilibrium, Centroid, Moment of Inertia, Friction. Revision problem and tutorial classes. [15 hr.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] Part B Dynamics: Rectilinear motion, Curvilinear motion, Projectile, Circular motion, Acceleration Components (Rectangular Comp., Normal Tangential Comp.), Kinetic -2nd Law of Newton. [15 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] Part C Thermodynamics: Properties of Substance, Pressure and Temperature, Work and Energy, Ideal Gas, First Law of Thermodynamics, 2nd Law of Thermodynamics. Hook's law. [15 hr.] Revision problem and tutorial classes [5 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5,10	LO #1, 4, 6 and 7
	Assignments	5	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	2	25% (25)	Continuous	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	8	LO # 4-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Static: Force system
Week 2	Units system, Forces and Components
Week 3	Resultant, Moment and Couples
Week 4	Equilibrium and Centroid
Week 5	Moment of Inertia and Friction
Week 6	Dynamics: Rectilinear motion
Week 7	Curvilinear motion, Projectile and Circular motion
Week 8	Midterm Exam
Week 9	Acceleration Components (Rectangular Comp., Normal Tangential Comp.)
Week 10	Kinetic - 2nd Law of Newton
Week 11	Thermodynamics: Properties of Substance and Pressure and Temperature
Week 12	Work and Energy and Ideal Gas
Week 13	First Law of Thermodynamics
Week 14	2nd Law of Thermodynamics
Week 15	Hook's law
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts		

Recommended Texts		
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
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<tr><td>Module Type</td><td colspan="3">Basic</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">UOM1031</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">3</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">75</td></tr>
<tr><td>Module Level</td><td>First Level</td><td colspan="2">Semester of Delivery</td><td colspan="2">One</td></tr>
<tr><td>Administering Department</td><td>Department of Electrical Engineering</td><td>College</td><td colspan="3">Engineering</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td colspan="2">Doctor</td></tr>
<tr><td>Module Tutor</td><td>Aws Thamir Mayouf</td><td>e-mail</td><td colspan="3">awsthamir@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>10/5/2026</td><td>Version Number</td><td colspan="3">1.1</td></tr>
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العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The module aims to prepare students to work with computers. It also teaches students the fundamentals of computers and their components. Students will learn about computer operating systems, with a focus on Windows. Students will also learn how to use Microsoft Office applications: Word, Excel, and PowerPoint.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The ability to identify, analyze, and solve complex engineering problems based on the principles of engineering, science, and mathematics. 2. The ability to acquire and apply new knowledge using appropriate learning strategies. 3. The ability to participate in and work professionally and ethically on multidisciplinary teams and projects. Students who pass this module are expected to learn the following topics: 1. Computers and operating systems 2. Software and hardware interaction 3. Windows File Management 4. Operating System Customization 5. Computer Hardware 6. Monthly Lab Exam 7. Exploring Microsoft Office 8. Getting Started with MS Word Essentials 9. Editing and Formatting Documents 10. Getting Started with MS Excel Essentials 11. Organizing and Enhancing Worksheets 12. Creating Formulas and Charting Data 13. Getting Started with MS PowerPoint Essentials 11. Organizing and Enhancing Slides 12. Creating Presentations

Indicative Contents المحتويات الإرشادية	Computers and Operating System [6 hr] Software and Hardware Interaction [6 hr] Windows File Management [3 hr] Operating System Customization [3 hr] Computer Hardware [3 hr] Exploring Microsoft Office [1.5 hr] Getting Started with MS Word Essentials [1.5 hr] Editing and Formatting Documents [3 hr] Getting Started with MS Excel Essentials [3 hr] Organizing and Enhancing Worksheets [3 hr] Creating Formulas and Charting Data [3 hr] Getting Started with MS PowerPoint Essentials [3 hr] Organizing and Enhancing Slides [1.5 hr] Creating Presentations [1.5 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for teaching this module is to encourage student participation in laboratory activities and refine and expand their critical thinking skills. This will be achieved through classes, laboratory work, and external research involving computer technology that interests students. 1. Lectures: • Structured lectures introduce fundamental concepts and practical applications. • Emphasis is placed on fundamental understanding, practical application, and actual use of the software. 2. Problem-solving sessions • Guided tutorials focus on solving real problems related to the software. • Students practice the fundamentals of the software.

	• Active student participation is encouraged through in-class discussions. 3. Project-Based Learning: • Individual or group mini-projects involve the practical use of the software. 4. Self-Directed Learning: • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support a deeper understanding. 5. Continuous Feedback: • Regular formative feedback is provided through assignments, quizzes, labs, and reports.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 11	LO#Q1: 1-2, Q2: 7-9
	Assignments	2	5% (5)	3, 10	LO#A1: 1-2, A2: 7-9
	Lab	10	20% (20)	CONTINUES	All

	Report	1	5% (5)	14	All
Summative assessment	Midterm Exam	2 hrs.	10% (10)	9	LO # 1-5
	Final Exam	3 hrs.	50% (50)		
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computers and Operating System
Week 2	Computers and Operating System (continue)
Week 3	Software and Hardware Interaction
Week 4	Software and Hardware Interaction (continue)
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7	Computer Hardware
Week 8	Exploring Microsoft Office and Getting Started with MS Word Essentials
Week 9	Mid-Term Exam
Week 10	Editing and Formatting Documents
Week 11	Getting Started with MS Excel Essentials
Week 12	Organizing and Enhancing Worksheets
Week 13	Creating Formulas and Charting Data
Week 14	Getting Started with MS PowerPoint Essentials
Week 15	Organizing and Enhancing Slides and Creating Presentations
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Computers and Operating System
Week 2	Computers and Operating System (continue)
Week 3	Software and Hardware Interaction
Week 4	Software and Hardware Interaction (continue)
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7	Computer Hardware
Week 8	Exploring Microsoft Office and Getting Started with MS Word Essentials
Week 9	Mid-Term Exam
Week 10	Editing and Formatting Documents
Week 11	Getting Started with MS Excel Essentials
Week 12	Organizing and Enhancing Worksheets
Week 13	Creating Formulas and Charting Data
Week 14	Getting Started with MS PowerPoint Essentials
Week 15	Organizing and Enhancing Slides and Creating Presentations

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	2015 Computer Literacy BASICS: A Comprehensive Guide to IC3 Connie Morrison, Dolores Wells, Lisa RuffoloCengage Learning. ISBN: 128576658X	Available as PDF
Recommended Texts	IC3 GS5 Certification Guide Using Windows 10 & Office 2016	
Websites	Google Classroom	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title
اسم المنهج</td><td colspan="3">Arabic Language 1</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type
نوع المنهج</td><td colspan="3">Basic</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☐ Tutorial
☐ Practical
☒ Seminar</td></tr>
<tr><td>Module Code
رمز المنهج</td><td colspan="3">UOM1011</td></tr>
<tr><td>ECTS Credits
عدد الوحدات</td><td colspan="3">2</td></tr>
<tr><td>SWL (hr/sem)
الحمل الكلي</td><td colspan="3">50</td></tr>
<tr><td>Module Level</td><td>1</td><td colspan="2">Semester of Delivery</td><td colspan="2">1</td></tr>
<tr><td>Administering Department</td><td>ENV8</td><td>College</td><td colspan="3">ENG4</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td colspan="2">Doctor</td></tr>
<tr><td>Module Tutor</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>10/5/2026</td><td colspan="2">Version Number</td><td colspan="2">2.0</td></tr>
</table>

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	لا يوجد	Semester	
Co-requisites module	لا يوجد	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	الهدف من هذا الفصل الدراسي هو تعريف الطلاب بالموضوعات الرئيسية لمادة اللغة العربية. سيغطي الفصل الدراسي المتطلبات الأساسية لتعاريف اللغة العربية، قواعد نحوية للأزمنة، تنمية القدرات النحوية لصيغ المفرد والجمع والممنوع من الجرد، بالإضافة الى البلاغة والتطبيق. وفي نهاية الفصل، سيكون لدى الطلاب معرفة واسعة بالمفاهيم وسيتم تحقيق ذلك من خلال المحاضرات النظرية والدروس والواجبات البتية والتقارير ذات الصلة بالمواضيع المطروقة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	CLO1: تعريف الطالب بألفاظ اللغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة مشوقة وجذابة. CLO2: أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. CLO3: تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين. CLO4: تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصورة. CLO5: تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة للكتب والمخاطبات الرسمية. CLO6: تمكين الطالب على كتابة التقارير العملية والنظرية والعروض التقديمية بلغة عربية واضحة وصحيحة. CLO7: القدرة على اكتساب وتطبيق المعرفة الجديدة واستخدام استراتيجيات تعليم مناسبة. CLO8: القدرة على المشاركة والعمل بمهنية واخلاقية للعمل في فرق متعددة التخصصات.
Indicative Contents	**الجزء الأول:** مقدمة عن اللغة العربية (4 ساعات)

المحتويات الإرشادية	• مقدمة عن اللغة العـ^]ة • تعـqف اللغة العـ^]ة ومما|mkاتها **الجزء الثاني:** قواعد نحوية وتشمل: (6 ساعات) • الفعل الما k rw • الفعل الما k rw • الافعال الخمسة **الجزء الثالث:** تنمية القواعد النحوية وتشمل: (6 ساعات) • المثk| والجمع (المذكر السالم والمؤنث السالم) • التعجب • الممنۆع من الˆف • المجرد والمqŒد **الجزء الرابع:** البلاغة والتطبيق (8 ساعات) • الاستعارة • الجناس • الطʼاق • الـشه•]ه **الجزء الخامس:** قواعد املائية: (3 ساعات) سوف يتم تعريف الطالب عن الأخطاء الاملائية الشائعة وطرق تجنبها بالإضافة الى كتابة المخاطبات الادرية. **الجزء السادس:** قواعد العد والمعدود: (3 ساعات) تعريف الطالب بقواعد واحكام العد والمعدود في اللغة العربية.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies الاستراتيجيات	توسيع مدارك الطلاب لمادة اللغة العربية، والإلمام بالمفاهيم الأساسية للغية العربية والبلاغة، والقدرة على التمييز بين الأزمنة. يحتوي هذه الفصل على العديد من المكونات التي تشمل دراسة المحاضرات والبرامج التعليمية والمناقشة والواجبات المنزلية ومنصات التعلم الإلكتروني. سيتم تدريس الدورة باللغة العربية، ويجب تقديم جميع المهام الإلزامية في غضون المواعيد النهائية للقبول في الامتحان.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem)	50		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative Assessment التقويم التكويني	Quizzes الكويز	3	6% (18)	4, 9, and 13	All
	H.W Assignments الواجبات البيتية	2	4% (8)	5, 11	CLO4, CLO5, and CLO6
	Seminars السمنار	1	6% (6)	12	All
	On-site Assignment واجبات داخل الصف	2	4% (8)	6, 10	CLO4, CLO5, and CLO6
Summative Assessment التقويم التلخيصي	Midterm Exam امتحان نصف الفصل	2 hrs	10% (10)	7	All
	Final Exam الامتحان النهائي	3 hrs	50% (50)	16	All
Total Assessment / التقويم النهائي			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered / المواضيع المغطاة
Week 1	مقدمة عن اللغة العربية وتعريف اللغة العربية ومميزاتها
Week 2	قواعد نحوية: الفعل الماضي
Week 3	قواعد نحوية: الفعل المضارع

Week 4	قواعد نحوية: الأفعال الخمسة
Week 5	تنمية القواعد النحوية: المثنى والجمع (المذكر السالم والمؤنث السالم)
Week 6	تنمية القواعد النحوية: التعجب، الممنوع من الصرف والمجرد والمزيد
Week 7	الامتحان الفصلي
Week 8	البلاغة والتطبيق: الاستعارة
Week 9	البلاغة والتطبيق: الجناس
Week 10	البلاغة والتطبيق: الطباق
Week 11	البلاغة والتطبيق: التشبيه
Week 12	الأخطاء الاملائية
Week 13	المخاطبات الإدارية
Week 14	قواعد واحكام العد والمعدود
Week 15	قواعد واحكام العد والمعدود
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered / المواضيع المغطاة
Week 1	لا يوجد
Week 2	لا يوجد
Week 3	لا يوجد
Week 4	لا يوجد
Week 5	لا يوجد
Week 6	لا يوجد
Week 7	لا يوجد

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text الاسم	Available in the Library? هل متوفر في المكتبة؟
Required Texts المنهج المطلوب	جامع الدروس العربية / مصطفى الغلاييني	نعم
Recommended Texts المنهج الموصى به	النحو الوافي / عباس حسن	نعم
Websites المواقع الالكترونية	https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">Basics of Electrical Engineering II</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Core</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☒ Lab
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<tr><td>Module Code</td><td colspan="3">EE108</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">8</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">200</td></tr>
<tr><td>Module Level</td><td colspan="2">UGI</td><td colspan="2">Semester of Delivery</td><td>2</td></tr>
<tr><td>Administering Department</td><td colspan="2">2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td colspan="2">Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Dr. Omar Muwafaq Mahmood</td><td>e-mail</td><td colspan="2">omer_alyousif@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td colspan="2">Version Number</td><td>1.0</td></tr>
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<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	38. To develop problem solving skills and understanding of AC circuit theory through the application of techniques. 39. To understand voltage, current and power from a given AC circuit. 40. This course deals with the basic concept of AC electrical circuits. 41. This is the basic subject for all AC electrical and electronic circuits. 42. To understand Kirchhoff's current and voltage Laws problems. 43. To perform mesh and Nodal analysis. 44. To perform Thevenin and superposition theory. 45. To understand the resonant circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	43. Recognize how electricity works in electrical circuits. 44. List the various terms associated with electrical circuits. 45. Summarize what is meant by a basic AC electric circuit. 46. Describe electrical AC voltage, current and power. 47. Define Ohm's law in AC circuits. 48. Identify the basic circuit passive and active elements and their applications. 49. Discuss the various properties of impedance. 50. Explain the two Kirchhoff's laws used in AC circuit analysis. 51. Explain the Analysis Methods used in AC Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Components and values</u> AC circuits, Current and voltage definitions, circuit elements, impedance networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] <u>Part B- Circuit reduction</u> combining sources, Combining impedances elements in series and parallel, delta and star transformation. [12 hrs.]

	Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] <u>Part C- Circuit Theory</u> Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory, the resonant circuits. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	8

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic Concept & Units in AC circuits, waveforms of AC sources
Week 2	Average and RMS values, Form Factor, Crest Factor

Week 3	Ohm's law, impedance and admittance calculations
Week 4	equivalent impedance: Series-parallel and delta – star transformation
Week 5	power calculation in A.C circuit and power factor
Week 6	Kirchhoff's laws: KVL-KCL
Week 7	Phasor diagram
Week 8	Mid-term Exam
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Maxwell's circulating currents (mesh analysis)
Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin's theorem and Norton's theorem
Week 14	maximum power transfer theorem
Week 15	Resonant circuits
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (using in AC circuits) and oscilloscope
Week 3	Lab 3: Introduction to AC function generator
Week 4	Lab 4: ohm's Law application in AC circuit
Week 5	Lab 5: series and parallel impedance, delta and star transformation

Week 6	Lab 6: Kirchhoff's Voltage Law
Week 7	Lab 7: Kirchhoff's Current Law
Week 8	Lab 8: implementation of Maxwell's circulating currents (mesh analysis)
Week 9	Lab 9: implementation of Nodal analysis
Week 10	Lab 10: implementation of Superposition theorem
Week 11	Lab 11: implementation of Thevenin's / Norton's Theorem
Week 12	Lab 12: implementation of maximum power transfer theorem
Week 13	Lab 13:AC power measurements (methods and instrumentations)
Week 14	Lab 14: power factor measurements
Week 15	Lab 15: resonance circuits validation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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<tr><td>Module Title</td><td colspan="3">Mathematics II</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Basic</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EE109</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td>UGI</td><td colspan="3">Semester of Delivery</td><td>2</td></tr>
<tr><td>Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="3">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
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<tr><td>Module Tutor</td><td>Dr. Mohammed Abdulmalek Ahmed</td><td>e-mail</td><td colspan="3">Ahmedm86@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
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<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>1. Provide students with a strong support for basic learning calculus concepts: limits, derivatives, and integration.

2. Help students communicate mathematical ideas through the practice of proper mathematical notations.

3. Help students to verify mathematical ideas through the practice of proper mathematical proof techniques.

4. Developing mathematical thinking and understanding in students by guiding them towards deep thinking rather than “memorizing all the rules”.

5. Increase students’ awareness of alternate means of learning such as group study, as well as strategies that will enhance the learning of mathematics.</td></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>Upon completion of the course, the student will be able to:

1. how to calculate the area under and between curves.

2. interpret a volume of revolution of a function’s graph around a given axis as a (Riemann) sum of disks or cylindrical shells, convert to definite integral form and compute its value.

3. express the length of a curve as a (Riemann) sum of linear segments, convert to definite integral form and compute its value.

4. express the surface area of revolution of a function’s graph around a given axis as a (Riemann) sum of rings, convert to definite integral form and compute its value.

5. antidifferentiate products of functions by parts.

6. recognize and implement appropriate techniques to anti-differentiate products o trigonometric functions.

7. devise and apply a trigonometric substitution in integrals involving Pythagorean</td></tr>
</table>

	Quotients. 8. decompose a rational integrand using partial fractions. 9. determine convergence of improper integrals with discontinuities in their domain or infinite limits of integration.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Definite Integrals</u> Areas between Curves: The Basic Formula, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry, Volumes of Solids of Revolution: Disc Method, Washer Method, Cylindrical Shells Method, Lengths of Curves in the Plane: The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula, Area of Surfaces of Revolution: The Basic Formula, Revolution about the y-axis, The Short Differential Form. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] <u>Techniques of Integration:</u> Basic Integration Formulas: Algebraic Procedures and Trigonometric Identities, Integration by Parts: The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration, Trigonometric Integrals: Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions, Trigonometric Substitution: Trigonometric Substitution for Combining Squares, Integrals involving 2+ + , ≠0, Two Useful Formulas, Rational Functions and Partial Fractions: General Description of the Method, The Substitution =tan(2⁄). [24 hrs.] Revision problem and tutorial classes [6 hrs.]

	Quizzes [2 hr.] Plane Curves and Polar Coordinates: Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates, Graphing in Polar Coordinates: Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect. [6 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	1	5% (5)	7	LO #2, 3, 4, 5 and 6
	Homework	3	12% (12)	4,8,10	LO #2-3, 4-7 and 8-9
	Report	1	8% (8)	8	
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Calculus and Area: Regions Bounded by Curves, Area under the Graph of a Nonnegative Continuous Function.
Week 2	Definite Integrals: Constant Functions, Area is Strictly a Special Case.
Week 3	Indefinite Integrals: The Indefinite Integral of a Function, Rules of Algebra, The Integrals of 2 2 , Solving Initial Value Problems with Indefinite Integrals.
Week 4	Integration by Substitution-Running the Chain Rule Backward: The Generalized Power Rule in Integral Form, Sines and Cosines, The Substitution Method of Integration, Substitution in Definite Integrals.
Week 5	Application of Definite Integrals: Areas between Curves: The Basic Formula, Derived from Riemann Sums, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry.
Week 6	Volumes of Solids of Revolution: Disc Method, Washer Method, Cylindrical Shells Method.

Week 7	Lengths of Curves in the Plane: The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula.
Week 8	Area of Surfaces of Revolution: The Basic Formula, Revolution about the y-axis, The Short Differential Form.
Week 9	Techniques of Integration: Basic Integration Formulas: Algebraic Procedures and Trigonometric Identities.
Week 10	Integration by Parts: The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration.
Week 11	Trigonometric Integrals: Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions.
Week 12	Trigonometric Substitution: Trigonometric Substitution for Combining Squares, Integrals involving 2+ + , $\neq 0$, Two Useful Formulas.
Week 13	Rational Functions and Partial Fractions: General Description of the Method, The Substitution =tan(2⁄).
Week 14	Plane Curves and Polar Coordinates: Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates.
Week 15	Graphing in Polar Coordinates: Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://www.khanacademy.org)	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="2">Computer Programming</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">Basic</td><td colspan="3" rowspan="4">☒ Theory
☐ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">EE110</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">6</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="2">150</td></tr>
<tr><td colspan="2">Module Level</td><td>First Level</td><td colspan="2">Semester of Delivery</td><td>Two</td></tr>
<tr><td colspan="2">Administering Department</td><td>Department of Electrical Engineering</td><td>College</td><td colspan="2">Engineering</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Aws Thamir Mayouf</td><td>e-mail</td><td colspan="2">awsthamir@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td>Version Number</td><td colspan="2">1.0</td></tr>
</table>

<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>1. Introduction of MATLAB program (m file).
2. To understand Types of variables, numbers, Expressions, operation and function.
3. To understand Solving of Electrical circuit in MATLAB program.
4. To perform Solving equations by symbols.
5. To solve the Function and its application (pulse & ramp functions).
6. To perform Engineering graphics (two dimensions and three dimensions) such as vector diagram mesh, bar plots).
7. To perform Matrix and its applications.</td></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>1. Proficiency in MATLAB: Students should develop a strong understanding of the MATLAB programming language, syntax, and functionality. They should be able to write, debug, and modify M-file programs effectively.
2. Problem-solving skills: MATLAB is often used for scientific and engineering applications, so students should learn how to apply MATLAB to solve complex problems in their respective fields. They should be able to analyze problems, develop algorithms, and implement them using MATLAB.
3. Data analysis and visualization: MATLAB offers powerful tools for data analysis and visualization. Students should learn how to import, manipulate, analyze, and visualize data using MATLAB functions and techniques.
4. computation: MATLAB is well known for its mathematical computing capabilities. Students should become proficient in using MATLAB for performing mathematical computations, including linear algebra and differential equations.
5. Algorithm development: MATLAB allows students to develop algorithms and implement them in M-file programs. They should learn how to break down complex problems into smaller, manageable tasks, design algorithms to solve those tasks, and integrate them into a complete MATLAB program.
6. Code optimization: Students should develop skills in optimizing MATLAB code for improved performance and efficiency.
7. Debugging and troubleshooting: MATLAB programs may encounter errors or produce unexpected results. Students should learn how to effectively debug</td></tr>
</table>

	and troubleshoot their M-file programs, identify and resolve issues, and improve the overall reliability of their code. 8. Documentation and code organization: Writing clear and well-organized code is crucial for collaboration and future maintenance. Students should learn to document their MATLAB programs, including comments, variable naming conventions, and overall code structure 9. Project implementation: In some cases, students may be required to develop larger-scale projects using MATLAB. They should learn how to plan, manage, and implement MATLAB-based projects, ensuring that their programs meet the specified requirements and deliver the desired outcomes.
Indicative Contents المحتويات الإرشادية	Part A - Circuit Components and values Introduction to MATLAB, Types of variables, Numbers and Expressions, Operation, Functions, Solving set of linear equations, Function and its application (pulse & ramp functions). [14 hrs.] Lab. [14 hrs.] Revision problem and tutorial classes [4 hrs.] Part B- Circuit reduction Differentiation, Integration, Solving of Electrical circuit, Engineering graphics (two dimension and three dimensions) such as vector diagram mesh and bar plots, Solving of ordinary differential equation, Curve fitting and interpolation, Matrix and its applications [14 hrs.] Lab. [14 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for delivering this module is to encourage student participation in exercises that refine and expand critical thinking skills. This will be achieved through classes and interactive tutorials, as well as by conducting simple experiments involving sampling activities that interest the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4, 8, 12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6, 7, 8 and 9
	Projects / Lab.	2	25% (25)	CONTINUES	All
	Report	0	0% (0)	---	---
Summative assessment	Midterm Exam	2 hrs.	10% (10)	8	LO # 1-5
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Complex Numbers, Array Operations, Matrix Operations
Week 3	Application of matrix, Solving set of linear equations.
Week 4	Control structures in MATLAB program.
Week 5	Plotting commands 2-D Graphics.
Week 6	Polynomials analysis.
Week 7	Function Files, its application (pulse & ramp functions)
Week 8	Revision – Mid Term Exam
Week 9	Solving equations by symbols.
Week 10	Numerical Integration.
Week 11	Transient Analysis.
Week 12	Frequency Response using MATLAB
Week 13	Partial fraction Expansion.
Week 14	Application on Battery Charging on circuit.
Week 15	Engineering graphics 3D.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Applied Complex Numbers, Array Operations, Matrix Operations.
Week 3	Applied Application of matrix, Solving set of linear equations.
Week 4	Applied Control structures in MATLAB program.
Week 5	Applied Plotting commands for 2-D Graphics.
Week 6	Applied Polynomials analysis.
Week 7	Applied Function Files, its application (pulse & ramp functions)
Week 8	Revision – Mid Term Exam
Week 9	Applied Solving equation by symbols.
Week 10	Applied Numerical Integration.
Week 11	Applied Transient Analysis.
Week 12	Applied Frequency Response using MATLAB
Week 13	Applied Partial Fraction Expansion.
Week 14	Applied Application on Battery Charging on circuit.
Week 15	Applied Engineering graphics 3D.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	• Numerical Analysis Using MATLAB® and Excel® Third Edition,Steven T. Karris.	Available as PDF

Recommended Texts	• ELEMENTARY MATHEMATICAL and COMPUTATIONAL TOOLS for ELECTRICAL and COMPUTER ENGINEERS USING MATLAB, Jamal T. Manassah City College of New York,2011 • ELECTRONICS and CIRCUIT ANALYSIS using MATLAB, JOHN O. ATTIA ,1999	
Websites	Google Classroom	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">Digital Techniques</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Core</td><td colspan="2" rowspan="5">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EE111</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">3</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">100</td></tr>
<tr><td>Module Level</td><td>UGI</td><td colspan="3">Semester of Delivery</td><td>2</td></tr>
<tr><td>Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="3">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader's Acad. Title</td><td>Professor</td><td colspan="3">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td>Dr. Azam Esam Dawood</td><td>e-mail</td><td colspan="3">azzam.esam@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
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العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>46. To develop problem solving skills and understanding of Digital circuit theory through the application of techniques.
47. To understand Digital circuit, latches and Flip-flops, asynchronous binary counters, synchronous binary counters.
48. This course deals with the basic concept of latches and Flip-flops, asynchronous binary counters, synchronous binary counters.
49. To construct data storage units/shift registers using flip flops
50. To analyze sequential logic circuits using appropriate tools.
51. To design and analyze synchronous binary, up/down counters.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>52. Recognize how combinational logic circuits works.
53. Design combinational logic circuits using combination logic design process.
54. Define and describe various latches and Flip-flops
55. Construct data storage units/shift registers using flip flops
56. Define asynchronous and synchronous Digital circuit
57. Identify how to design and analyze asynchronous binary counters.
58. Explain how to design and analyze BCD asynchronous counters
59. Explain the Synchronous counters Binary Counters 2: bit, 3-bit.
60. Explain the types of shift registers and Shift register counters Ring Counter.</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td>Indicative content includes the following.

<u>Part A - Circuit Components and values</u>

Introduction to Digital Technique, Basic Definitions, System of Numbers, General number formula: Binary, octal, decimal & hexadecimal numbers, Numbers Base Conversion (Arithmetic operation in different numbers complements, binary codes, BCD, Ex-3, gray codes). [9 hrs.] : Revision problem and tutorial classes [6 hrs.] : Quizzes [1 hr.]

<u>Part B- Circuit reduction</u>

Boolean algebra: (Basic definitions, basic theorem & properties, Boolean functions), Canonical & Standard Forms Digital Logic Gates. [12 hrs.]: Revision problem and tutorial classes [8 hrs.]: Quizzes [1 hr.]

<u>Part C- Circuit Theory</u></td></tr>
</table>

	Karnaugh Maps (AND & OR implementation, don't care condition), Adders Arithmetic Operation (Sub tractors, half & full adders & Subtractors, binary parallel adders), Code Conversion (Even and odd party logic, decoders, encoders comparator, multiplexers & demultiplexers), Sequential Logic (Flip Flops (RS, T, D, JK...) Master slave FF, Counters, Shift registers).. [24 hrs.]: Revision problem and tutorial classes [16 hrs.]:Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects /	1	20% (20)	Continuous	All
	Report	1	10% (10)	2 to 12	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Digital Technique, General number formula
Week 2	Numbers Base Conversion, Boolean algebra
Week 3	Canonical & Standard Forms Digital Logic Gates, Karnaugh Maps
Week 4	Adders Arithmetic Operation, Code Conversion
Week 5	Introduction to sequential logic circuit design Latches, S-R Latch, gated RS Latch
Week 6	Edge-triggered Flip-Flops, JK-FF and D-FF Flip-Flop Operating Characteristics
Week 7	Shift Register operation
Week 8	Mid-term Exam
Week 9	Types of shift registers, Shift register counters: Ring Counter

Week 10	Models of State Machines
Week 11	Asynchronous Counters: Ripple counter
Week 12	Synchronous counters: Binary Counters 2: bit, 3-bit
Week 13	BCD Counter
Week 14	Up/down counter
Week 15	Synchronous counters design
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Digital Fundamental: By Thomas L. Floyd 11th Edition Pearson Education Limited (2015)	Yes
Recommended Texts	Contemporary Logic Design, Randy Katz Addison Wesley Publishing Company1993	No
Websites	Introduction to Boolean algebra and logic design by Gerhard and Melvin	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physics II**		Module Delivery		
Module Type	**Basic**		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	**EE112**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	UGI		Semester of Delivery		2
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification		Doctor
Module Tutor	Mr. Ahmad Abduljabbar Ismael		e-mail	a.a.ismail@uomosul.edu.iq	
Peer Reviewer Name	Mr. Omar Turath		e-mail	omartawfeeq_1981@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>52. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits.
53. To understand energy level and atomic structure through energy-band theory of materials.
54. This course deals with the basic concept and Internal structure of materials of materials including metals, insulators and semiconductors.
55. To understand electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission.
56. To understand the intrinsic and extrinsic semiconductors parameters.
57. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors.
58. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>61. Recognize the Semiconductors and compound semiconductors materials such as Si, Ge, and GaAs.
62. List the various terms associated with active electronics elements.
63. Summarize what is meant by an electronic circuit.
64. Describe energy band theory of all materials.
65. Discuss the various properties of diodes and transistors.
66. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors.
67. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td>Indicative content includes the following.

<u>Part A - Energy Level and Atomic Structure</u>

The atom, models, wave nature of light, dual nature of matter, energy-band theory of metals, insulators and semiconductors, crystal structure, ionic, covalent and metallic bonding, energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions. [8 hrs.]

Revision problem and tutorial classes [4 hrs.]

Quizzes [1 hr.]</td></tr>
</table>

	Part B- Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons, Fermi levels, work function, electronic emission. Semiconductors: Semiconductors materials (Si, Ge and compound semiconductors), extrinsic semiconductors, Fermi-level in semiconductor, diffusion and carrier life time, Hall effect. [8 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] Part C- Semiconductor p-n Junction: p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions. [6 hrs.] Revision problem and tutorial classes [3 hrs.] Quizzes [1 hr.] Part D- Diode Circuit Applications: Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of Operation and type, Transistor biasing circuits, Application Circuit. [8 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	Continuous	LO #1, 4, 6 and 7
	Assignments	3	12% (12)	Continuous	LO #1, 2, 3, 4, 5 and 7
	Onsite Assignments	5	5% (5)	Continuous	-----
	Report	1	8% (8)	Continuous	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Energy Level and Atomic Structure: The atom, models, wave nature of light, dual nature of matter. Energy-band theory of metals, Insulators and semiconductors, Crystal structure, Ionic, Covalent and metallic bonding.
Week 2	Energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions.
Week 3	Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons.
Week 4	Electrical Conduction in Metals: Fermi levels, Work function, Diffusion Current, Electronic emission.
Week 5	Introduction of semiconductors: Semiconductors materials (Si, Ge and compound semiconductors).
Week 6	Introduction of semiconductors: Intrinsic semiconductors, and Fermi-level in semiconductor.
Week 7	Introduction of semiconductors: Extrinsic semiconductors, and Fermi-level in semiconductor.
Week 8	Introduction of semiconductors: Demonstrated of electrical conductance in semiconductors materials. Diffusion Current in semiconductors, carrier life time, and Hall effect.
Week 9	Introduction semiconductor P-N junction: P-N junction in equilibrium, current-voltage characteristics. charge-control description of a diode.
Week 10	Diffusion current, diffusion current density, draw Energy-band level. Transition and diffusion capacitance's, diode switching times.
Week 11	diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	Preparatory week before the final Exam
Learning and Teaching Resources	

مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">Democracy and Human Rights</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Support</td><td colspan="2" rowspan="4">☐ Theory
☒ Lecture
☐ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">UOM1040</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">2</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">50</td></tr>
<tr><td>Module Level</td><td>1</td><td colspan="2">Semester of Delivery</td><td colspan="2">three</td></tr>
<tr><td>Administering Department</td><td>Department of Electrical Engineering</td><td>College</td><td colspan="3">Engineering</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Professor</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">Doctor</td></tr>
<tr><td>Module Tutor</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>10/5/2026</td><td>Version Number</td><td colspan="3">1.0</td></tr>
</table>

<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td>None</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td>None</td></tr>
</table>

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of studying the democracy and human rights topics is to: 1. Understand the concept of human rights and explore their sources, including international, regional, national, and religious sources. 2. Define administrative corruption, explore its types, and understand its detrimental effects on society. Study methods to combat administrative corruption and promote transparency, accountability, and good governance. 3. Trace the historical development and evolution of human rights, examining key milestones and movements that have shaped the modern understanding of human rights. 4. Differentiate between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. Explore legal, institutional, and societal guarantees to prevent human rights violations, including guarantees of human rights in Islam, national-level protections, and international safeguards. 6. Comprehend the concept of democracy, including its principles, values, and various forms of democratic governance such as direct, semi-direct, indirect, and digital democracy. Overall, studying these topics aims to develop a comprehensive understanding of human rights, democracy, and combating corruption, empowering individuals to actively promote and protect human rights and democratic values in society.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After these module aims, students should be able to: 1. Demonstrate a comprehensive understanding of the concept of human rights and their sources, including international, regional, national, and religious sources. 2. Identify and explain the fundamental characteristics of human rights, such as universality, indivisibility, interdependence, and inalienability. 3. Analyze the historical emergence and evolution of human rights, including key milestones and movements that have shaped their development. 4. Differentiate between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. Evaluate and apply legal, institutional, and societal guarantees to prevent human rights violations, considering guarantees in Islam, at the national level, and within the international framework. 6. Understand and discuss the concept of democracy, including its principles, values, and different forms of democratic governance. 7. Evaluate the Islamic stance on democracy and engage in critical analysis of the strengths and weaknesses of the democratic system. 8. Recognize and assess the impact of administrative corruption on society and propose methods to combat and prevent corruption in administrative systems. 9. Demonstrate critical thinking skills by analyzing and evaluating different

	perspectives on human rights, democracy, and corruption. 10. Apply acquired knowledge and skills to promote and protect human rights, democracy, and good governance in personal, professional, and civic contexts. Overall, students should have a solid understanding of democracy and human rights, democracy, and corruption issues, and be able to apply this knowledge to contribute to the advancement of human rights and democratic values in society.
Indicative Contents المحتويات الإرشادية	The indicative content includes: 1. Definition and sources of democracy and human rights (international, regional, national, religious). [3h] 2. Characteristics of democracy and human rights: universality, indivisibility, interdependence, inalienability. [3h] 3. Emergence and evolution of human rights: historical development, key milestones, influential movements. [3h] 4. Types of human rights: civil and political, economic and social, environmental, cultural, and developmental. [3h] 5. Guarantees to prevent human rights violations: legal, institutional, societal safeguards, Islamic guarantees, national and international levels. [3h] 6. Concept of democracy: principles, values, forms of governance (direct, semi-direct, indirect). [3h] 7. Islamic stance on democracy: compatibility, strengths, weaknesses. [3h] 8. Critique of the democratic system: analysis of strengths and weaknesses. [3h] 9. Administrative corruption: definition, types, societal impact. [3h] 10. Methods to combat administrative corruption. [3h]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to learning and teaching strategies for a human rights module, there are several approaches can be taken to enhance understanding and engagement. Here are some effective strategies: 1. Interactive Discussions: Encourage students to actively participate in discussions, debates, and group activities. This promotes critical thinking, allows for different perspectives to be shared, and fosters a deeper understanding of human rights issues. 2. Case Studies: Present real-life case studies that highlight human rights violations or achievements. Analyzing these cases helps students apply theoretical concepts to practical situations and develops their problem-solving skills.

	3. Research Projects: Assign research projects on specific human rights topics or issues. This encourages independent learning, critical analysis, and the development of research skills. 4. Collaborative Learning: Foster collaboration among students through group projects or assignments. This encourages teamwork, peer learning, and the exchange of diverse perspectives. 5. Assessment Variety: Use a variety of assessment methods, including essays, presentations, debates, and quizzes, to assess students' understanding of human rights concepts and their ability to apply them to real-world situations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #2, 4, 6 and 8
	Assignments	2	20% (20)	3, 5, 8, 11, 13	LO # 1, 3, 7, 6, 9 and 10
	Projects / Lab.		10% (10)		
	Report	1	10% (10)	13	LO # 2,4,5,7,9and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Definition of human rights and sources of rights (international sources / regional sources / national sources / religious sources).
Week 2	Characteristics of human rights.
Week 3	The emergence and evolution of human rights.
Week 4	Types of human rights / civil and political rights. Economic and social rights. Environmental, cultural, and developmental rights.
Week 5	Guarantees to prevent human rights violations / guarantees of human rights in Islam.
Week 6	Guarantees for the protection of human rights at the national level.
Week 7	Guarantees of human rights at the international level.
Week 8	The concept of democracy.
Week 9	Characteristics of a democratic system.
Week 10	Forms of democratic governance (direct democracy / semi-direct democracy / indirect democracy).
Week 11	Digital democracy / definition and advantages and disadvantages of digital democracy / manifestations of digital democracy.
Week 12	The Islamic stance on democracy.
Week 13	Critique of the democratic system.
Week 14	Administrative corruption / definition and types.
Week 15	Methods to combat administrative corruption.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	ضمانات حقوق الانسان وحمايتها وفقا للقانون الدولي والتشريع الوطني / نبيل عبد الرحمن ناصر الدين	No
Recommended Texts	الديمقراطية وحقوق الانسان / د. امير عبد العزيز	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English language 1**			Module Delivery	
Module Type	**Basic**			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**UOM1021**				
ECTS Credits	**2**				
SWL (hr./sem)	**50**				
Module Level	UGI		Semester of Delivery	2	
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Professor		Module Leader's Qualification	Doctor	
Module Tutor			e-mail		
Peer Reviewer Name	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	59. To develop Communications skills in the English language. 60. To let the students able to read and write in correct Grammer. 61. To develop the skills of writing professional writing 62. To develop the skills of writing emails for future Engineers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	68. Learning Parts of Speech in English 69. Learn different tenses of verbs. 70. Learn active and passive voice. 71. Learn adjectives and adverbs. 72. Learn the correct prepositions. 73. Learn the correct articles
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – learn parts of speech</u> Nouns, verbs, adjectives, articles, pronouns. [9 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] <u>Part B-different tenses</u> Present simple, present perfect, present continuous, past simple, past perfect, past continuous. [9 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] <u>Part C- active and passive voice</u> Active and passive voice, since and for [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their communications skills. This will be achieved through classes, interactive involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	1	20% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Part of speech: Verbs present
Week 3	Part of speech: Verbs past
Week 4	Part of speech: perfect tenses
Week 5	Part of speech: Noun
Week 6	Part of speech: preposition
Week 7	Part of speech: adVerbs
Week 8	Mid-term Exam
Week 9	Part of speech: passive and active
Week 10	Part of speech: since and for
Week 11	Part of speech: articles
Week 12	Part of speech: conjunctions
Week 13	Writing an email
Week 14	Writing an email exercises
Week 15	Technique to fix Grammers.
Week 16	Preparing week before the Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	NEW HEADWAY INTERMEDIATE	Yes
Recommended Texts	ENGLISH GRAMMAR IN USE	No
Websites	https://www.udemy.com/course/english-for-engineers/	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Circuits Analysis I		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	EEEC201				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	Two		Semester of Delivery		Three
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification		Doctor
Module Tutor	Dr. Sarra Ismaiel Khalil		e-mail	saraa2020@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmed Salim Jarallah		e-mail	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Transient Response of First-Order RL and RC circuits, Natural Response, Complete response. 2. Forced response and natural response of First-Order RL and RC circuits, General response, sequential switching. 3. Transient Response of Second Order RLC circuits, Natural response of series RLC circuits. 4. Analysis of overdamped, underdamped and critically damped RLC circuits. 5. Mutual Inductance, Mutual- and self-inductance equations. 6. Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer. 7. T- and PI model the ideal transformer: impedance matching. 8. Two-Port Networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic AC electric circuit. 4. Describe electrical AC voltage, current and power. 5. Define Ohm's law in AC circuits. 6. Identify the basic circuit passive and active elements and their applications. 7. Discuss the various properties of impedance. 8. Explain the two Kirchhoff's laws used in AC circuit analysis. 9. Explain the Analysis Methods used in AC Electrical Circuits.
Indicative Contents المحتويات الإرشادية	1. Transient Response of First-Order RL and RC circuits, Natural Response, Complete response. [12 hrs.] 2. Forced response and natural response of First-Order RL and RC circuits, General response, sequential switching. [12 hrs.] + [1 hr. Quiz]

	3. Transient Response of Second Order RLC circuits, Natural response of series RLC circuits. [12 hrs.] + [1 hr. Quiz] 4. Analysis of overdamped, underdamped and critically damped RLC circuits. [12 hrs.] 5. Mutual Inductance, Mutual- and self-inductance equations. [12 hrs.] 6. Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer. [12 hrs.] + [1 hr. Quiz] 7. T- and PI model the ideal transformer: impedance matching. [12 hrs.] 8. Two-Port Networks. [12 hrs.] + [1 hr. Quiz]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For Electrical Networks in electrical Engineering, students will learn: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. (1)

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	12% (12)	Continuous	LO #1, 5, 8 and 9
	Online Assignments	3	12% (12)	Continuous	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments	1	4% (4)	Continuous	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	3	12% (12)	Continuous	All
	Report	---	---	---	---
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3 hr.	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Transient Response of First-Order RL and RC circuits.
Week 2	Natural Response, and Complete response of First-Order RL and RC circuits.

Week 3	, General response, sequential switching of First-Order RL and RC circuits
Week 4	Forced response and natural response of First-Order RL and RC circuits
Week 5	Transient Response of Second Order RLC circuits
Week 6	Natural response of series RLC circuits. of Second Order RLC circuits, Natural response of series RLC circuits.
Week 7	Analysis of overdamped, underdamped and critically damped RLC circuits.
Week 8	Complete analysis of RLC circuits.
Week 9	Transient analysis of parallel RLC circuits.
Week 10	Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer.
Week 11	T- and PI model the ideal transformer: impedance matching.
Week 12	Two-Port Networks.
Week 13	Terminal equations: a, b, y, z, g and h parameters.
Week 14	Analysis of a terminated 2-port network. Interconnected 2-port networks.
Week 15	Poly-phase Circuits: Single-phase and three phase wire system.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis Eight Edition (William H. Hayt) 2012	Yes
Recommended Texts	Electric Circuits Tenth Edition (James W. Nilsson) 2015	No
Websites	Fundamentals of Electric Circuits (Charles K. Alexander) 2009	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics III		Module Delivery		
Module Type	Basic		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	EEEC202				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	2		Semester of Delivery	3	
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor	
Module Tutor	Ibrahim Ismael Alnaib		e-mail	ibrahim-85353@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmad Salam		e-mail	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	9. Develop problem-solving skills and understand partial differentiation. 10. Understand the chain rule and the total derivative. 11. Understand vectors and units, space coordinates, and space vectors. 12. Understand gradient, divergence, and Curl in curved coordinates. 13. Solving linear differential equations of the first and second order with constant coefficients. 14. Understanding Fourier series.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. Understand the concept of partial derivatives for functions of two or more variables. 11. Understand the concept of the total derivative and its relationship to partial derivatives. 12. Determine whether a critical point is a maximum, minimum, or saddle point using the second derivative test or other methods. 13. Understand vector representation and components in Cartesian coordinates. 14. Understand the geometric interpretation of the vector product. 15. Express gradient, divergence, and curl in terms of curvilinear coordinates. 16. Solve first and second-order linear differential equations with constant coefficients. 17. Understand the need for Fourier series in representing periodic functions. 18. Understand double integrals and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Partial Differentiation and Vectors</u> Partial Differentiation, function of two or more variables, partial derivatives, The Chain Rule and total Derivative, maxima, minima and saddle point, Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Product of Three Vectors, Applications [20 hrs.] Revision problem and tutorial classes [5 hrs.]

	Quizzes [1 hr.] <u>Part B- Vector Calculus and Differential Equations</u> Vector Functions and Their Derivatives, Gradient of Scalar Field, Divergence of Vector Field, Curl of Vector Field, Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates, 1st and 2nd order linear differential equations. [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] <u>Part C- Fourier Series and Multiple Integrals</u> Fourier series, Periodic functions and Fourier Series-Euler formulas, Double integrals, areas, and volumes [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5*3)	2 to 12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	7	All
	Report	1	8% (1*8)	8	----
Summative assessment	Midterm Exam	2 hr	10% (1*10)	10	All
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Partial Differentiation: Function of two or more variables, partial derivatives.
Week 2	The Chain Rule and Total Derivative, Maxima, minima, and saddle points.
Week 3	Vectors: Vector components and units, Space coordinates and space vectors.
Week 4	Scalar Product and Vector Product, Units and plane equations.
Week 5	Equations of lines and planes, Product of Three Vectors, Applications of vectors.
Week 6	Vector Functions and Their Derivatives, Gradient of Scalar Field.
Week 7	Divergence of Vector Field, Curl of Vector Field.
Week 8	Mid-term Exam
Week 9	Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates.
Week 10	Introduction to Differential Equations, 1st and 2nd order linear differential equations.
Week 11	Application of differential equations to electrical systems.
Week 12	Transformation of higher order linear differential equations onto coupled differential equations.
Week 13	Periodic functions and Fourier Series-Euler formulas.
Week 14	Application of Fourier series in Electrical Engineering.
Week 15	Double integrals, areas, and volumes
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Calculus By Thomas Finny 13th Edition, Pearson Publisher,2016.	No
Recommended Texts	Advanced Engineering Mathematics, 10th Edition, By Reyszig ERWIN, Publisher 2011.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Electromagnetic Fields	Module Delivery
Module Type	Basic learning activities	☒ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar
Module Code	EEPM203	
ECTS Credits	4	
SWL (hr./sem)	100	

Module Level	2	Semester of Delivery	3
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya @uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	Dr Saad Wasmi Osman	e-mail	s.w.o.luhaib@uomosul.edu.iq
Peer Reviewer Name	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya @uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aims of this module are to: 1. Introduce fundamental coordinate systems and vector analysis required for electromagnetic field theory. 2. Develop a solid understanding of electrostatic fields and forces produced by discrete and continuous charge distributions. 3. Enable students to apply Gauss's law to analyze electric fields and electric flux density for highly symmetric charge configurations. 4. Provide a clear understanding of electric potential, potential difference, and energy concepts in electrostatic fields. 5. Explain the behavior of electric fields in conductors and dielectric materials, including boundary conditions and capacitance. 6. Introduce magnetostatic field concepts and enable analysis of magnetic fields produced by steady current distributions. 7. Develop the ability to apply Biot–Savart law and Ampere's circuital law to practical magnetic field problems. 8. Explain magnetic forces, work, power, and inductance in electromagnetic systems. 9. Introduce time-varying electromagnetic fields and electromagnetic induction principles. 10. Provide a foundation for understanding Maxwell's equations and electromagnetic wave propagation in free space. 11. Prepare students for advanced studies in electromagnetics, antennas, microwave engineering, and communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	19. Apply coordinate systems and vector analysis a. Use rectangular, cylindrical, and spherical coordinate systems. b. Manipulate scalars and vectors using vector algebra, vector components, unit vectors, and vector operations. 20. Analyze electrostatic fields a. Apply Coulomb's law to determine electric force and electric field intensity due to point charges. b. Evaluate electric fields due to multiple point charges and continuous charge distributions (line, surface, and volume charges). 21. Apply Gauss's law

	a. Calculate electric flux density and electric field using Gauss's law for symmetric charge distributions, including point, line, surface, and volume charges. 22. Evaluate electric potential and energy a. Determine work done in moving charges. b. Analyze electric potential and potential difference in electrostatic fields. 23. Analyze conductors, dielectrics, and capacitors a. Explain electric fields in material media. b. Apply boundary conditions at dielectric–dielectric, conductor–dielectric, and conductor–free space interfaces. c. Analyze capacitance and capacitor configurations. 24. Analyze magnetostatic fields a. Apply Biot–Savart law and Ampere's circuital law to determine magnetic fields due to various current distributions. b. Analyze magnetic fields of solenoids, toroids, and coaxial transmission lines. 25. Evaluate magnetic forces, energy, and inductance a. Calculate magnetic force on moving charges and current-carrying conductors. b. Analyze magnetic flux, flux density, work, power, and inductance of conductors and toroids. 26. Analyze time-varying electromagnetic fields a. Apply Faraday's law to determine induced electromotive force. b. Understand electromagnetic induction phenomena. 27. Apply Maxwell's equations a. Use vector calculus operators and the divergence theorem. b. Derive and apply Maxwell's equations to uniform plane waves and wave propagation in free space.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A: Mathematical Foundations (6 hours) • Coordinate systems: rectangular, cylindrical, and spherical (2 hrs) • Scalars and vectors (1 hr) • Vector algebra, vector components, unit vectors (2 hrs) • Vector addition, subtraction, and multiplication (1 hr) Part B: Electrostatics (9 hours) • Coulomb's law and electric force (2 hrs) • Electric field intensity (1 hr) • Electric field of a point charge and multiple point charges (2 hrs) • Electric fields due to continuous charge distributions: o Line charge (2 hrs)

	- Surface and volume charges (2 hrs) Part C: Electric Flux Density and Gauss's Law (6 hours) - Electric flux and electric flux density (1 hr) - Gauss's law: theory and physical interpretation (1 hr) - Applications of Gauss's law: - Point charge (1 hr) - Line charge (1 hr) - Surface charge (1 hr) - Volume charge (1 hr) Part D: Electric Potential and Material Media (6 hours) - Work done in moving a point charge (1 hr) - Electric potential and potential difference (2 hrs) - Conductors and dielectrics: electric fields in material space (1 hr) - Boundary conditions: - Dielectric–dielectric - Conductor–dielectric - Conductor–free space (1 hr) - Capacitance and capacitors (1 hr) Part E: Magnetostatics (9 hours) - Static magnetic fields and magnetic field concepts (1 hr) - Biot–Savart law (2 hrs) - Magnetic field due to different current distributions (1 hr) - Right-hand rule (0.5 hr) - Solenoids and applications (1.5 hrs) - Toroids (1 hr) - Ampere's circuital law and applications (2 hrs): - Infinite line current - Infinite sheet of current - Infinitely long coaxial transmission line Part F: Magnetic Forces and Inductance (5 hours) - Magnetic flux and magnetic flux density (1 hr) - Magnetic force on a moving charge (1 hr) - Work and power in magnetic fields (1 hr) - Inductance: - Inductance of a conductor (1 hr) - Inductance of a toroid (1 hr)

	Part G: Time-Varying Fields and Maxwell's Equations (4 hours) • Faraday's law of electromagnetic induction (1 hr) • Induced electromotive force (1 hr) • Vector operator (del) and divergence theorem (0.5 hr) • Derivation and applications of Maxwell's equations (1.5 hrs) Part H: Electromagnetic Waves (2 hours) • Uniform plane waves (1 hr) • Wave propagation in free space (1 hr) Part I: Revision and Examination Preparation (3 hours) • Comprehensive revision • Problem-solving and exam-oriented examples

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,14	LO #1, 4, 6 and 7
	Assignments	3	12% (12)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Onsite assessment	1	5% (5)		LO #1-7
	Projects				
	Report	8	8% (8)	----	----
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors.
Week 2	Vector analysis: vector algebra, vector components and unit vectors, vector addition and subtraction. vector multiplication. coulomb's law and electric force: the experimental law of coulomb.
Week 3	Electric field intensity: electric field of a point charge, electric field of n point charges. Electric fields due to continuous charge distributions: electric field of a line charge. electric field of a volume of charge.
Week 4	Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge.
Week 5	Electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge.
Week 6	Work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance.
Week 7	dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. Conductors, dielectrics, and capacitance: capacitance and capacitors.
Week 8	Magneto-statics: the static magnetic fields, biot-savart law. magnetic field due to different current distributions. right-hand rule. solenoid, applications of solenoid, toroid. ampere's circuital law,

	applications of ampere's law. applications of ampere's law: infinite line current, infinite sheet of current. infinitely long coaxial transmission line.
Week 9	Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid.
Week 10	Magnetic forces, work & power: force on a moving charge. work and power.
Week 11	Magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force.
Week 12	Maxwell's equations: the vector operator (del) and the divergence theorem
Week 13	Maxwell's equations: derivation of Maxwell's equations and applications.
Week 14	Maxwell's equations: the uniform plane wave.
Week 15	Maxwell's equations: wave propagation in free space.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	William H. Hayt "Engineering Electromagnetics" 4th edition	Yes

Recommended Texts	Schaum's outline of theory and problems of Electromagnetics	Yes
Websites	Nefyodov, Eugene I., and Sergey Smolskiy. Electromagnetic fields and waves. Springer, 2019.	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Transformers			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM204				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	2		Semester of Delivery	3	
Administering Department	Department of Electrical Engineering		College	College of Engineering	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor	
Module Tutor	د. هبة ناظم أمين		e-mail	hkaoaz@uomosul.edu.iq	
Peer Reviewer Name	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electrical Circuit Analysis I & II	Semester	4&3

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**1.** To understand the principle of transformers, E.M.F and transformer construction. **2.** To understand and study transformer on no load and on load. **3.** To understand the transformer equivalent circuit and Separation of core losses. **4.** To study the Regulation of transformer, Losses and efficiency. **5.** To study the Parallel operation of transformer, Three-phase transformer, connections and cooling of transformers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1.** Identify the principle of transformers. **2.** Identify the transformer on no load and on load. **3.** Identify the Regulation of transformer, Losses and efficiency. **4.** Summarize the Parallel operation of transformer, Three-phase transformer.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Transformers working, principle of transformers. Transformer construction, E.M.F equation. Transformer on no load and on load. Transformer equivalent circuit. Open and short circuit test. Separation of core losses. Regulation of transformer. Losses and efficiency. All-Day efficiency. Auto transformer. Parallel operation. Three-phase transformer, connections. Open-Delta Scoot connection, cooling of transformers.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	3	5 (15%)	3,6,11,14	LO 1-4

Formative assessment	Online assignments واجبات بيتية	3	4 (12%)	3 to 12	LO 1-4
	واجبات داخل الكلية Onsite Assignments	1	5 (5%)	5 to 8	LO 1-4
	Report	1	8 (8%)	13	LO 1-4
Summative assessment	Midterm Exam	2 hr	10%	7	LO 1-4
	Final Exam	3 hr	50%	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Applications of Transformers. • Basic Concepts: Understanding electromagnetism, Faraday’s law, and mutual induction. • Construction and Working Principle: Core Design: Material selection, core type, and core design considerations.

	• Winding Design: Materials, insulation, and layout. • Thermal Design: Cooling methods, temperature rise, and thermal performance.
Week 2	Types of Transformers: Step-up, step-down, power, distribution, and instrument transformers.
Week 3	Transformer Parameters • Equivalent Circuit: Deriving the equivalent circuit parameters.
Week 4	Transformer Parameters • Impedance and Losses: Core losses (hysteresis and eddy current), copper losses, and efficiency.
Week 5	Transformer Testing • Open Circuit Test: Determining core losses and magnetizing reactance. • Short Circuit Test: Determining copper losses and leakage reactance. • Polarity Test: Importance and procedure for testing polarity.
Week 6	Transformer Testing • Polarity Test: Importance and procedure for testing polarity.
Week 7	Mid-term Exam
Week 8	Transformer Performance • Efficiency: Calculating efficiency under different load conditions.
Week 9	Transformer Performance

	• Voltage Regulation: Importance, calculation, and factors affecting voltage regulation. • Load Characteristics: Performance under varying loads.
Week 10	Transformer Performance All day efficiency
Week 11	Transformer Theory • Ideal Transformer: Assumptions, voltage transformation ratio, and basic equations. • EMF Equation: Derivation and significance. • Turns Ratio and Voltage Regulation: Impact on performance and efficiency.
Week 12	Three-Phase Transformers • Connections: Y-Y, Y-Δ, Δ-Y, Δ-Δ connections, and phase shift implications.
Week 13	Three-Phase Transformers • Parallel Operation: Conditions for successful parallel operation, load sharing, and voltage regulation. • Open-Delta and Scott Connection
Week 14	Special Transformers • Autotransformers: Construction, working principle, advantages, and disadvantages.
Week 15	Special Transformers • Instrument Transformers: Current transformers (CTs) and potential transformers (PTs) for measurement and protection. • Isolation Transformers: Applications and significance in safety.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Rajput, R. K. (2004). A Textbook of Electrical Technology. Firewall Media.	Online (yes)
Recommended Texts	1. Del Vecchio, R. M., Poulin, B., Feghali, P. T., Shah, D. M., & Ahuja, R. (2001). Transformer design principles: with applications to core-form power transformers. CRC press. 2. Harlow, J. H. (2003). Electric power transformer engineering. CRC press. 3. Winders, J. (2002). Power transformers: principles and applications. CrC Press. 4. Theraja, B. L. (2014). A textbook of electrical technology. S. Chand Publishing.	Online (yes)
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electronics Principles			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEEC203				
ECTS Credits	4				
SWL (hr./sem)	100				
Module Level	2			Semester of Delivery	Three
Administering Department	2 - (Electrical Engineering)			College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya			e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor			Module **Leader's** Qualification	Doctor
Module Tutor	Mr. Firas Natheer Abdukadir			e-mail	firas_nadheer@uomosul.edu.iq
Peer Reviewer Name	Dr. Ahmad Salam			e-mail	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026			Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	15. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 16. To understand the Basic Transistor Construction through graphical analysis of transistors Connections and biasing. 17. This course deals with the basic concept of the small-signal analysis of the transistors such as D.C. and A.C. Equivalent Circuits. 18. To understand the Load Line Analysis, Operating Point Transistor Parameters, and Rating Amplification Stabilization. 19. To understand the H-parameters, Hybrid Equivalent Circuit. Z-parameters, R-parameters Equivalent Circuit. 20. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 21. To Describe and operation of the Multistage Transistor Amplifiers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	28. Recognize the regions of operation, graphical analysis of BJT, regions of operation stability. 29. List the various terms associated with bias configuration of the transistors. 30. Summarize what is meant of the practical circuit of transistor amplifier. 31. Describe the types of multistage amplifiers. 32. Discuss the various properties of transistors used as an amplifier 33. Explain the transistor construction and operation such as amplifier and switching. 34. Explain the operation of the linear amplifier through the a.c. load line and DC load line analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Transistor Construction, Operation, and Stabilization</u> Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection, Transistor Curves, Cutoff and

	Saturation. Transistor as a switch. Common Collector Connection. Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification. Stabilization, Stability Factor Methods of Transistor Biasing. [15 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] <u>Part B- D.C and A.C Equivalent Circuits of the transistors</u> Practical Circuit of Transistor Amplifier, D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit. r-parameters, r-parameters Equivalent Circuit. The Linear Amplifier. [15 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] <u>Part C- Transistor Bias Configuration and Multistage Transistor Amplifiers</u> The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration, Common-Emitter Emitter Bias Configuration, Common – Emitter Collector Feedback Configuration, Common – Emitter Voltage Divider Configuration. The Common – Collector Amplifier, the Common – Base Amplifier. Multistage Transistor Amplifiers. [15 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	3	12% (4)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Onsite Assignments	1	5% (5)	----	-----
	Report	1	8% (8)	Continuous	All
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Transistor Construction. Transistor Symbols. Transistor Operation.
Week 2	Transistor Connections: Common Base CB Connection, Common Emitter CE Connection.
Week 3	Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection.
Week 4	Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification.
Week 5	Stabilization, Stability Factor Methods of Transistor Biasing.
Week 6	Practical Circuit of Transistor Amplifier.
Week 7	D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits.
Week 8	Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit.
Week 9	Transistor ac Equivalent Circuits, r-parameters, r-parameters Equivalent Circuit.
Week 10	The Linear Amplifier.
Week 11	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration.
Week 12	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Emitter – Bias Configuration, Common – Emitter Collector Feedback Configuration.
Week 13	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Voltage Divider Configuration.
Week 14	The Common – Collector Amplifier, the Common – Base Amplifier.
Week 15	Multistage Transistor Amplifiers.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	Electrical Engineering Lab. I		Module Delivery	
Module Type	Core		☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEEC206			
ECTS Credits	3			
SWL (hr./sem)	75			
Module Level	2		Semester of Delivery	3
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor
Module Tutor	Dr. Ahmed Salim Jarallah		e-mail	Ahmed.salim@uomosul.equ.iq
Peer Reviewer Name	Dr. Ahmed Salim Jarallah		e-mail	Ahmed.salim@uomosul.equ.iq
Scientific Committee Approval Date	10/5/2026		Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	22. To handle laboratory equipment and electrical elements professionally and scientifically. 23. To analyze electrical circuits and comprehend their operational principles. 24. To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 25. To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 26. To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	35. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 36. Ability to analyze electrical circuits and understand the nature of their work(ii). 37. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 38. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 39. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0%(0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (10)	---	---
Summative assessment	Midterm Exam	2Hr	10% (10)	7	LO # 1-5
	Final Exam	3Hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction & representation about first group of experiments
Week 2	Thevenin theory in AC circuits
Week 3	Measurement of power factor in electrical networks
Week 4	Study of I-V characteristics of normal diode & zener diode
Week 5	First quiz
Week 6	Introduction & representation about second group of experiment
Week 7	Diode application I: Rectifier filters
Week 8	Diode application II: Clipping & clamping circuits
Week 9	Transient condition for R-L & R-C circuits
Week 10	Second quiz + first term theoretical exam. for 1st &2nd group
Week 11	First term practical exam
Week 12	Introduction & representation about third group of experiment
Week 13	Transient condition for RLC circuits
Week 14	Transformer tests: open, short & load test
Week 15	Study of common emitter transistor characteristics

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Electrical technology (twenty-third edition) BL.THERAJA, AK. THERAJA S. Chand and company Ltd. (2005), ISBN: 81-219-2440-5. • Electronics devices (Ninth edition) by Thomas L. Floyd (2012), Prentice Hall ISBN-13: 978-0-13-254986-8.	No
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound works with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Course Description Form

1. Course Name:	
The crimes of the baath regime in Iraq	
2. Course Code:	
3. Semester/Year:	
2026-2025	
4. Description Preparation Date:	
2025-09-15	
5. Available Attendance Forms:	
Individual group	
6. Number of Credit Hours(Total)/Number of Units(Total)	
18 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: wisam jamal jamal Email: wisam.jamal@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	• Educating students about the crimes committed by the Baath regime in Ir ………… • Guiding students to familiarize themselves With crimes………… • Educating students about the seriousness of crimes…………
9. Teaching and Learning Strategies	
	Through the prescribed book

Strategy	

10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or Subject Name	Learning Method	Evaluation Method
First second third fourth fifth sixth Seventh Eighth Ninth 10th	2 2 2 2 2 2 2		The concept crimes and their types Types of trinational crime Political crime Exam Sociai Crime The crime of suppressing the Shaaban uprising psychologial crimes of the baath regime of disrupting Friday prayers Mass grave crimes	View Sfei minutes a contributio = = = = = =	Written lecture = = = = = =

Eleven twelfth Thirteenth Fourth Fifteenth	2 2 2 2 2 2 2		Chemical attack on Haiabja Use of internationally Exam Environmental crimes of the baath regime in Iraq Incidents of cemeteries and genocide committed dy the Baathist regime in Iraq	= = = = = = =	= = = = = = =

11.Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports 1.The theoretical exam inside the hall

2.The daily exam

3.Numders of activities within the class

4.Question-answer and exam

5.Monthly exam.... etc	
12.Learning and Teaching Resources	
Required textbooks(curricular books, if any)	Course book
Main references (sources)	
Recommended books and references (scientific journals, reports)	
Electronic references, websites	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Arabic Language 2		Module Delivery
Module Type	Basic		☒ Theory
Module Code	UOM2012		
ECTS Credits	50		

SWL (hr./sem)	2		
Module Level	2	Semester of Delivery	3
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya @uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	سوسن أمين خضر	e-mail	sausan.zakar@uomosul.edu.iq
Peer Reviewer N	Ahmad Salam	e-mail	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- تنمية مهارات الطلبة في استخدام اللغة العربية استخدامًا سليمًا في السياقات الأكاديمية والعلمية. 2- تمكين الطلبة من فهم النصوص العلمية والهندسية المكتوبة باللغة العربية وتحليلها. 3- تطوير قدرة الطلبة على التعبير الكتابي والشفهي بأسلوب واضح ودقيق. 4- تعزيز مهارات الكتابة الوظيفية المرتبطة بالتخصص الهندسي مثل التقارير والمراسلات الرسمية. 5- ترسيخ قواعد اللغة العربية الأساسية بما يخدم التواصل العلمي والمهني. 6- تنمية مهارات التفكير النقدي والتحليل اللغوي لدى الطلبة. 7- تعزيز الثقة بالنفس في استخدام اللغة العربية في العروض والمناقشات العلمية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- يميز بين بناء الفعل للمعلوم وبنائه للمجهول، ويستخدم كليهما استخدامًا صحيحًا في الجمل والنصوص الوظيفية. 2- يتعرف على أقسام الأفعال في اللغة العربية (ماضٍ، مضارع، أمر) ويفرق بينها من حيث الصيغة والدلالة والاستعمال. 3- يحدد علامات الجزم وعلامات النصب للأفعال المضارعة، ويطبقها تطبيقًا سليمًا في الكتابة الأكاديمية. 4- يستخدم الأعداد في اللغة العربية استخدامًا صحيحًا من حيث التذكير والتأنيث، والإعراب، وتمييز العدد. 5- يفرق بين حرفي الضاد والظاء نطقًا وكتابة، ويتجنب الأخطاء الشائعة المرتبطة بهما. 6- يوظف علامات الترقيم توظيفًا صحيحًا في النصوص الكتابية بما يحقق الوضوح والدقة في المعنى. 7- يتعرف على الأغلاط اللغوية الشائعة في الاستعمال الكتابي والشفهي، ويصححها وفق القواعد اللغوية. 8- يميز بين المفعول فيه (الظرف) والمفعول معه من حيث التعريف والدلالة والإعراب. 9- يعرب الجمل التي تحتوي على المفاعيل المختلفة إعرابًا صحيحًا. 10- يطبق القواعد النحوية المدروسة في صياغة جمل ونصوص علمية ووظيفية سليمة لغويًا. 11- ينمي مهارته في التحليل اللغوي وربط القاعدة بالتطبيق العملي. 12- يظهر دقة لغوية ومسؤولية أكاديمية في الكتابة والتعبير
Indicative Contents المحتويات الإرشادية	. بناء الفعل في اللغة العربية

	• تعريف الفعل المعلوم والفعل المجهول • صيغ بناء الفعل للمعلوم • صيغ بناء الفعل للمجهول • تحويل الفعل من المعلوم إلى المجهول • تطبيقات لغوية من نصوص علمية ووظيفية 2. أقسام الأفعال في اللغة العربية • الفعل الماضي: خصائصه ودلالاته • الفعل المضارع: خصائصه ودلالاته • فعل الأمر: صوغه واستعماله • دلالة الزمن في الأفعال • تطبيقات عملية على استعمال الأفعال 3. نصب الفعل المضارع وجزمه • أدوات نصب الفعل المضارع • علامات النصب الأصلية والفرعية • أدوات جزم الفعل المضارع • علامات الجزم الأصلية والفرعية • الفرق بين النصب والجزم في الاستعمال • تمارين تطبيقية وإعرابية 4. الأعداد في اللغة العربية • تعريف العدد وتمييزه • أنواع الأعداد (المفردة، المركبة، المعطوفة، العقود) • تذكير العدد وتأنيثه • إعراب الأعداد وتمييزها • أخطاء شائعة في استعمال الأعداد • تطبيقات من السياقات العلمية والهندسية 5. الضاد والظاء • الفرق الصوتي والكتابي بين الضاد والظاء

• مواضع شيوع كل حرف • كلمات شائعة يخطئ فيها الطلبة • تدريبات على النطق والكتابة الصحيحة 6. علامات الترقيم • مفهوم علامات الترقيم وأهميتها • الفاصلة، الفاصلة المنقوطة، النقطة • علامة الاستفهام والتعجب • النقطتان، الأقواس، الشرطة • توظيف علامات الترقيم في النصوص العلمية 7. الأغلاط اللغوية الشائعة • أخطاء نحوية شائعة في الكتابة • أخطاء إملائية وصرفية • أخطاء في التراكيب والأساليب • أساليب تصحيح الأخطاء اللغوية 8. المفاعيل في اللغة العربية • المفعول فيه (الظرف): تعريفه وأنواعه • المفعول معه: تعريفه ودلالته • الفرق بين المفعول فيه والمفعول معه • إعراب المفاعيل وتطبيقاتها • أمثلة من النصوص العلمية والوظيفية 9. التطبيقات اللغوية • تحليل نصوص مختارة • إعراب جمل مختارة • كتابة جمل ونصوص قصيرة وفق القواعد المدروس	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	17	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	33	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	3	15% (5*3)	2 to 12	L0#1-4-6-7

Formative assessment	Assignments	3	12% (4*3)	2 to 12	L0#1-4-6-7
	Classwork	1	5% (1*5)	7	-----
	Report	1	8% (1*8)	8	-----
Summative assessment	Midterm Exam	2 hr	10% (1*10)	10	LO#4-7
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	بناء الفعل للمعلوم والمجهول
Week 2	أقسام الأفعال في العربية
Week 3	علامات الجزم في اللغة العربية
Week 4	علامات النصب في اللغة العربية
Week 5	الأعداد في اللغة العربية
Week 6	الفرق بين الضاد والظاء
Week 7	علامات الترقيم
Week 8	أغلاط شائعة
Week 9	المفعول فيه

Week 10	المفعول معه
Week 11	المفعول لأجله
Week 12	من القرآن الكريم -سورة الاسراء
Week 13	من الأحاديث النبوية – ان الله يحب اذا عمل احدكم عملا ان يتقنه
Week 14	من النصوص الأدبية- دالية أبي العلاء المعري
Week 15	من النصوص الأدبية- رُب ليل كأنه الصبح في الحُسن
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	جامع الدروس العربية لمصطفى الغلاييني	
Recommended Texts	مغني اللبيب لابن هشام/ شرح ابن عقيل	
Websites	المكتبة الشاملة	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group	A - Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="8">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">Electrical Circuit Analysis II</td><td colspan="4">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Core</td><td colspan="4" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EEPM208</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">5</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">125</td></tr>
<tr><td colspan="2">Module Level</td><td colspan="2">UGII</td><td colspan="3">Semester of Delivery</td><td>Semester four</td></tr>
<tr><td colspan="2">Administering Department</td><td colspan="2">2 - (Electrical Engineering)</td><td>College</td><td colspan="3">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="3">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya @uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td colspan="2">Professor</td><td colspan="3">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="3">Dr. Sarra Ismaiel Khalil</td><td>e-mail</td><td colspan="3">saraa2020@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="3">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya @uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="3">10/5/2026</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
</table>

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course equips students with the skills to analyze circuits in the S-domain, apply transfer functions, and calculate system outputs using partial fractions and convolution. It covers sinusoidal steady-state response, frequency response, and the design of first-order RL and RC filters. Students will study resonance in series and parallel circuits, Bode plot scaling, and key parameters like resonant frequency, Q-factor, and bandwidth. The course also introduces passive and active filter design, the use of OPAMPs as amplifiers and buffers, and the implementation of Butterworth and cascaded filters for practical applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Analyze electrical circuits in the S-domain using Laplace transform techniques. 2. Apply transfer functions to model linear systems and determine their dynamic behavior. 3. Calculate system outputs using partial fraction expansion and convolution methods. 4. Analyze sinusoidal steady-state responses and evaluate circuit behavior in the frequency domain. 5. Design and analyze first-order RL and RC filters and assess their performance characteristics. 6. Understand and analyze resonance phenomena in series and parallel RLC circuits. 7. Interpret and construct Bode plots, including magnitude and phase scaling. 8. Evaluate key resonance parameters such as resonant frequency, quality factor (Q-factor), and bandwidth. 9. Design and implement passive and active filters for practical engineering applications. 10. Use operational amplifiers (OPAMPs) as amplifiers and buffers in analog circuit design.

	11. Design and analyze Butterworth filters and cascaded filter structures to meet specific frequency response requirements.
Indicative Contents المحتويات الإرشادية	1. Transient response of first-order RL and RC circuits: natural response and complete response. [12 hrs.] 2. Forced and natural response of first-order RL and RC circuits: general response and sequential switching. [12 hrs.] + [1 hr. Quiz] 3. Transient response of second-order RLC circuits: natural response of series RLC circuits. [12 hrs.] + [1 hr. Quiz] 4. Analysis of overdamped, underdamped, and critically damped RLC circuits. [12 hrs.] 5. Mutual inductance: self-inductance and mutual inductance equations. [12 hrs.] 6. Magnetic coupling: coefficient of coupling and linear transformer. [12 hrs.] + [1 hr. Quiz] 7. Ideal transformer models: T-model and π-model, impedance matching. [12 hrs.] 8. Two-port networks and their applications. [12 hrs.] + [1 hr. Quiz]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For Electrical Networks in electrical Engineering, students will learn: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. (1)

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	12% (12)	Continuous	LO #1, 5, 8 and 9
	Assignments	3	12% (12)	Continuous	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	3	12% (12)	Continuous	All
	Report				
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3 hr.	50% (50)	15	All
Total assessment			%100		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Analysis of circuits in S-domain circuit elements.
Week 2	Applications the transfer function.
Week 3	Output calculation using partial fraction.
Week 4	Output calculation using convolution integral.
Week 5	Sinusoidal steady state response from TF.
Week 6	Frequency Response.
Week 7	First- Order RL and RC filters.
Week 8	Series resonance other resonance from scaling bode plots.
Week 9	Parallel RLC resonant circuit resonant frequency: Q-factor, bandwidth cutoff frequencies.
Week 10	Passive filter design.
Week 11	Active filter design.
Week 12	First – order low- pass and high – pass filter.
Week 13	The use of OPAMP as amplifier and Buffer.
Week 14	Butterworth filter.
Week 15	Cascaded filter.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. William H. Hayt, Jack E. Kemmerly, Steven M. Durbin – *Engineering Circuit Analysis*, McGraw-Hill Education. 2. Charles K. Alexander, Matthew N. O. Sadiku – *Fundamentals of Electric Circuits*, McGraw-Hill Education. 3. Richard C. Dorf, James A. Svoboda – *Introduction to Electric Circuits*, Wiley. 4. Robert L. Boylestad – *Introductory Circuit Analysis*, Pearson. 5. Sergio Franco – *Design with Operational Amplifiers and Analog Integrated Circuits*, McGraw-Hill Education. 6. A. Bruce Carlson – *Circuits: Engineering Concepts and Analysis of Linear Electric Circuits*, Thomson Engineering. 7. Leonard S. Bobrow – *Foundations of Electrical Engineering*, Oxford University Press. Allan H. Robbins, Wilhelm C. Miller – *Circuit Analysis: Theory and Practice*, Cengage Learning	
Recommended Texts		
Websites	https://www.allaboutcircuits.com/ https://www.electronics-tutorials.ws/	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mathematics IV			Module Delivery	
Module Type	Basic			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEEC209				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	Basic learning activities		Semester of Delivery		4
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Professor		Module Leader's Qualification		Doctor
Module Tutor	Ibrahim Ismael Alnaib		e-mail	ibrahim-85353@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmad Salam		e-mail	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	27. To develop problem-solving of Eigenvalues and eigenvectors 28. To understand Laplace Transforms. 29. This course deals with the basic concept of DC electrical circuits. 30. To understand the application of Laplace Transforms in electronic circuits. 31. To understand the Fourier, transform and their applications in electrical engineering
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize Eigenvalues and eigenvectors. 2. Summarize series and series geometric. 3. Identify the Laplace Transforms. 4. Identify the Fourier transform their applications. 5. Identify the application in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Eigenvalues and eigenvectors; diagonalization. Sequence and series, sequence convergence, series geometric series, nth partial sum, test of convergence, Laplace Transforms: Introduction to transforms and operators, Laplace transforms of basic functions; unit step function, transforms of 1st and 2nd derivatives, Application to electric circuits; Transforms of piecewise continuous functions Inverse Laplace transforms, derivation using partial fractions. Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems.

	Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5*3)	4,8,12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	Continuous	All
	Report	1	8% (1*8)	----	----
Summative assessment	Midterm Exam	2 hr	10% (1*10)	8	All
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Sequence and series, sequence convergence,
Week 2	series geometric series, nth partial sum, test of convergence,
Week 3	Taylor and Mandarin series,
Week 4	Eigenvalues and eigenvectors; diagonalization.

Week 5	Introduction to transforms and operators, Laplace Transforms
Week 6	Laplace transforms of basic functions
Week 7	unit step function, transforms of 1st and 2nd derivatives
Week 8	Mid-term Exam
Week 9	Inverse Laplace transforms,
Week 10	Application to electric circuits;
Week 11	Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems
Week 12	derivation using partial fractions
Week 13	Transforms of piecewise continuous functions.
Week 14	Fourier transform: Introduction, Fourier transform equation, properties,
Week 15	Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, 10th Edition, By Reyszig ERWIN, Publisher 2011.	No
Recommended Texts	Calculus By Thomas Finny 13th Edition, Pearson Publisher, 2016.	No

Websites	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="4">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td>DC Machines</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td>Core</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td>EEPM210</td></tr>
<tr><td>ECTS Credits</td><td>5</td></tr>
<tr><td>SWL (hr./sem)</td><td>125</td></tr>
<tr><td>Module Level</td><td>2</td><td>Semester of Delivery</td><td>4</td></tr>
<tr><td>Administering Department</td><td>Department of Electrical Engineering</td><td>College</td><td>College of Engineering</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td>o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Professor</td><td>Module Leader’s Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td>د. هبة ناظم أمين</td><td>e-mail</td><td>hkaoaz@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td>o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>10/5/2026</td><td>Version Number</td><td></td></tr>
</table>

<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>Electrical Circuit Analysis I & II</td><td>Semester</td><td>4&3</td></tr>
</table>

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**6.** To understand the principle of Electro-Mechanical Energy Conversion of DC Machine. **7.** To understand Armature. Reaction and communication. **8.** To understand the D.C generator. General principle **9.** To study the Regulation of DC generator, Losses and efficiency. **10.** To study Motors principle. Voltage equation of motor, torque, types of motors. Motor characteristics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**5.** Identify the principle of DC machine. **6.** Identify the Armature. Reaction and communication. **7.** Identify the Regulation of DC generator, Losses and efficiency. **8.** Summarize the testing of DC machines and Speed control of D.C motors.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Principles of Electro-Mechanical Energy Conversion. Classification of Electrical machines. D.C generator. General principle. Construction and working, E.M.F equation. Armature Winding Armature. Reaction and communication, types of generation. Losses in generator. The efficiency, generation characteristics. Parallel operation of D.C generator. D.C Motors principle. Voltage equation of motor, torque, types of motors. Motor characteristics, power stages, losses and efficiency. Speed control of D.C motors, breaking. Starters, testing of D.C Machines Permeant D.C Machines.

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	3	5 (15%)	3,6,11,14	LO 1-4

Formative assessment	Online assignments واجبات بيتية	3	4 (12%)	3 to 12	LO 1-4
	واجبات داخل الكلية Onsite Assignments	1	5 (5%)	5 to 8	LO 1-4
	Report	1	8 (8%)	13	LO 1-4
Summative assessment	Midterm Exam	2 hr	10%	7	LO 1-4
	Final Exam	3 hr	50%	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Principles of Electro-Mechanical Energy Conversion.
Week 2	Classification of Electrical machines.
Week 3	D.C generator. General principle.

	• Construction and working, E.M.F equation.
Week 4	D.C generator. General principle. • • Armature Winding Armature. Reaction and communication, types of generation.
Week 5	D.C generator. General principle. • Losses in generator. The efficiency, generation characteristics.
Week 6	Parallel operation of D.C generator.
Week 7	Mid-term Exam
Week 8	D.C Motors principle. • Voltage equation of motor, torque.
Week 9	D.C Motors principle. • Types of motors. Motor characteristics.
Week 10	D.C Motors principle. • power stages, losses and efficiency.
Week 11	Speed control of D.C motors
Week 12	Breaking of D.C motors.
Week 13	Starters of D.C motor
Week 14	Testing of D.C Machines Permeant D.C Machines.
Week 15	Testing of D.C Machines Permeant D.C Machines.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Theraja, B. L. (2014). A textbook of electrical technology. S. Chand Publishing.	Online (yes)
Recommended Texts	Rajput, R. K. (2004). A Textbook of Electrical Technology. Firewall Media.	Online (yes)
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Distribution Systems**			Module Delivery	
Module Type	**Core**			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**EEPM211**				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	Second-Power and machines			Semester of Delivery	6
Administering Department	Department of Electrical			College	Engineering
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya			e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor			Module **Leader's** Qualification	Doctor
Module Tutor	M.Sc. Ahmed Bassam Aziz			e-mail	ahmed.aziz@uomosul.edu.iq
Peer Reviewer Name	M.Sc. Ahmed Bassam Aziz			e-mail	ahmed.aziz@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026			Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	Power Distribution Systems: The module aims to familiarize students with the distribution of electrical power from the transmission grid to end-users. It covers distribution network design, components, and operation, including substations, distribution transformers, switchgear, and protection systems. Students learn about the challenges associated with distribution system operation, such as voltage regulation, power quality, and reliability.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. Familiarity with Power Distribution Systems: Students will gain a solid understanding of power distribution systems, including network design, components, and operation. They will become knowledgeable about substations, distribution transformers, switchgear, and protection systems. They will understand the challenges associated with voltage regulation, power quality, and system reliability in distribution networks. 2. Students will be able to apply engineering principles and concepts to solve practical problems related to distribution systems. They will develop problem-solving skills and apply their knowledge to design efficient and

	reliable power systems, address system vulnerabilities, and optimize system performance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Distribution Systems:</u> Introduction, Classification of Distribution System, Methods of Connection, Comparison among Distribution Systems, Type of D.C Distributions: D.C Distributor fed at One End-Concentrated Loading, D.C Distributor fed at Both End-Concentrated Loading, D.C Distributor fed at One End with Uniformly Distributed Load, D.C Distributor fed at Both Ends with Uniformly Distributor Load, D.C Ring Distributor, Ring Distributor with Inter-Connector, Stepped Distributor, Classification of A. C. Distribution Systems. Methods of Connection, Single Phase Distribution Systems, Three Phase Distribution Systems. Types of A. C. Distribution Systems. A. C. Radial Systems: A. C. Distributor fed at one end. A. C. Distributor fed at both ends. A. C. Ring Systems Protection of Distribution Systems, Distribution Transformers, Types of Sub-Stations, Sub-Stations Measurements Devices. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [3 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	60	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	120		

Module Evaluation تقييم المادة الدراسية					
As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	4% (4)	3,6,11	LO # 1,2, and 3
	Assignments	3	4% (4)	2 to 15	LO # 1,2, and 3
	Projects / Lab.				
	Report	1	8% (8)	7	LO # 1,2, and 3
Summative assessment	Midterm Exam	1.5hr	10% (10)	8	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	Material Covered
Week 1	Introduction to Distribution Systems.
Week 2	Classification of DC Distribution Systems.
Week 3	Comparison among Distribution Systems.
Week 4	Mathematical methods for calculation currents, voltages, voltage drops, resistance.
Week 5	Solve examples, class works, homeworks.
Week 6	Classification of AC Distribution Systems.
Week 7	Single Phase Distribution Systems.
Week 8	Solve examples, Quiz.
Week 9	three Phase Distribution Systems.
Week 10	Distribution Transformers.
Week 11	Solve examples, class works, homeworks.
Week 12	Midterm exam
Week 13	Types of Sub-Stations.
Week 14	Sub-Stations Protection Devices.
Week 15	Sub-Stations Measurements Devices.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. Power Distribution Planning Reference Book by H. Lee willis, 2014. 2. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo, 2009. 3. A Course in Electrical Power. By J. B. Gupta. 4. Electric Power Generation, Transmission, and Distribution. Edited By Leonard L. Grigsby. 5. Electric Power Distribution Reliability. By Richard E. Brown Power & Machines.	Yes
Recommended Texts	6. Electrical Engineering Fundamentals by S. Bobby Rauf, 2020	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="2">Renewable Energies Siences</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">Core learning activity</td><td colspan="3" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">EEPM212</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">2</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="2">50</td></tr>
<tr><td colspan="2">Module Level</td><td>Second- Power and Machines</td><td colspan="2">Semester of Delivery</td><td>four</td></tr>
<tr><td colspan="2">Administering Department</td><td>Department of Electrical Engineering</td><td>College</td><td colspan="2">Engineering</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Raghad Adeeb Othman</td><td>e-mail</td><td colspan="2">raghadeeb@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td colspan="2">Version Number</td><td>1.1</td></tr>
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	• Understanding the physical and engineering principles underlying technologies for converting renewable energy into usable electrical or thermal energy. • Enabling students to analyze renewable energy resources and assess their potential in different regions, especially in hot and arid environments like Iraq. • Giving students basic skills in designing renewable energy systems (such as photovoltaic solar systems). • Developing the ability to evaluate the performance and efficiency of renewable energy systems through technical calculations and operational data. • Familiarizing students with the economic and environmental aspects of renewable energy projects, such as investment costs, payback periods, and emissions reduction. • Enhancing students' awareness of the role of renewable energy in sustainable development and energy security. • Preparing students to review global standards and trends in renewable energy issued by international organizations such as the International Renewable Energy Agency (IRENA).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the course, the student will be able to 1. analyze renewable energy resources, 2. design simple systems based on them, 3. evaluate their performance and economic and environmental feasibility, 4. link theoretical aspects to practical applications in the local context.
Indicative Contents المحتويات الإرشادية	W1 Understanding Electrical Energy and Its Sources • The concept of energy and its forms • Classification of energy sources

	• Definition of electrical energy and electrical power • Mathematical questions W2 Introduction to Renewable Energy Sciences • Introduction to Traditional and Renewable Energy Sources • Motivations for the Transition to Renewable Energy • Energy Challenges in the World and Iraq • Advantages and Disadvantages of Renewable Energy • Understanding the Concept of Energy Security • Reviewing Statistics Issued by the International Renewable Energy Agency (IRENA). W3 Solar and Photovoltaic Energy • Principle of photovoltaic conversion • Types of solar cells • Current-voltage (I-V) and power-voltage (PV) curves • Effect of temperature and radiation • Series and parallel connections • Calculation of voltage, current, and power • Standard rating factors (STC) W4 Solar thermal energy • The concept of solar thermal energy and the difference between it and photovoltaic solar energy • The principle of converting solar radiation into thermal energy • Types of solar thermal energy systems: • Types of solar thermal collectors: • Basic components of a solar thermal system: • Methods of storing thermal energy • Factors affecting system performance: • Technical and environmental advantages of solar thermal energy • Technical and economic challenges • Suitability of solar thermal energy systems for hot and arid environments (such as Iraq) W5 wind energy • Wind Turbine Working Principle • Types of Wind Turbine Farms

	• Turbine Power Curve • Cutoff, Input, and Output Speeds • Selecting the Right Site • Calculating Power Generation W6 Hydroelectric energy • The Concept of Hydropower and Its Importance in Renewable Energy Systems • The Principle of Converting Water Energy into Mechanical Energy and then into Electrical Energy • Basic Components of a Hydropower Plant • Types of Hydropower Plants • Types of Water Turbines • Factors Affecting Power Generation • The Basic Equation for Calculating Hydropower W7 Geothermal energy • The concept of geothermal energy and its natural sources • The Earth's thermal structure and geothermal heat sources • The principle of converting geothermal energy into electrical energy • Types of geothermal resources • Types of geothermal power plants • Basic components of a geothermal power plant • Direct uses of geothermal energy W8 Tidal energy (ocean energy) • The concept of ocean energy and its main types • The concept of tidal energy and its physical source • The principle of converting tidal energy into electrical energy • Tidal energy utilization methods and technologies • Basic components of a tidal energy system • Operating principle of tidal turbines • Characteristics of the energy resource W9 Biofuel energy • The Concept of Biofuels and Their Importance in Renewable Energy Systems • Sources of Biofuels (Agricultural Crops, Agricultural Waste, Organic Waste) • Types of Biofuels • Biofuel Production Technologies

	• Different Generations of Biofuels (First, Second, and Third Generation) • Physical and Energy Properties of Biofuels • Comparison of Biofuels to Fossil Fuels W10 Storage system • The Concept of Energy Storage and Its Importance in Renewable Energy Systems • The Role of Storage Systems in Addressing the Fluctuations of Renewable Energy Sources • Classification of Energy Storage Systems • Electrochemical Storage Systems • Mechanical Storage Systems • Thermal Storage Systems • Chemical (Hydrogen) Storage Systems • Basic Components of Storage Systems • Key Performance Indicators (KPIs) for Storage Systems W11 hydrogen fuel cell • Introduction to Hydrogen as an Energy Carrier • The Concept and Principle of Operation of a Hydrogen Fuel Cell • Electrochemical Reactions within a Fuel Cell • Types of Fuel Cells (PEMFC, SOFC, AFC, MCFC) • Basic Components of a Fuel Cell System • Performance and Efficiency Characteristics of Fuel Cells • Methods of Hydrogen Production • Methods of Hydrogen Storage and Transportation • Integrating Fuel Cells with Renewable Energy Systems • Applications of Hydrogen Fuel Cells (Transportation, Buildings, Standby Systems, Backup Generation) W12 Hybrid Renewable Energy Systems • The Concept of Hybrid Systems • Combining Solar with Wind or Diesel • Control Strategies • Improving Reliability W13 Economic Aspects of Renewable Energy Projects • Investment Costs • Operating and Maintenance Costs • Backup Period • Comparison of Renewable and Conventional Systems

	W14 Environmental and Social Impacts and Supporting Policies • Emissions Reduction • Impact on Rural Development • The Role of Policies and Legislation • The Role of International Organizations such as the International Renewable Energy Agency and the International Energy Agency W15 Case study and practical application of a renewable energy project • Real site analysis • Resource estimation • Selection of the appropriate system • Presenting and discussing design results

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures • Structured lectures introduce fundamental concepts, theories, and analytical techniques . • Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. 2. Problem-Solving Sessions • Active student participation is encouraged through in-class discussions. • Forming groups of students to prepare specialized reports on the scientific subject and present them during discussion sessions with the students. 3. Self-Directed Learning • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support deeper understanding. 4. Continuous Feedback • Regular formative feedback is provided through assignments, quizzes, and reports. • Feedback helps students identify strengths and areas for improvement.
Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا	

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	15	5,8,11	1-4
	Assignments	1/3	12	2,4,7	1-3
	CLASSWORK	1/1	5	4	1-4
	Report	1/1	8	CONTINUES	1-4
Summative assessment	Midterm Exam	1.5/1	10	7	1-4
	Final Exam	3/1	50	16	1-4
Total assessment			100		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Understanding Electrical Energy and Its Sources
Week 2	Introduction to Renewable Energy Sciences
Week 3	Solar and Photovoltaic Energy
Week 4	Solar thermal energy
Week 5	wind energy
Week 6	Hydroelectric energy
Week 7	Exam
Week 8	Geothermal energy
Week 9	Tidal energy (ocean energy)
Week 10	Biofuel energy
Week 11	Storage system
Week 12	hydrogen fuel cell
Week 13	Hybrid Renewable Energy Systems
Week 14	Economic Aspects of Renewable Energy Projects
Week 15	Environmental and Social Impacts and Supporting Policies
Week 16	Case study and practical application of a renewable energy project

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	FUNDAMENTALS OF SMART	

	GRID SYSTEMS, By: MUHAMMAD KAMRAN	
Recommended Texts	DESIGN OF SMART POWER GRID RENEWABLE ENERGY SYSTEMS, By: ALI KEYHANI	
	HANDBOOK OF RENEWABLE ENERGY TECHNOLOGY, By : Ahmed F. Zobaa Brunel University, U.K. Ramesh C. Bansal, The University of Queensland, Australia	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Electrical Engineering Lab. II	Module Delivery	
Module Type	Core	☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEEC213		
ECTS Credits	3		
SWL (hr./sem)	75		
Module Level	2	Semester of Delivery	3
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	Dr. Ahmed Salim Jarallah	e-mail	Ahmed.salim@uomosul.equ.iq
Peer Reviewer Name	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course deals with general and different topics in the fields of electronic and power within the framework of the student's curriculum and includes practical experiences in studying the characteristics of the diode and its applications and the types of connection of the transistor and its advantages. This course also covers the study of transient conditions in electrical circuits and transformer tests and DC machines
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course designed to develop the students' abilities about using the different measurement equipment's that necessary to execute the practical experiments. Also this course covered the need of students to investigate the theoretical subjects according to practical method that's will improve the scientific level of students through this course By the end of this course, student should be able to: • Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). • Ability to analyze electrical circuits and understand the nature of their work(ii). • Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). • Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). • Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Components and values DC circuits, Current and voltage definitions, Passive sign convention and circuit elements,

	Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] Part B- Circuit reduction combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] Part C- Circuit Theory Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.]

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0%(0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (10)	---	---
Summative assessment	Midterm Exam	2Hr	10% (10)	7	LO # 1-5
	Final Exam	3Hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Study of common base transistor characteristic
Week 3	Lab 3: Common emitter transistor as an amplifier
Week 4	Lab 4: Common Collector transistor as an amplifier
Week 5	Lab 5: Low bass filter
Week 6	Lab 6: band bass filter
Week 7	Lab 7: high bass filter
Week 8	Lab 8: Transistor as a switch & device drive
Week 9	Lab 9: Mid-term exam
Week 10	Lab 10: Digital logics
Week 11	Lab 11: Digital Circuits
Week 12	Lab 12: Study of JFET Transistor characteristics
Week 13	Lab 13: Negative feedback connection
Week 14	Lab 14: Speed control for DC motor
Week 15	Lab 15: preparatory week before the Final exam and review
Week 16	Lab 16 : Final exam

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Electrical technology (twenty-third edition) BL.THERAJA, AK. THERAJA S. Chand and company Ltd. (2005), ISBN: 81-219-2440-5. • Electronics devices (Ninth edition) by Thomas L. Floyd (2012), Prentice Hall ISBN-13: 978-0-13-254986-8.	Yes
Recommended Texts		Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound works with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Mathematical Analysis	Module Delivery	
Module Type	B	☒ Theory ☒ ☐ Lecture Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM301		
ECTS Credits	4		
SWL (hr./sem)	100		
Module Level	3	Semester of Delivery	5
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	Dr. Riyadh Zaki Sabry	e-mail	riyadhzaki@uomosul.edu.iq
Peer Reviewer Name	Mohamad N. Abdul Kadir	e-mail	makadr@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	On successful completion of this subject, students must be able: • To understand the concepts of z transform and to solve the difference equations. • Teaching student, the basic principles of function of complex variables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Discrete time system analysis Z-transforms Inverse Z-transform Difference equations Series solution of differential equation. Power series Frobenious method Bessel differential equation Solutions of Bessel's Equation Applications of Bessel's Equation, functions of complex variables, ; Analytic functions integrations.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	3	12% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (25)		
	On-site assignment	1	5%(5)	12	All
	Report	1	8% (8)	14-	All

Summative assessment	Midterm Exam	1	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Discrete time system analysis , Z transform; sampling
Week 2	Region of convergence
Week 3	properties of z transform
Week 4	properties of z transform
Week 5	Inverse Z transform
Week 6	Convolution
Week 7	Difference equations
Week 8	Mid-term Exam
Week 9	Inverse Z transform
Week 10	Series solution of differential equation
Week 11	Power series Frobenious method
Week 12	Bessel differential equation
Week 13	Solutions of Bessel's Equation Applications of Bessel's Equation
Week 14	Functions of complex variables.

Week 15	functions of complex variables, ; Analytic functions integrations
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011.	Yes
Recommended Texts	Advanced Engineering Mathematics Cengage Learning, Seventh Edition., 2007.	Yes
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="8">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">Transmission Systems</td><td colspan="4">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">Core</td><td colspan="4" rowspan="5">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EEPM302</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">150</td></tr>
<tr><td colspan="2">Module Level</td><td colspan="2">UG III</td><td colspan="3">Semester of Delivery</td><td>5</td></tr>
<tr><td colspan="2">Administering Department</td><td colspan="2">2 - (Electrical Engineering)</td><td>College</td><td colspan="3">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="3">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td colspan="2">Professor</td><td colspan="3">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="3">Dr. Saad Enad Mohammed</td><td>e-mail</td><td colspan="3">saadmohamed@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Peer Reviewer Name</td><td colspan="2">Mohamad N. Abdul Kadir</td><td>e-mail</td><td colspan="3">makadr@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Scientific Committee Approval Date</td><td colspan="2">10/5/2026</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
</table>

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Introduction to power transmission systems: The module aims to provide an overview of power transmission systems, including their importance in electrical power distribution networks. Students learn about the role of power transmission in delivering electricity from power plants to distribution substations. 2. Study of transmission system components: The module aims to familiarize students with the various components of a power transmission system. This may include topics such as transformers, circuit breakers, transmission lines, insulators, and protective devices. Students learn about the functions, characteristics, and operational considerations of these components. 3. Understanding transmission line parameters: The module aims to provide an understanding of transmission line parameters such as resistance, inductance, capacitance, and conductance. Students learn how these parameters affect the performance and efficiency of power transmission systems. 4. Safety and environmental considerations: The module aims to emphasize safety practices and environmental considerations associated with power transmission systems. Students learn about safety protocols, grounding techniques, electromagnetic fields, and environmental impacts of transmission line construction and operation. 5. Practical application and problem-solving: The module aims to develop practical skills in students for designing, analyzing, and troubleshooting power transmission systems. This may involve laboratory experiments, simulation exercises, case studies, and projects to reinforce theoretical concepts.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. Demonstrate knowledge and understanding of the principles, theories, and concepts related to power transmission systems. 2. Explain the role and importance of power transmission systems in electrical power distribution networks. 3. Identify and describe the components of power transmission systems, such as transformers, circuit breakers, transmission lines, and protective devices. 4. Understand the parameters and characteristics of transmission lines, including resistance, inductance, capacitance, and conductance. 5. Apply problem-solving skills to troubleshoot and resolve issues related to power transmission system operation and performance. 6. Apply knowledge of power system reliability and maintenance techniques to ensure the proper functioning of transmission systems. 7. Utilize appropriate tools and techniques to analyze and improve the efficiency and reliability of power transmission systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction of Transmission Systems: Choice of Transmission Voltage, Overhead Transmission Lines (OHTL), Electrical Calculations of OHTL, Mechanical calculations of OHTL, Insulators of OHTL, Corona. [24 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] Representation of Overhead Transmission Lines: Short and Medium Transmission Lines, Long Transmission Lines, Incident and reflected voltage, General Circuit Constant. [24 hrs.] Revision problem and tutorial classes [6 hrs.]
	Quizzes [2 hr.] Electrical Power Cables (EPC): Capacitance of EPC, Current Rating of Cables. [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizzes [1 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 3, 4, 5 and 8
	Assignments	3	12% (12)	2 to 15	LO # 2, 4, 5, 7, and 8
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	11	3,5
	On-site assignment	1	5%(5)	12	4
Summative assessment	Midterm Exam	1	10% (10)	9	1-6
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction Transmission Systems
Week 2	Choice of Transmission Voltage.
Week 3	Overhead Transmission Lines (OHTL).
Week 4	Electrical Calculations of OHTL.
Week 5	Mechanical calculations of OHTL.
Week 6	Insulators of OHTL.
Week 7	Corona
Week 8	Representation of OHTL.
Week 9	Short and Medium Transmission Lines (TL).
Week 10	Long TL.
Week 11	Incident and reflected voltage.
Week 12	General Circuit Constant.
Week 13	Electrical Power Cables (EPC).
Week 14	Capacitance of EPC.
Week 15	Current rating of Cables.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1. A course in Electrical Power by J. B. Gupta.	Yes
Recommended Texts	2. Principles of Power Systems by V. K. Mehta.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	AC Machines	Module Delivery	
Module Type	Core	☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM303		
ECTS Credits	6		
SWL (hr./sem)	150		
Module Level	3	Semester of Delivery	1
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Module **Leader’s** Acad. Title	Professor	Module **Leader’s** Qualification	Doctor
Module Tutor	Dr. Yasir M.Y. Ameen	e-mail	Yasir_752000@uomosul.edu.iq
Peer Reviewer Name	Mohamad N. Abdul Kadir	e-mail	makadr@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering II	Semester	2
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسyة ونتائج التعلم والمحتpqات الإرشادSة	
Module Aims أهداف المادة الدراسyة	1. Understand the concept of rotating magnetic field and understand the principles of the rotating AC machines (induction machines and synchronous machines). 2. Understand and know how to use the equivalent circuit of the induction machine and the synchronous machine. 3. Understand power flows and the power flow diagram. 4. Understand the torque-speed characteristic curve. 5. Understand the philosophy and benefits of speed control methods, starting methods and braking methods. 6. Understand the induction machine used as a generator. 7. Understand the phasor diagrams for a synchronous machine. Understand the equations for power and torque in a synchronous machine, understand how terminal voltage varies with load in a synchronous generator operating alone. 8. Understand the conditions required to parallel two or more synchronous generators, and understand the operation of synchronous generators in parallel with infinite bus. 9. Understand the static stability limit of a synchronous generator. Understand synchronous machine ratings, and what condition limits each rating value. 10. Understand the effect of governor set point changing, load changing and field current changing on the synchronous machine variables. 11. Understand how and why power factor varies as synchronous motor field current varies -the "V" curve.

Module Learning Outcomes مخرجات التعلم للمادة الدراسyة	Upon successful completion of this module, students will be able to: 1- Explain the concept of a rotating magnetic field and its significance in AC machines. 2- Demonstrate a comprehensive understanding of the principles underlying the operation of induction machines and synchronous machines. 3- Apply equivalent circuit models to analyze and predict the behavior of induction machines and synchronous machines. 4- Analyze power flows and power flow diagrams in AC machines, considering factors affecting power transfer and distribution. 5- Interpret and analyze torque-speed characteristic curves, enabling the prediction of machine performance under different operating conditions. 6- Evaluate and understand the operation of induction machines as generators, including considerations for efficient generator mode operation. 7- Construct and interpret phasor diagrams for synchronous machines, and use them to analyze and predict machine behavior. 8- Formulate equations for power and torque in synchronous machines and demonstrate an understanding of how terminal voltage varies with load in a synchronous generator operating independently. 9- Identify and comprehend the conditions required for parallel operation of synchronous generators, and evaluate the operation of synchronous generators in parallel with an infinite bus. 10- Assess the static stability limit of synchronous generators and understand synchronous machine ratings, recognizing the factors that limit each rating value. 11- Analyze the effect of changing governor set points, loads, and field currents on synchronous machine variables, and predict the impact of these changes on machine performance. 12- Analyze the relationship between synchronous motor field current and power factor variations using the "V" curve, explaining how and why power factor varies in synchronous motors.
Indicative Contents المحتpqات الإرشادSة	Indicative content includes the following. Part A: Overview [10hr] 1- Introduction to AC Machines. - Overview of AC machines and their importance in electrical engineering . - Historical background and development of AC machines 2- Rotating Magnetic Field -Concept of a rotating magnetic field -Generation and properties of a rotating magnetic field Part B: Induction Machines [25 hr] -Construction and working principles of induction machines

	-Induction machine equivalent circuit. -Power and torque equations in induction motor -Torque-speed characteristics of induction machines. -speed control methods of induction motor. -Finding equivalent circuit parameters. -Induction machine as a generator. Part C: Synchronous Machines [40 hrs] -Construction and working principles of synchronous machines -Synchronous machine equivalent circuit -Phasor diagrams for synchronous machines -Power and torque equations in synchronous machines and Power Flow Diagrams -Variation of terminal voltage with load in synchronous generators -Synchronous Generators operating alone. -Parallel Operation of Synchronous Generators and Conditions required for parallel operation of synchronous generators -Operation of synchronous generators in parallel with an infinite bus -Stability and Ratings of Synchronous Generators -Effect of governor set point changes and filed current changes on synchronous generator variables -Impact of load changes and filed current changes on synchronous motor performance. Synchronous machine "V" Curves.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Conduct regular lectures to deliver theoretical concepts and foundational knowledge. Use multimedia presentations, diagrams, and examples to enhance understanding. Encourage student participation through discussions and questions. Practical Laboratory Sessions in cooperation with the Course of the Power and Machine Lab to provide students with practical experience in operating AC machines. Case Studies and Problem-Solving Exercises: Assign case studies and problem-solving exercises that simulate real-world scenarios related to AC machines. Encourage students to apply their theoretical knowledge to analyze and solve these problems, fostering critical thinking and problem-solving skills. Group Discussions and Peer Learning: Organize group discussions and collaborative learning activities where students can discuss and share their understanding of AC

	machines. Encourage peer-to-peer teaching and learning, promoting active engagement and the exchange of ideas. Simulations and Virtual Labs: Utilize computer-based simulations and virtual labs to supplement practical learning. These tools can provide interactive experiences and allow students to experiment with different AC machine configurations and operating conditions. Guest Lectures and Industry Visits: Invite industry experts or guest lecturers to share their practical experiences and insights related to AC machines. Arrange visits to relevant industrial facilities to provide students with exposure to real-world applications and challenges. Online Resources and Learning Management Systems: Provide access to online resources, including lecture notes, reference materials, and interactive tutorials. Utilize a learning management system to facilitate communication, assignment submissions, and online discussions. Assessments: Design a variety of assessments, including quizzes, assignments, and examinations, to evaluate students' understanding of the course material. Incorporate practical assessments, such as simulation-based projects, to assess hands-on skills. Feedback and Progress Monitoring: Provide timely and constructive feedback to students on their assignments and assessments. Monitor students' progress throughout the course and offer additional support or clarification when needed. Industry-Engaged Projects: Assign project work that requires students to apply their knowledge of AC machines to real-world problems or industry-related challenges. This could involve designing a motor control system, optimizing power flows, or analyzing the performance of a synchronous generator. By employing a combination of these learning and teaching strategies, students can develop a solid theoretical understanding of AC machines while also gaining practical skills and the ability to apply their knowledge in real-world scenarios.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدرا‰Š المنتظم للطالب خلال الفصل	78	Structured SWL (h/w) الحمل الدرا‰Š المنتظم للطالب أسبوعيا	5

Unstructured SWL (h/sem) الحمل الدرا ‰Š غ P• المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدرا ‰Š غ P• المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدرا ‰Š ال• ‰ • للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5)	2,7,14	LO #1, 2-6, 7-11
	Assignments	3	12% (4)	2 to 14	LO # 2-6, 7,8,10,11
	Projects / Lab.	0	0% (0)	----	----
	On-site assignment	1	5%(5)	12	4
	Report	1	8% (05)	14	All
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introducing to rotating electrical machines and their classifications, Introducing to Rotating MMF Theorem.
Week 2	Construction and characteristics of 3-phase induction motors, Equivalent circuit of three-phase induction machines.
Week 3	Power and torques in three-phase induction machines, Maximum torque and Torque-Speed characteristics.
Week 4	NEMA Design classes of induction motor rotors, Tests to obtain equivalent circuit parameters.
Week 5	Speed control, starting and braking methods of three-phase induction motors.
Week 6	Introduction to Induction generators, Induction generators operating.
Week 7	Construction and characteristics of 3-phase synchronous machines, Derive the equivalent circuit of the synchronous machines, and understand power and torques equations
Week 8	Phasor diagram of synchronous machines for different conditions

Week 9	Operating synchronous generator alone (P-F and Q-V characteristics), Conditions and advantages of parallel operation of S.G, operating with another generator.
Week 10	Parallel operation of S.G with infinite busbar, Understand the effect of Changing governor set point and changing of the field current
Week 11	Rating Limitations of Synchronous generator.
Week 12	Synchronous motors, equivalent circuit, PF control, effect of load changing and field current changing on the motor variables.
Week 13	Phasor diagrams of synchronous machine and V-curves for different cases, Starting methods of Synchronous motors
Week 14	Open and short circuit tests and obtain equivalent circuit parameters, Voltage regulation of synchronous generator
Week 15	General review.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Stephan J. Chapman., Electric Machinery Fundamentals, (5th Edition), McGraw-Hill, New York,2012.	AS PDF
Recommended Texts	J. Hindmarsh, *Electrical Machines and their applications*, *(4th Edition)*, Pergamon Press, Oxford. New York. 1977. V.K Mehta and Rohit Mehta, *principles of electrical machines*, 2nd edition 2008, S.Chand &company LTD د ”اسل محمد سعيد و د ضياء ع‰ • النعمة." مـائن التيار المتناوب" مطوعة جامعة الموصل 1989	AS PDF
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">Electrical Measurements</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">B</td><td colspan="2" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">EEPM304</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">4</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="3">100</td></tr>
<tr><td colspan="2">Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td>5</td></tr>
<tr><td colspan="2">Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader's Acad. Title</td><td>Professor</td><td colspan="2">Module Leader's Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Dr. Wael Hashem Hamdon</td><td>e-mail</td><td colspan="2">Waelhashem_67@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Peer Reviewer Name</td><td>Mohamad N. Abdul Kadir</td><td>e-mail</td><td colspan="2">makadr@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Scientific Committee Approval Date</td><td>10/5/2026</td><td colspan="2">Version Number</td><td>1.0</td></tr>
</table>

<table>
<tr><th>Relation with other Modules

العلاقة مع المواد الدراسية الأخرى</th></tr>
</table>

Prerequisite module	Basics of Electrical Engineering I	Semester	One
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand what is the electrical measurements. 2. To learn what is instrumentation system. 3. To know what are the sources of errors in electrical measurements and how to fix them. 4. To familiarize the students to various types of measuring instruments and their performance characteristics. 5. To design the multi-range ammeters, voltmeters and ohmmeters for both AC and DC circuits. 6. To learn the bridges and their types and how to use them in electrical measurements. 7. To know the oscilloscopes and their applications 8. To explain what are the transducers and their types and their usage in measurements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Student is able to understand the basic principles of measuring instruments related to Electrical Engineering and choose a proper measuring instrument suitable for any given application taking into consideration the operating conditions
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Electrical Measurement Principle</u> Basics, instruments classifications, linearity, Errors. Units [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] <u>Part B- Electromechanical instruments</u> Principle work, Torques types, PMMC, multi-range voltmeters, ammeters, ohmmeters, rectifier type voltmeter. [10 hrs.]

	Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Mid-term exam [2 hr.] <u>Part C- Oscilloscope and bridges</u> Oscilloscopes and their applications, DC and AC bridges. [12 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] <u>Part D- Transducers</u> Transducers, types applications. [8 hrs.] Revision problem and tutorial classes [3 hrs.] Quizz [1 hr.] Final exam [3 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 3, 4, 5 and 8
	Assignments	3	12% (12)	2 to 15	LO # 2, 4, 5, 7, and 8
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	11	3,5
	On-site assignment	1	5%(5)	12	4
Summative assessment	Midterm Exam	1	10% (10)	9	1-6
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic Concept of electrical measurements, what are the Instrument, Resolution. Accuracy, Precision, etc. What are the instrumentation system with some example
Week 2	Classification of measurements instruments, the linearity of measurements instruments.
Week 3	Units and system of units, SI units, fundamental and derived units
Week 4	Errors in electrical measurements, How to reduce them.
Week 5	Electromechanical instrument, How it is work, the torque types, Examples
Week 6	Permanent magnet moving coil PMMC, Multi-range Voltmeter and Ammeter design. Examples.
Week 7	Series and shunt ohmmeter design, voltmeter-ammeter method to resistance measurement. Examples.
Week 8	Rectifier type voltmeter. Examples.
Week 9	Mid-term exam
Week 10	Oscilloscope
Week 11	Oscilloscope applications
Week 12	Direct current bridges
Week 13	Alternative current bridges
Week 14	Transducers, their types, how to classify them.
Week 15	Resistance, inductive, capacitive change transducers
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Electronic Instrumentation And Measurements Techniques by William David copper.	Yes
Recommended Texts	Electrical and Electronic Measurements by Dr. Ahmed A. Montaser	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group	A - Excellent	امتياز	90 - 100	Outstanding Performance
(50 - 100)	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="2">Power Electronics I</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">Core</td><td colspan="3" rowspan="4">☐ Theory
☒ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☒ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">EEPM305</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">6</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="2">150</td></tr>
<tr><td>Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td colspan="2">5</td></tr>
<tr><td>Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="3">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td>Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="3">o.yehya@uomosul.edu.iq</td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Professor</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">Doctor</td></tr>
<tr><td>Module Tutor</td><td>1-Dr. Mohamad N. Abdul Kadir</td><td>e-mail</td><td colspan="3">makadr@uomosul.edu.iq</td></tr>
<tr><td>Peer Reviewer Name</td><td>Dr Yasir Muhammed Yonus</td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Scientific Committee Approval Date</td><td>10/5/2026</td><td>Version Number</td><td colspan="3">1.0</td></tr>
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<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
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Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	12. Introduce the undergraduate students to the principle of switch-based conversion in power electronics. 13. The analysis of power components and important factors when dealing with nonsinusoidal quantities. 14. To introduce the features and characteristics the common semiconductor power switching devices. 15. To introduce the single-phase and three-phase phase-controlled power converter circuits. 16. To relate the steady state and transient analysis of phase-controlled power converter circuits to the converter performance and design. 17. To introduce the basics of AC controllers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the completion of the course, the students should be able to: 1. Define the scope, tools types and applications of power converters. 2. Calculate the assess the figures of merits used to describe the quality of non-ideal waveforms in power electronics converters. 3. Describe the behavioral characteristics and ratings of power switching semiconductor devices such as diodes, Thyristors, MOSFETs and IGBTs. 4. Analyze single-phase and three-phase power diode circuits, evaluate input-output performance parameters with idealized load models. 5. Analyze single-phase and three-phase power SCR controlled rectifier circuits with various load models. 6. Describe and Analyze the single-phase and three-phase-AC controller circuits with R and RL loads.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction, definitions and tools</u> Power Electronics: definitions, approach and applications. [2 hrs.] Figures of Merits: Ripple factor, Total harmonic distortion, Form factor, Power factor (non-sinusoidal waveform), conversion efficiency. [4 hrs.] Review of circuit analysis tools [6 hrs.] Quizzes [1 hr.] <u>Part B- Semiconductor Switching Devices</u> Ideal and semiconductor switching devices. Power losses in switching devices. [2hrs] Characteristics of power diodes and diode ratings, special power diodes. [2 hrs] SCR construction and principle of operation, characteristics, ratings and operation in basic circuits. Traics [4hrs] Fully controlled switching devices: GTOs, MOSFETs, IGBTs and smart power modules [3 hrs] Quizzes [1 hr.] <u>Part C- Phase-controlled AC-DC converters</u> Single-phase bridge rectifier with R, RL, C filter. Analysis of controlled rectifier with R, RLE loads. [6 hrs] Analysis of 6-pulse controlled rectifier with ideal and practical loads [10 hrs]. The effect of line inductance [4 hrs], Dual converter [2 hrs] Determination of Devices ratings. [2 hrs.]
	Quizzes [1 hr.] <u>Part D- Phase-controlled AC-AC controllers</u> Analysis of AC –Controller: Single phase with R/RL-Load, analysis of three-phase AC controller with R-Load [6 hrs]. Integral –Cycle control, cycloconverter [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, report writing and scientific debate skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,12	2, 3, 4, 5
	Assignments	3	12% (12)	5,9,13	2, 3, 4, 6
	Projects / Lab.	0	0 (0)	-----	----
	On-site assignment	1	5%(5)	12	4
	Report	1	5% (5)	11	1-5
Summative assessment	Midterm Exam	1	10% (10)	9	1-4
	Final Exam	3hr	50% (50)	16	1-6
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: Definitions, Power and Energy, Types of Conversion, Power Electronics Approach. The role of switch in power converter, Energy recovery.
Week 2	Power Computations: Mean, RMS, Figures of Merits

Week 3	Methods of Analysis of switching circuits: closed form solution, discrete analysis, Fourier-based analysis
Week 4	Power Diodes: Steady-state characteristics, basic parameters and ratings, transient characteristics, Special Diodes.
Week 5	SCRs: Steady-state characteristics, basic parameters and ratings, controlling SCR by gate pulses.
Week 6	Half-wave diode rectifiers: R-load, RL-Load, freewheeling diode and capacitor filter.
Week 7	Full-Wave diode rectifier R, RL load and freewheeling diode.
Week 8	Controlled Full-Wave rectifier R, RL load and freewheeling diode.
Week 9	Three-phase three-pulse rectifier
Week 10	Six-pulse diode rectifier with R and highly inductive load
Week 11	Analysis of six-pulse rectifier with RLE load
Week 12	The effect of line inductance
Week 13	Diodes and SCR sizing / voltage and current selection
Week 14	AC –Controller: Single phase with R/RL-Load
Week 15	AC –Controller: Three - phase with R-Load

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Power Electronics by Daniel W. Hart, ISBN 978-0-07-338067-4. McGraw Hill (2010)	No

Recommended Texts	-Power electronics Devices, circuits, and Applications (Fourth Edition) by Muhammad H. Rashid, ISBN 978-0-13-312590-0 , Pearson 2014 -Power Electronics Basics, by Yuriy Rozanov, Sergey Ryvkin, Evgeny Chaplygin and Pavel Voronin. ISBN 978-1-4822-9880-2, CRC Press 2016 -Power Electronics, Drives, and Advanced Applications, Kumar, Behera, Joshi and Bansal .CRC Press 2020	No
Websites	https://classroom.google.com	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Power and Machine Lab. I			Module Delivery	
Module Type	Support			☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM306				
ECTS Credits	4				
SWL (hr./sem)	100				
Module Level		3	Semester of Delivery		5
Administering Department		2 - (Electrical Engineering)	College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title		Professor	Module **Leader's** Qualification		Doctor
Module Tutor	م. عمر تراث+كادر المختبر		e-mail		
Peer Reviewer Name		ا.م.د. ياسر محمد يونس	e-mail	Yasir_752000@uomosul.edu.iq	
Scientific Committee Approval Date		10/5/2026	Version Number	1.0	
Relation with other Modules العلاقة مع المواد الدراسية الأخرى					

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

<table>
<tr><td colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Aims
أهداف المادة الدراسية</td><td>1- Measure and analyze transformer circuit model parameters and Identify and comprehend the different connection types of three-phase transformers.
2- Gain a basic understanding of the operation characteristics of DC generators.
3- Control the speed of DC motors and understand the underlying principles.
4- Apply triggering and gate drive approaches to power semiconductor devices and gain an understanding of rectifier, chopper, and inverter circuits. Additionally, explore the fundamentals of electrical machine drive systems.
5- Gain a basic understanding of Programmable Logic Controllers (PLCs) and their applications.
6- Develop foundational knowledge of electronic circuits, including decoders, encoders, and the 555IC.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>Upon successful completion of the Power and Machine Lab I course, students will be able to:
1- Measure and analyze the circuit model parameters of transformers, gaining a comprehensive understanding of their characteristics and performance. Identify and differentiate between various connection types of three-phase transformers, understanding their applications and operational considerations.
2- Apply control methods to regulate the speed of DC motors, considering the underlying principles and techniques involved.
3- Measure, analyze and Identify the operation of dc and ac generator</td></tr>
</table>

	4- Utilize triggering and gate drive approaches for power semiconductor devices, while comprehending the basic principles and practical applications of rectifier, chopper, and inverter circuits. Additionally, develop a fundamental understanding of electrical machine drive systems. 5- Demonstrate a basic understanding of Programmable Logic Controllers (PLCs), including their functionality, programming concepts, and application in automation and control systems. 6- Acquire foundational knowledge in electronic circuits, specifically decoders, encoders, and the 555IC, comprehending their principles, applications, and integration into electronic systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – power and machine</u> Open and short circuit test for single-phase Transformer. Speed and direction control of D.C. shunt motor using voltage control method Three-phase Power measurement. Speed Control of D.C shunt Motor using field control method. Speed Control of DC Shunt Motor Using Armature Voltage Control Method. No load test of D.C. shunt generator. shunt generator load test. Single phase transformer load test. [32 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.] <u>Part B- Power Electronics</u> Thyristor Controllable Rectification Circuit. Three phase full wave Rectifier. The triac light dimmer control circuit. DC-DC Converters. [12 hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.] <u>Part c- Electronics</u> The operation Amplifier. Decoder, Encoder circuit. Integrating and differentiating circuit. Digital counter [12 hrs.] Revision problem and tutorial classes [6hrs.]

	Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. Through hands-on experiments, projects, and laboratory work, students will gain practical skills and knowledge in the areas of power applications, electrical machines, power electronics, and electronic circuits. This course aims to provide students with a comprehensive understanding of measurement techniques, control methods, and practical applications in the field of electrical engineering.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	8	All
	Report	10	15% (15)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	All
Summative assessment	Theoretical Exam	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Speed and direction control of D.C. shunt motor using voltage control method.
Week 2	No-load test of D.C. shunt generator.
Week 3	0pen and short circuit test for single-phase Transformer.
Week 4	Three-phase Power measurement.
Week 5	Thyristor Controllable Rectification Circuit & The triac light dimmer control circuit.
Week 6	Three phase full wave Rectifier.
Week 7	Decoder and Encoder and 555IC .
Week 8	Speed Control of D.C shunt Motor using field control method.

Week 9	DC shunt generator load test.
Week 10	Single phase transformer load test.
Week 11	Three Phase Transformer connection.
Week 12	DC-DC Converters (boost).
Week 13	Triggering of SCR using OP-AMP 741and Buck DC–DC Converter.
Week 14	The Operational Amplifier and Digital counter.
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	ELECTRICAL MACHINES-I LABORATORY MANUAL, BY Lab . staff	YES
Recommended Texts	1- P. C. Sen, “Principles of Electrical machines and power electronics”, 2nd edition, John Wiley & Sons. 2- M H Rashid, “Power Electronics – circuits, devices and applications”, 3rd edition, Pearson Education. 3- Robert L. Boylestad , Louis Nashelsky Electronic Devices and Circuit Theory 10th Edition	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Numerical Analysis			Module Delivery	
Module Type	Basic			☒ Theory ☒ Lecture Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM307				
ECTS Credits	4				
SWL (hr./sem)	100				
Module Level		3	Semester of Delivery		6
Administering Department		2 - (Electrical Engineering)	College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title		Professor	Module **Leader's** Qualification		Doctor
Module Tutor	Dr. Riyadh Zaki Sabry		e-mail	riyadhzaki @uomosul.edu.iq	
Peer Reviewer Name		Mohamad N. Abdul Kadir	e-mail	makadr@uomosul.edu.iq	
Scientific Committee Approval Date		10/5/2026	Version Number		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Solving the 2nd order differential equation and Bessel differential equations by series solutions.
	2. Students learn the principals of the wave equation for one and two dimensions. 3. To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Partial Differential Equations. One dimensional wave equation Separation of variables, Vibrating string, two-dimensional wave equation, transmission line, Introduction to Complex Variables Complex number system and its operations, Limits and sequences Continuous functions and their properties, Derivatives complex integration and Cauchy integral theorems. Concepts and role for the numerical method in engineering, Numerical Solution of Nonlinear Algebraic Equations, Open Methods, Numerical Solution of linear algebraic equations, Curve Fitting

Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (5)		
	Assignments	3	12% (5)		
	Projects / Lab.	0	0% (25)		
	On-site assignment	1	5%(5)		
	Report	1	8% (8)		
Summative assessment	Midterm Exam	1	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Partial Differential Equations. One dimensional wave equation Laplace equation Derivatives
Week 2	Separation of variables
Week 3	vibrating string, two-dimensional wave equation, transmission line
Week 4	Introduction to Complex Variables
Week 5	Complex number system and its operations
Week 6	Limits and sequences Continuous functions and their properties
Week 7	complex integration and Cauchy integral theorems
Week 8	Mid-term Exam
Week 9	Concepts and role for the numerical method in engineering, approximations, and errors, the definition of Round-off error and truncation error, absolute and rel ative true/approximation error.
Week 10	Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method)
Week 11	Open Methods (Newton-Raphson and secant method).
Week 12	Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/wel1-conditioned system, Parlial and complete Pivoting, Convergence Criteria, Jacobi iterative method.
Week 13	The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method. Tri-diagonal systems and its solution.
Week 14	Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 15	Introduction another to another methods (finite difference, finite volume, finite element method
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011. Applied Numerical Methods with MATLAB for Engineers and Scientists ,Steven C. Chapra,2018	Yes
Recommended Texts	1- Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	YES
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Generation Systems			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM308				
ECTS Credits	5				
SWL (hr./sem)	125				
Module Level	3		Semester of Delivery		6
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification		Doctor
Module Tutor	Dr. Saad Enad Mohammed		e-mail	saadmohamed@uomosul.edu.iq	
Peer Reviewer Name	Mohamad N. Abdul Kadir		e-mail	makadr@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	6. Power Generation Technologies: The module aims to introduce students to different power generation technologies, such as thermal power plants, hydroelectric power plants, nuclear power plants, renewable energy sources (solar, wind, biomass, etc.), and their characteristics. It covers the principles of operation, components, efficiency, and environmental impacts of these power generation technologies. 7. Power Distribution Systems: The module aims to familiarize students with the distribution of electrical power from the transmission grid to end-users. It covers distribution network design, components, and operation, including substations, distribution transformers, switchgear, and protection systems. Students learn about the challenges associated with distribution system operation, such as voltage regulation, power quality, and reliability.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. Knowledge of Power Generation Technologies: Students will acquire a comprehensive understanding of various power generation technologies, including thermal, hydroelectric, nuclear, and renewable energy sources. They

	will grasp the principles of operation, components, efficiency, and environmental impacts associated with each technology. 2. Familiarity with Power Distribution Systems: Students will gain a solid understanding of power distribution systems, including network design, components, and operation. They will become knowledgeable about substations, distribution transformers, switchgear, and protection systems. They will understand the challenges associated with voltage regulation, power quality, and system reliability in distribution networks. 3. Students will be able to apply engineering principles and concepts to solve practical problems related to power generation and distribution systems. They will develop problem-solving skills and apply their knowledge to design efficient and reliable power systems, address system vulnerabilities, and optimize system performance.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Generation Systems: Introduction and Definitions of Primary and secondary energy, commercial and noncommercial Energy, renewable and non-renewable energy, Definitions: Load factor, utilization factor, capacity factor, diversity factor, demand factor, availability. Energy Generation in Power Plants: Hydro power plants, Thermal Power Plants, Steam Power Plant, Gas Power Plant, Combined Cycle Gas Power Plant, Nuclear Power Plant, Diesel Power Plants. Renewable Energy Systems: Solar energy system, Solar Thermal Power Plants, Wing energy systems, Geothermal systems, Biomass systems, Fuel Cell. [24 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] Distribution Systems: Introduction, Classification of Distribution System, Methods of Connection, Comparison among Distribution Systems, Type of D.C Distributions: D.C Distributor fed at One End-Concentrated Loading, D.C Distributor fed at Both End- Concentrated Loading, D.C Distributor fed at One End with Uniformly Distributed Load, D.C Distributor fed at Both Ends

	with Uniformly Distributor Load, D.C Ring Distributor, Ring Distributor with Inter-Connector, Stepped Distributor, Classification of A. C. Distribution Systems. Methods of Connection, Single Phase Distribution Systems, Three Phase Distribution Systems. Types of A. C. Distribution Systems. A. C. Radial Systems: A. C. Distributor fed at one end. A. C. Distributor fed at both ends. A. C. Ring Systems Protection of Distribution Systems, Distribution Transformers, Types of Sub-Stations, Sub-Stations Measurements Devices. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [3 hr.]

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem)	63	Structured SWL (h/w)	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	3, 8, 12	LO # 1, 2, and 3
	Assignments	3	12% (12)	2 to 15	
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	11	All
	On-site assignment	1	5%(5)	12	4
Summative assessment	Midterm Exam	1	10% (10)	9	LO # 1, 2, and 3
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Definitions of Primary and secondary energy.
Week 2	commercial and noncommercial Energy.
Week 3	renewable and non-renewable energy.
Week 4	Definitions: Load factor, utilization factor, capacity factor, diversity factor, demand factor, availability.
Week 5	Energy Generation in Power Plants: Hydro power plants, Thermal Power Plants, Steam Power Plant, Gas Power Plant, Combined Cycle Gas Power Plant, Nuclear Power Plant, Diesel Power Plants.
Week 6	Renewable Energy Systems: Solar energy system, Solar Thermal Power Plants, Wing energy systems, Geothermal systems, Biomass systems. Fuel Cell.
Week 7	Introduction to Distribution Systems.
Week 8	Classification of DC Distribution Systems.
Week 9	Comparison among Distribution Systems.
Week 10	Classification of AC Distribution Systems.
Week 11	Single Phase Distribution Systems.
Week 12	three Phase Distribution Systems.
Week 13	Distribution Transformers.
Week 14	Types of Sub-Stations.
Week 15	Sub-Stations Measurements Devices.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	3. Power Distribution Planning Reference Book by H. Lee willis, 2014. 4. Electrical Distribution Systems by Dale R. Patrick and Stephen W. Fardo, 2009.	Yes
Recommended Texts	5. Electrical Engineering Fundamentals by S. Bobby Rauf, 2020.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="2">Electrical Machines Drives</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">Core</td><td colspan="3" rowspan="4">☒ Theory
☐ Lecture
☐ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">EEPM309</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">5</td></tr>
<tr><td>SWL (hr./sem)</td><td colspan="2">125</td></tr>
<tr><td colspan="2">Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td>6</td></tr>
<tr><td colspan="2">Administering Department</td><td>2 - (Electrical Engineering)</td><td>College</td><td colspan="2">UoM2 - (Engineering)</td></tr>
<tr><td>Module Leader</td><td colspan="2">Prof. Dr. Omar Sharaf Al-deen Yehya</td><td>e-mail</td><td colspan="2">o.yehya@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Module Leader’s Acad. Title</td><td>Professor</td><td colspan="2">Module Leader’s Qualification</td><td>Doctor</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Dr. Yasir M.Y. Ameen</td><td>e-mail</td><td colspan="2">Yasir_752000@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Peer Reviewer Name</td><td>Mohamad N. Abdul Kadir</td><td>e-mail</td><td colspan="2">makadr@uomosul.edu.iq</td></tr>
<tr><td colspan="2">Scientific Committee Approval Date</td><td>10/5/2026</td><td>Version Number</td><td colspan="2">1.0</td></tr>
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<table>
<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>Basics of Electrical Engineering II</td><td>Semester</td><td>2</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسyة ونتائج التعلم والمحتpqات الإرشادSة	
Module Aims أهداف المادة الدراسyة	13- To introduce students to the fundamental concepts, theories, and principles of electrical machine drives. 14- To introduce students to the types of mechanical loads and understand steady state stability points in different operation quadrants. 15- To develop students' understanding of the different types of electrical machines and their operating characteristics. 16- To equip students with knowledge of power electronic converters used in electrical machine drives. 17- To familiarize students with control strategies for efficient and reliable operation of electrical machine drives. 18- To enable students to analyze and evaluate the performance of electrical machine drive systems. 19- To encourage critical thinking and problem-solving skills through real-world case studies in the field of speed control, starting and braking of the electrical machines such as DC, induction and synchronous motors. 20- To promote awareness of emerging trends and technologies in the field of electrical machine drives, such as the field of electrical vehicles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسyة	Upon successful completion of this module, students will be able to: 1- Demonstrate a clear understanding of the fundamental concepts, theories, and principles underlying electrical machine drives. 2- Identify and classify different types of mechanical loads and comprehend the steady-state stability points associated with various operation quadrants. 3- Differentiate between different types of electrical machines, including DC, induction, and synchronous motors, and evaluate their operating characteristics.
	4- Explain the functioning and operation of power electronic converters used in electrical machine drives. 5- Apply control strategies to ensure efficient and reliable operation of electrical machine drives. 6- Analyze and evaluate the performance of electrical machine drive systems. 7- Utilize critical thinking and problem-solving skills through real-world case

	studies focused on speed control, starting, and braking of electrical machines, such as DC, induction, and synchronous motors. 8- Demonstrate awareness of emerging trends and technologies in the field of electrical machine drives, particularly in areas like electric vehicles, and discuss their potential impact and applications.

Indicative Contents
المحتpqات الإرشادSة
	Indicative content includes the following.
	• Introduction to Electrical Machine Drives
	  • Overview of electrical machine drives and their importance in various industries
	  • Introduction to fundamental concepts, theories, and principles of electrical machine drives
	  • Introduction to mechanical loads and steady-state stability points in different operation quadrants
	• Types of Electrical Machines
	  • Classification and characteristics of electrical machines, including DC, induction, and synchronous motors
	  • Operating principles, construction, and key features of each type of electrical machine
	  • Analysis of the operating characteristics, performance parameters, and limitations of electrical machines
	• Power Electronic Converters
	  • Introduction to power electronic converters and their role in electrical machine drives
	  • Detailed study of converter topologies and their applications in different types of electrical machines
	  • Understanding the functioning and control of power electronic converters in electrical machine drive systems
	• Control Strategies for Electrical Machine Drives
	  • Overview of control strategies for efficient and reliable operation of electrical machine drives
	  • Study of speed control techniques, starting methods, and braking mechanisms for DC, induction, and synchronous motors
	  • Application of control strategies to optimize the performance of electrical machine drives
	• Performance Analysis of Electrical Machine Drives
	  • Analysis and evaluation of the performance parameters of electrical machine drive systems

	• Examination of efficiency, power factor, and torque production, of electrical machine drives • Techniques for assessing and improving the overall performance and reliability of electrical machine drive systems • Emerging Trends and Technologies

	• Exploration of emerging trends and technologies in the field of electrical machine drives • Investigation of advancements in electric vehicles and their impact on electrical machine drives • Discussion of cutting-edge research, innovations, and future directions in electrical machine drives

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Conduct regular lectures to deliver theoretical concepts and foundational knowledge. Use multimedia presentations, diagrams, and examples to enhance understanding. Encourage student participation through discussions and questions. Practical Laboratory Sessions in cooperation with the Course of the Power and Machine Lab to provide students with practical experience in operating Electrical machines drives . Case Studies and Problem-Solving Exercises: Assign case studies and problem-solving exercises that simulate real-world scenarios related to Electrical machines drives . Encourage students to apply their theoretical knowledge to analyze and solve these problems, fostering critical thinking and problem-solving skills. Group Discussions and Peer Learning: Organize group discussions and collaborative learning activities where students can discuss and share their understanding of AC machines. Encourage peer-to-peer teaching and learning, promoting active engagement and the exchange of ideas.

	Simulations and Virtual Labs: Utilize computer-based simulations and virtual labs to supplement practical learning. These tools can provide interactive experiences and allow students to experiment with different AC machine configurations and operating conditions. Guest Lectures and Industry Visits: Invite industry experts or guest lecturers to share their practical experiences and insights related to Electrical machines drives . Arrange visits to relevant industrial facilities to provide students with exposure to real-world applications and challenges. Online Resources and Learning Management Systems: Provide access to online resources, including lecture notes, reference materials, and interactive tutorials. Utilize a learning management system to facilitate communication, assignment submissions, and online discussions. Assessments: Design a variety of assessments, including quizzes, assignments, and examinations, to evaluate students' understanding of the course material. Incorporate practical assessments, such as simulation-based projects, to assess hands-on skills. Feedback and Progress Monitoring: Provide timely and constructive feedback to students on their assignments and assessments. Monitor students' progress throughout the course and offer additional support or clarification when needed. Industry-Engaged Projects: Assign project work that requires students to apply their knowledge of AC machines to real-world problems or industry-related challenges. This could involve designing a motor control system, optimizing power flows, or analyzing the performance of a synchronous generator. By employing a combination of these learning and teaching strategies, students can develop a solid theoretical understanding of Electrical machines drives while also gaining practical skills and the ability to apply their knowledge in real-world scenarios.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	63	Structured SWL (h/w)	4

الحمل الدرا ‰Š المنتظم للطالب خلال الفصل		الحمل الدرا ‰Š المنتظم للطالب أسبوعyا	
Unstructured SWL (h/sem) الحمل الدرا ‰Š غ P• المنتظم للطالب خلال الفصل	72	Unstructured SWL (h/w) الحمل الدرا ‰Š غ P• المنتظم للطالب أسبوعyا	4.8
Total SWL (h/sem) الحمل الدرا ‰Š ا• ‰ • للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO #1-7
	Assignments	3	12% (12)	2 to 15	All
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	11	All
	On-site assignment	1	5%(5)	12	4
Summative assessment	Midterm Exam	1	10% (10)	9	1-6
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered

Week 1	Overview for electrical drives, concept, classification, parts and advantages of electrical dives, applications of electrical drives in electrical vehicles
Week 2	Dynamic of the motor load system, components of load toques, electrical braking, steady state stability, ratings of converters and motors, speed control and multi quadrant operation, drive specifications
Week 3	Characteristics of dc motors, types of dc motors, steady-state speed torque relations, methods of speed control, starting, braking, multi quadrant operation of separately excited dc motor
Week 4	Power electronics drives classification, overview of semiconductor switching devices, single-phase dc drive(half-wave converter, semi converter, full-converter, dual converter)
Week 5	Three-phase dc drives (half-wave converter, semi converter, full-converter)
Week 6	Chopper drives (principle of power control, principle of regenerative control, principle of rheostatic brake control,
Week 7	Chopper drives, two and four quadrant drives, and General review of dc drives and evaluation the dc part
Week 8	AC drives (classifications, induction motor drives, speed control methods, stator voltage control
Week 9	Induction motor drives speed control using frequency control, V/f control,
Week 10	Speed control and starting methods of synchronous motors
Week 11	Course projects about Synchronous Motor Drives (speed control and introductions to types of SM, cylindrical rotor, salient-pole, reluctance, permanent-magnet , switched reluctance , brushless dc and ac motors), stepper motor drives, and scaler and vector control of IM
Week 12	Modern drives of EV (Reports)
Week 13	Projects discussion
Week 14	Projects discussion
Week 15	AC drive review.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	1- “Fundamentals of Electric Drives”, Gopal K Dubey, Narosa 2- “Power Electronics”, P.S. Bimbhra	AS PDF

Recommended Texts	1- "Power Electronics", M. H. Rashid 2- "Electric Motor Drives – Modeling, Analysis and Control," R. Krishnan, Prentice-Hall of India. 3- "Electric Drives – Concepts and Applications", Vedam Subrahmanyam, Tata McGraw Hill	AS PDF
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	Power Electronics II	Module Delivery	
Module Type	Core	☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☒ Seminar	
Module Code	EEPM310		
ECTS Credits	6		
SWL (hr./sem)	150		
Module Level	3	Semester of Delivery	Six
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification	Doctor
Module Tutor	Dr. Mohamad N. Abdul Kadir	e-mail	makadr@uomosul.edu.iq
Peer Reviewer Name	Dr Yasir Muhammed Yonus	e-mail	Yasir_752000@uomosul.edu.iq
Scientific Committee Approval Date	10/5/2026	Version Number	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

<table>
<tr><th colspan="2">أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Aims

أهداف المادة الدراسية</td><td>This course is designed as the second part of Power Electronics I (EEPM305) course. In EEPM305 the students introduced to power switching devices and phase-controlled converters. This course focuses on PWM control applied to dc-dc and dc-ac converters with emphasis on design part.

1- DC-DC and DC-AC power conversion. The operating principles, design,

characteristics and application of these electronic power converter circuits are treated, with the goal of equipping the students with capability to analyze and design such power supplies.

2- Various important topologies of power converter circuits for specific types of applications are covered and analyzed. These include DC-DC converters and inverters.

3- The course also analyze the qualities of waveforms at input and output ends of these converters. The quality of these waveforms is of major concern to users of modern power converter circuits.

4- The course covers some aspects of the design and application.</td></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>By the completion of the course, the students should be able to:

1. Perform analysis of single- and multi-quadrant DC-DC chopper, and identify the fundamental control methods (current mode/voltage mode).
2. Analyze non-isolated DC-supply circuits: Buck, Boost, Buck-Boost and Cuk converters.
3. Perform a basic design (topology and components selection) of dc-supply circuit for a given application.
4. Describe the role of the transformer isolation and analyze the basic transformer-isolated dc-dc converters.
5. Present single-phase VSI half and full-bridges implementations.
6. Analyze the single-phase inverter operation in square-wave, quasi-square wave and PWM modes.
7. Define three-phase VSI, switching variables and operations as six step inverter.
8. Present carrier comparison control of three phase inverter.</td></tr>
<tr><td>Indicative Contents

المحتويات الإرشادية</td><td>Indicative content includes the following.</td></tr>
</table>

	Chapter 1: DC Choppers: (3 weeks) First quadrant, second quadrant, first and second quadrants, first and fourth quadrants and four quadrants choppers. Bridge Circuit switching function Chapter 2: non-isolated D.C power supply circuits: (4 weeks) Buck, boost, buck-boost, and Cuk regulators. Chapter 3: Transformer-Isolated DC supplies (2 weeks): Feedforward and flyback. Chapter 4: Single-phase and three-phase inverters. (6weeks) Square wave mode (half and full bridge circuits), quasi square wave operation and PWM of single-phase inverter Three phase inverter and its switching variables Pulse width modulation (PWM) strategies of three-phase inverter.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, software use, report writing and scientific debate skills.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 2, 5 and 7
	Assignments	3	12% (12)	2 to 15	LO # 1, 3, and 6
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	13	ALL
	On-site assignment	1	5%(5)	11	3
Summative assessment	Midterm Exam	1	10% (10)	9	1-4
	Final Exam	3hr	50% (50)	16	ALL

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: PWM control explanation through an idealized converter.
Week 2	One and two dc quadrant choppers: topology and analysis.
Week 3	Four-quadrant chopper: analysis; voltage and current control.
Week 4	Non-isolated DC Power supply circuits Buck Converter, Boost Converter
Week 5	Buck-Boost, Cuk converter
Week 6	DC power supply circuits: discontinuous mode analysis
Week 7	DC power supply circuits comparison and design aspects
Week 8	Transformer Isolated DC supply circuit. The operation and analysis of transformer in power converters
Week 9	Fly-back Converter Forward Converter
Week 10	(Mid-term exam) Chapter 6: AC Inverters Single –Phase half-bridge inverter Square wave mode
Week 11	Single –Phase full-bridge Inverter Square wave mode Single –Phase Quasi square wave mode
Week 12	Single-Phase Inverter: PWM control

	Implementation and analysis using Fourier series analysis
Week 13	Three –Phase VSI: Square Wave Mode (six-step inverter)
Week 14	Session 1: Three –Phase VSI: Sinusoidal PWM Session 2: Three-Phase VSI: Carrier Comparison methods
Week 15	Analysis and design of three-phase inverter.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	INTRODUCTION TO MODERN POWER ELECTRONICS (third edition) by Andrzej M. Trzynadlowski; Wiley (2016)	No
Recommended Texts	-- Power Electronics: Converters, Applications and Design; by Mohan, Undeland and Robbins 3rd Edition (Wiley) -Fundamentals of Power Electronics, by Robert W. Erickson and Dragan Maksimovi´c, Third Edition, Springer (2020).	No
Websites	https://classroom.google.com/c/NDA5MDI4MDc5MzQz	

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Programmable controllers		**Module Delivery**		
Module Type	Core		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**		
Module Code	EEPM311				
ECTS Credits	2				
SWL (hr./sem)	50				
Module Level	3		Semester of Delivery	Six	
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor	
Module Tutor	1-		e-mail	@uomosul.edu.iq	
Peer Reviewer Name	Fawaz Yaseen Abdullah		e-mail	fawaazyasen@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	An introductory course on programmable logic controllers (PLCs) and their basic applications. Topics include an overview of PLCs, PLC hardware components, basics of PLC programming, development of fundamental PLC ladder programming, timers and counters, data manipulation, concepts in analog data I/O advanced programming techniques, PLC sensors and actuators, and PLC communication Networks. Classroom instruction is supported by laboratory activities through which students use PLCs to perform
	industrial control functions, troubleshooting, and networking PLCs in situations of typical industrial projects
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Apply modern PLC programming tools to develop functional ladder diagrams 2. Design a ladder program to control sequential processes. 3. Design a ladder program for timer and counter based systems 4. Assess communication links between computers, PLCs and various I/O devices

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Competency 1: The student will demonstrate an understanding of the building blocks of basic Boolean algebra by: 1. Applying basic number conversation to and from different numbers systems, such as: binary, decimal, hexadecimal, anecdotal 2. Describing and implementing basic logical operators such as: and, or and not 3. Simplifying Boolean functions using K-Maps 4. Converting Boolean functions into digital circuits and generating the corresponding truth tables 5. Describing and implementing the one's and two's complement binary notation Competency 2: The student will demonstrate an understanding of basic programmable logic controller (PLC) technology and the industrial control devices used currently in automation by: 1. Defining and describing a PLC 2. Describing the functions of all the devices in a PLC system 3. Describing the differences and similarities among relay ladder logic and PLC ladder logic 4. Describing the differences between personal computers and PLCs 5. Designing and implementing basic ladder logic programs 6. Describing the electrical safety issues related to working with PLCs Competency 3: The student will demonstrate an understanding of the basic operation of electro-mechanical input devices by:

	1. Identifying and describing various manually operated switches typically used in PLCs such as: toggle, push button, selector, and push wheel 2. Identifying and describing the following output devices: solenoids, relays, contactors, and alarms 3. Interfacing basic input/output devices to a PLC system 4. Troubleshooting basic input/output devices in a PLC system Competency 4: The student will demonstrate an understanding of the operation of basic electronic and mechanical timers by: 1. Describing the main differences among mechanical and electronic timing relays 2. Identifying and describing the operation of a mechanical timing relay 3. Identifying and describing the operation of timer -on delay (TON) and timer -of delay (TOF) timer instructions 4. Troubleshooting input/output modules with timer instructions Competency 5: The student will demonstrate an understanding of the operation of basic electronic and mechanical counters by: 1. Describing the main differences between mechanical and electronic counters 2. Identifying and describing the operation of a mechanical counter 3. Designing and analyzing ladder diagrams for the up/down counter typically implemented in industrial automation 4. Designing and implementing, using a PLC system, the done bit, enable bit and overflow/underflow bit counters 5. Troubleshooting counters in a ladder logic design Competency 6: The student will demonstrate an understanding of the operation and function of electromechanical sequencing devices by: 1. Identifying and describing the operation and function of electro-mechanical sequencing devices 2. Describing the basic PLC sequencer function

	3. Designing and implementing the ladder logic diagram for the operation of a PLC sequencer with timing 4. Designing, describing and implementing the technique of cascading sequencers 5. Troubleshooting ladder logic rungs using sequencer instructions Competency 7: The student will demonstrate an understanding of the operation and function of analog sensors by: 1. Describing the operation and function of analog devices such as temperature, pressure, flow and position sensors 2. Enumerating and describing the components of an infrared system and their operations 3. Explaining the general closed -loop block diagram and stating the purpose of each of the blocks 4. Describing and explaining the general characteristics that differ between effective and ineffective control systems 5. Troubleshooting basic input/output analog devices

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	-Active Learning: Through class discussions and real world problems. - Coordination with lab classes to provide a parallel hands-on experience. -Use google classroom platform to enhance learning and provide supplementary material.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 2, 5 and 7
	Assignments	3	12% (12)	2 to 15	LO # 1, 3, and 6
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	13	ALL
	On-site assignment	1	5%(5)	11	3
Summative assessment	Midterm Exam	1	10% (10)	9	1-4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to PLCs.
Week 2	PLC basics
Week 3	PLC Addressing.
Week 4	Basic Ladder Logic Programming
Week 5	Basic Instructions
Week 6	Programming word level logic instructions, Relation of digital gate logicto contact/coil logic, Relay logic, Relay Sequencers
Week 7	Programming word level logic instructions, Relation of digital gate logicto contact/coil logic, Relay logic, Relay Sequencers
Week 8	PLC Timer Functions
Week 9	ladder diagram elements. Instructions: Relay type instructions,
Week 10	(Mid-term exam)
Week 11	Instruction addressing, Branch Instructions,
Week 12	Internal Relay Instructions, Programming
Week 13	PLC I/O Module Types
Week 14	PLC I/O Module Types and PLC Trainer Configuration
Week 15	Tutorial Class Discussion.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Gary Dunning, "Introduction to Programmable Logic Controllers", Thomson, 2nd Edition	No
Recommended Texts	-- John W. Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", PHI Learning, New Delhi, 5th Edition - John R. Hackworth, Frederick D., Hackworth Jr., "Programmable Logic Controllers Programming Methods and Applications", PHI Publishers	No
Websites	https://classroom.google.com	

Grading Scheme مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C – Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Power and Machine Lab. II			Module Delivery	
Module Type	Core			☐ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	EEPM312				
ECTS Credits	4				
SWL (hr./sem)	100				
Module Level	3	Semester of Delivery		6	
Administering Department	2 - (Electrical Engineering)	College		UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail		o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification		Doctor	
Module Tutor	م. عمر تراث+كادر المختبر	e-mail			
Peer Reviewer Name	ا.م.د. ياسر محمد يونس	e-mail		Yasir_752000@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026	Version Number		1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	7- Understand parallel operation and zig-zeg connection of transformer. 8- Understand how the speed of dc motors can be controlled. 9- Understand the load test of dc motors. 10- Understand how to find Induction motor parameters. 11- Understand the triggering approaches of MOSFET transistor and learning the basic of the chopper and inverter circuits. 12- Apply the principles of electrical drives to real-world applications in industrial and commercial settings 13- Understand the basic of: Integrating and differentiating circuit., Shift Registers. Op-Amp and PLC.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of Lab 2, students will be able to: 1- Demonstrate a comprehensive understanding of the parallel operation and zig-zag connection of transformers, including their benefits, challenges, and practical applications. 2- Apply load test to the DC machines. 3- Conduct load tests on DC machine, analyze the performance characteristics, and interpret the results. 4- Determine the parameters of induction motors through practical experiments, including measurements and calculations, allowing for a thorough understanding of their operating characteristics. 5- Utilize triggering approaches for MOSFET transistors, applying the principles to design and analyze basic chopper and inverter circuits. Understand the advantages, limitations, and applications of these circuits. 6- Apply the principles of electrical drives to real-world applications in industrial and commercial settings, considering factors such as motor selection, control strategies, and energy efficiency. 7- Gain a basic understanding of integrating and differentiating circuits, shift registers, operational amplifiers (Op-Amp), and Programmable Logic Controllers (PLCs), including their principles, functionalities, and applications in electronic systems.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – power and machine</u> Determination of regulation of an alternator by Synchronous Impedance Method Three-phase induction motor (No-load & Locked rotor test) parallel Operation of Two Single-phase Transformers. Load test of D.C. series generator Three-phase induction motor. (Directional control and star -delta starting) Three-phase Synchronous generator (Load test) [32 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 hr.] <u>Part B- Power Electronics</u> PWM signal generation to control a D.C. chopper using Arduino Motor drive [12 hrs.] Revision problem and tutorial classes . full Bridge Inverter Automatic Control of Motor Drive ACH555 [12hrs.]
	Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.] <u>Part c- Electronics</u> Design of a timer using the IC-555 Shift Registers . The concept of Analog to digital converter (ADC) using Arduino Introduction to PLC and Ladder Logic Programming [12 hrs.] Revision problem and tutorial classes [6hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. Through hands-on experiments, projects, and laboratory work, students will gain practical skills and knowledge in the areas of power applications, electrical machines, power electronics, and electronic circuits. This course aims to provide students with a comprehensive understanding of measurement techniques, control methods, and practical applications in the field of electrical engineering.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	2

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	8	All
	Report	10	15% (15)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	All
Summative assessment	Theoretical Exam	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Determination of regulation of an alternator by Synchronous Impedance Method
Week 2	Three-phase induction motor (No-load & Locked rotor test)
Week 3	parallel Operation of Two Single-phase Transformers
Week 4	PWM signal generation to control a D.C. chopper using Arduino

Week 5	Motor drive
Week 6	Design of a timer using the IC-555 Or PLC applications
Week 7	(starting of synchronous motor
Week 8	Mid-term Exam
Week 9	Load test of D.C. series generator
Week 10	Three-phase induction motor. (Directional control and star -delta starting)
Week 11	Three-phase Synchronous generator (Load test)
Week 12	full Bridge Inverter
Week 13	Automatic Control of Motor Drive ACH555
Week 14	The concept of Analog to digital converter (ADC) using Arduino
Week 15	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	ELECTRICAL MACHINES -II LABORATORY MANUAL, BY Lab . staff	YES
Recommended Texts	- P. C. Sen, "Principles of Electrical machines and power electronics", 2nd edition, John Wiley & Sons. - M H Rashid, "Power Electronics – circuits, devices and applications", 3rd edition, Pearson Education.	No

	- Robert L. Boylestad , Louis Nashelsky Electronic Devices and Circuit Theory 10th Edition	
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Engineering Project Design & Planning		Module Delivery		
Module Type	C		☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	EEPM313				
ECTS Credits	2				
SWL (hr./sem)	50				
Module Level	3		Semester of Delivery	6	
Administering Department	2 - (Electrical Engineering)		College	UoM2 - (Engineering)	
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya		e-mail	o.yehya@uomosul.edu.iq	
Module **Leader's** Acad. Title	Professor		Module **Leader's** Qualification	Doctor	
Module Tutor			e-mail		
Peer Reviewer Name	Mohamad N. Abdul Kadir		e-mail	makadr@uomosul.edu.iq	
Scientific Committee Approval Date	10/5/2026		Version Number		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student should be able to: 1. Select a realistic engineering project idea that serves their field of specialization. 2. Formulate the project problem, objectives, and outcomes in a scientific manner. 3. Prepare a preliminary design or an initial simulation model to verify the feasibility of the idea. 4. Learn how to use certain laboratory equipment and how to handle or operate it properly. 5. Prepare a work plan (timeline and implementation plan) that leads to the completion of the engineering project. 6. Write a project proposal and deliver a preliminary presentation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing the course, the student will be able to: 1. Formulate a well-structured proposal for the graduation project. 2. Select appropriate simulation/design tools according to the specialization. 3. Create a system block diagram, circuit diagram, or flowchart. 4. Interpret preliminary simulation results and identify the required improvements. 5. Prepare a timeline and organize the tasks of the project team. 6. Write a concise engineering report and deliver a clear presentation.
Indicative Contents المحتويات الإرشادية	First: Theoretical Component 1. The concept of the graduation project, its specifications, and success criteria. 2. Selecting a project idea and linking it to the needs of society and/or industry. 3. Formulating the Problem Statement, Objectives, and Scope. 4. Collecting scientific sources and managing references (IEEE style). 5. Fundamentals of the Engineering Design Process. 6. Requirements and constraints analysis (cost, time, availability of components, safety). 7. Comparing solutions and selecting the optimal alternative (Decision Matrix). 8. Introduction to modeling and simulation for electrical engineering projects. 9. Preparing an implementation plan (WBS + Gantt chart) through a Work Breakdown Structure by dividing the project into smaller parts (main tasks and sub-tasks) to make execution clear and manageable. 10. Writing the project proposal and a concise technical report. 11. Principles of testing and verification (Test Plan). 12. Overview of research ethics (citation, originality, plagiarism).

	13. Introduction to fundamental international standards in electrical engineering (IEC, IEEE, ISO, NFPA, ANSI, BS) and their impact on safety and design/execution quality. Second: Practical Component 1. Selecting a practical applied or computer-based project for each group (2–4 students). 2. Preparing a concise proposal. 3. Conducting a preliminary literature review (12–15 references). 4. Developing an initial simulation model (according to the specialization). 5. Identifying the tools and components required for the project. 6. Preparing a timeline with milestones, delivering a progress presentation, and a preliminary final presentation for the graduation project.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive lectures 2. Group mentoring and guidance sessions 3. Simulation, design, and hands-on laboratory sessions 4. Project-Based Learning (PBL) 5. Short weekly discussions and presentations

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	33	Structured SWL (h/w)	3

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	12% (4)	3,7,11	1, 3, 4
	Assignments	2	4 %(2)	4,12	2,5
	Projects / Lab.	5	20% (4)	2-12	All
	On-site assignment	1	4%(4)	9	All
	Report				
Summative assessment	Midterm Exam	1	10%	10	1-5
	Final Exam	1	50%	16	All
Total assessment			100		

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the Engineering Project: concept of a project, types of engineering projects, project life cycle, and the role of the electrical engineer.
Week 2	Defining the project idea and formulating the engineering problem (Problem Definition) and analyzing technical requirements.
Week 3	Engineering solution generation (Concept Generation) and comparison of alternatives using engineering and economic criteria.
Week 4	Engineering Design Process and its application to electrical engineering projects.
Week 5	Preparing the Project Proposal: objectives, scope, deliverables, and constraints.
Week 6	Project planning: Work Breakdown Structure (WBS) and defining activities and tasks.
Week 7	Project scheduling: Gantt charts, networks (PERT/CPM), and time estimation.
Week 8	Resource and cost management: cost estimation, budgeting, and human/technical resources.
Week 9	Risk management in engineering projects: risk identification, analysis, and mitigation strategies.
Week 10	Technical considerations in electrical projects: standards (IEC, IEEE), safety, reliability, and sustainability.
Week 11	Quality management and engineering documentation: technical reports, drawings, and specifications.
Week 12	Teamwork and engineering communication: team management, presentations, and engineering ethics.
Week 13	Project implementation and monitoring: progress tracking, change control, and performance evaluation.
Week 14	Project presentations and final evaluation: discussion of results, lessons learned, and future improvements.
Week 15	Introduction to the Engineering Project: concept of a project, types of engineering projects, project life cycle, and the role of the electrical engineer.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources		
مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	Hugh Jack, Engineering Design, Planning, and Management, 2nd Edition, 2021. (Elsevier Shop)	
Recommended Texts	1. Christopher S. Coulston & Ralph M. Ford, Design for Electrical and Computer Engineers, 2024. (open.umn.edu) 2. Graeme Dandy, David Walker & Trevor Daniell, Planning and Design of Engineering Systems, 2018. (Routledge) 3. C. Lessard, Project Management for Engineering Design. (Springer Link) 4. Engineering Capstone Design: Project Planning, Organizing, and Executing. (Wiley) 5. Project Management, Planning and Control. (drnishikantjha.com) 6. الحسن أمe fd، الحسe fd علام، الدل ل المتaامل لتخط ط و]دارة المUVوعات، 2022. (مد dm ستور) 7. عxد الله ذrب قندrل، إضاءات عp علم إدارة المشارع الهندس ة من التصم م إ التنف ذ، 2020. (Google Books) 8. Garold D. Oberlender, Project Management for Engineering and Construction. (tempo.io) 9. Project Management Institute (PMI), PMBOK® Guide. (cciedump.spoto.net)	
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	English language 3		Module Delivery		
Module Type	S		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☒ Seminar		
Module Code	EEPM314				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	3	Semester of Delivery		Six	
Administering Department	2 - (Electrical Engineering)	College	UoM2 - (Engineering)		
Module Leader	Prof. Dr. Omar Sharaf Al-deen Yehya	e-mail	o.yehya@uomosul.edu.iq		
Module **Leader's** Acad. Title	Professor	Module **Leader's** Qualification		Doctor	
Module Tutor		e-mail			
Peer Reviewer Name	Mohamad N. Abdul Kadir	e-mail	makadr@uomosul.edu.iq		
Scientific Committee Approval Date	10/5/2026	Version Number		1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims	The aims of the module are to
المادة الدراسية	1. Foster the development of problem-solving skills, with a particular emphasis on speaking, reading, writing, and listening, while also gaining a comprehensive understanding of the English language as a foreign language through the utilization of various techniques. 2. Comprehend the fundamental principles of the English language. 3. Explore the foundational concepts essential for learning the key principles of English grammar and expanding English vocabulary. 4. Establish a solid foundation for proficient English writing and speaking. 5. Gain a comprehensive understanding of constructing grammatically accurate English sentences.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completing the course, students will be able to: 1. Demonstrate proficiency in utilizing main and auxiliary verbs, as well as possessive pronouns. 2. Compile a comprehensive list of words associated with questions and various subject pronouns. 3. Engage in conversations concerning social expressions and personal information, particularly regarding jobs, using affirmative, negative, and interrogative sentences. 4. Discuss the usage of adjectives and their placement within sentences. 5. Construct simple present sentences using "I," "we," "you," and "they," and accurately define the usage of articles. 6. Describe the present simple tense utilizing "he" and "she," and explore adverbs of frequency. 7. Identify basic question words and demonstrative pronouns, and effectively apply them in different contexts. 8. Examine the usage of "there is/are" and various prepositions. 9. Analyze the structure of simple past sentences and irregular verbs. 10. Explain the negative and interrogative structures of simple past tense sentences, along with adverbs associated with the past tense. 11. Recognize the usage of multiple adverbs and the use of "can/can't" in sentences, while explaining requests and offers. 12. Elaborate on the usage of "like" and "would you like," as well as the application of "some" and "any" in various expressions. 13. Discuss the application of the present continuous tense and distinguish it from the present simple tense. 14. Explain the structures employed to refer to future plans.
Indicative Contents المحتويات الإرشادية	The indicative content of the course comprises the following: 1. Introduction to the significance of English language acquisition and its role in social communication.
	2. Application and practice of various tenses, such as present and past tenses. 3. Comprehensive exploration of key concepts, including offers, requests, future, personal expressions, and different tenses. 4. Utilization of a range of skills to facilitate English language learning, including listening, reading, writing, and speaking. Additionally, providing diverse examples to enhance understanding of concepts and structures.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	The main strategies adopted in delivering this module include: • Encouraging active participation and fostering critical thinking skills through engaging students in discussions. • Applying the communicative approach to enhance students' English language learning skills and enable effective communication. • Incorporating authentic materials in the classroom to create a realistic and immersive learning experience. • Emphasizing student motivation and promoting their engagement in the learning process. • Enhancing interaction and communication skills to achieve greater success in English language proficiency.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	1, 5, 10	LO# 3, 4, 5 and 8
	Assignments	3	12% (12)	2, 6, 12	LO # 2, 4, 5, 7, and 8
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	13	LO #5, 8, 9, and 10

	On-site assignment	1	5%(5)	12	
Summative assessment	Midterm Exam	1	10% (10)	9	LO #1 - 7
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency.
Week 2	Emphasis is placed on developing listening
Week 3	Emphasis is placed on developing speaking,
Week 4	Emphasis is placed on developing reading
Week 5	Emphasis is placed on developing writing
Week 6	grammar and fundamental writing skills
Week 7	Midterm Exam
Week 8	Understand the main ideas of a variety of written and spoken texts
Week 9	Participate effectively in a short conversation using appropriate language.
Week 10	Select appropriate vocabulary to talk about feelings and experiences.
Week 11	Select appropriate vocabulary to talk about opinions and experiences.
Week 12	Recognize, understand and use a number of phrasal verbs and collocations.
Week 13	Effective organizational strategies that include introductions, and paragraphs.
Week 14	Effective organizational strategies that include transitions, and conclusion.
Week 15	Revision
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?
Required Texts	John and liz Soar. (New Headway Beginner) 4th edition. Oxford: Oxford University Press.	Yes
Recommended Texts		No
Websites		

Grading Scheme مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 – 100)	A – Excellent	امتياز	90 – 100	Outstanding Performance
	B – Very Good	جيد جدا	80 – 89	Above average with some errors
	C – Good	جيد	70 – 79	Sound work with notable errors
	D – Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E – Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

1. Course Name:
Control systems I
2. Course Code:
EEP407
3. Semester / Year:
1/ 2025-2026
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
60/4
7. Course administrator's name (mention all, if more than one name)
Name: Mohammed Obaid Mustafa Email: mohammed.obaid@uomosul.edu.iq
8. Course Objectives

Course Objectives	The objective of control system analysis is to understand how a system behaves under various inputs and conditions, and to evaluate whether it meets the desired performance and stability requirements. Specifically, the key objectives include: **1.** Understanding System Behavior Analyze how the system responds to different types of inputs (step, ramp, sinusoidal, etc.). Examine time-domain and frequency- domain responses. **2.** Determining Stability • Identify whether the system will remain bounded and predictable for all bounded inputs. • Use methods like: o Routh-Hurwitz criterion o Nyquist plot o Bode plot o Root locus 3. Control System Design (GO -2)

	• Provide a foundation for designing controllers (PID, fuzzy, optimal, etc.) to achieve desired dynamic behavior.

9. Teaching and Learning Strategies

Strategy	-Active Learning: Through class discussions and real world problems. - Coordination with lab classes to provide a parallel hands-on experience. -Use google classroom platform to enhance learning and provide supplementary material.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	2	OC1	Review … Basic fundamental of control systems	Lecture	HW
	2	OC1	Stability of Linear Control Systems Methods of Determining Stability Routh-Hurwitz Criterion	Lecture	HW
2	2	OC1	Routh-Hurwitz Criterion	Lecture – tutorial	Exam Quiz
	2	OC3	State feedback	Lecture	HW
3	2	OC2	Root Locus Analysis Basic Properties of the Root Loci (RL)	Lecture	HW
	2	OC2	Design Aspects of the Root Loci	Lecture	HW
4	2	OC2	Examples about Root Locus	Tutorial Class Discussion	HW
	2	OC2	Root Locus Analysis	Lecture Tutorial	Exam
5	4	OC2	Frequency-Domain Analysis	Lecture	HW
6	4	OC2	Nyquist Stability concept	Lecture Tutorial	HW
7	4	OC2	Nyquist Stability - examples	Lecture Tutorial	Exam Quiz
8	4	OC2	Nyquist Stability	Lecture Tutorial	Exam
9	2	OC2	Boele Plot Analysis	Lecture	Exam

9	2	OC2	Stability Analysis with the Magnitude-Phase Plots	Lecture Tutorial	HW
10	4	OC2	Boele Plot Analysis With Logarithmic Graph Paper	Lecture Tutorial	Exam Quiz
11		OC4	Design of Control System	Exam Quiz	HW
12		OC4	Design of PID	Exam Quiz	HW
13		OC4	P, PI, PD , PID Controller	Lecture Tutorial	Exam Quiz
14		OC4	ziegler-nichols Method	Lecture	HW
15		OC4	ziegler-nichols Examples	Lecture Tutorial	Exam Quiz

11. Course Evaluation

- Mid term examinations: 30%
- Quizzes & Assignments: 10%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbook	Automatic Control Systems 9th edition, BENJAMIN C. KUO
Main references	Modern Control Engineering 5th edition, Katsuhiko Ogata
Recommended books and references	
Electronics References	*Google Classroom Page: Power Electronics* *Class code:* *bism4ey*

Google Classroom Page: Power Electronics
Class code: bism4ey

MODULE DESCRIPTION FORM

1. Course Name:
Power System Analysis I
2. Course Code:
EEP401
3. Semester / Year:
1/ 2025-2026
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
45 / 3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Saad Enad Mohammed Email: saadmohamed@uomosul.edu.iq

8. Course Objectives	
Course Objectives	The objective of Power system analysis is for designing entire power systems consisting of generators, transformers, capacitor banks, shunt elements, transmission lines and so on. Power system analysis makes sure the equipment works together so that the required power is delivered to the load centers at the prescribed voltage and frequency, and no component in the network is overloaded and no-fault condition jeopardizes the system.

9. Teaching and Learning Strategies	
Strategy	1- Electronic illustration tools, such as presentations, slides, images, videos, and others, can be used to clarify concepts and scientific information to students. These tools can be used to illustrate examples and practical applications, present graphs and charts to clarify relationships and processes, and demonstrate results and statistical data. 2- Surprise daily tests can be conducted without prior notice to students to motivate them to regularly review the materials and prepare well for any test. These daily tests can be sudden and short-term, aiming to test students' immediate understanding of the study materials and concepts. As for weekly tests, they can be announced in advance to students, giving them sufficient time to prepare. The purpose of weekly tests is to assess the overall progress of students and their understanding of the study materials over a longer period. 3- Students can be given the opportunity to participate in open discussion sessions on the

	study topics. These sessions can be organized to allow students to discuss scientific materials, exchange ideas and opinions, ask questions, and clarify any doubts. These discussion sessions can be organized as part of the lessons or as independent activities. Additionally, students can be assigned research tasks to explore the latest applications of the scientific subject matter.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	3	OC1	Introduction: Need for system planning and operational studies - basic components of a power system.	Lecture	Exam HW
2	3	OC1	Introduction is restructuring - single line diagram-per phase.	Lecture – tutorial	Exam Quiz
3	3	OC1/OC3	Per unit analysis - generator – transformer representation for different power system: studies.	Lecture	Exam
4	3	OC3	Transmission line and load Primitive Network: Construction of Y-bus using inspection transformation methods.	Lecture	Exam HW
5	3	OC2	Construction of Z-bus using inspection transformation methods.	Lecture	Exam Quiz
6	3	OC2	Power Flow Analysis: Importance of power flow analysis to planning and operation of power systems.	Lecture	Exam
7	3	OC4	Statement of power flow problem.	Tutorial Class Discussion	
8	3	OC4	Mid-term EXAM	Lecture Tutorial	Exam Quiz
9	3	OC5	classification of buses.	Lecture	Exam
10	3	OC5	development of power flow model in complex variables form.	Lecture Tutorial	Exam HW
11	3	OC6	Iterative solution using Gauss Seidel method.	Lecture	Exam Quiz

12	3	OC7	Numerical Solution of power flow using Newton- Raphson method.	Lecture Tutorial	Exam
13	3	OC7	Iterative solution using fast De-couple method.	Lecture	Exam
14	3	OC6-OC7	MATLAB Applications in Load Flow Analysis	Lecture Tutorial	Exam/Quiz
15	3		Final Exam.	Group discussion	

11. Course Evaluation

- Mid-term examinations: 30%
- Quizzes & Assignments: 10%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbook	*POWER SYSTEM ANALYSIS by William D. Stevenson*
Main references	*Power System Analysis and Design by Glover*
Recommended books and references	*Power System Analysis by Hadi Saadat*
Electronics References	*Google Classroom Page: Power System Analysis I* *Class code: tskvx4t4*

MODULE DESCRIPTION FORM

1. Course Name:
Power System Protection I
2. Course Code:
EEP402
3. Semester / Year:
1st Semester / 4th Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
45/3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Shaker Mahmood Khudher Email: shakeralhyane@uomosul.edu.iq
8. Course Objectives

Course Objectives	The aim of this course is to: 1. The development and applications of switchgear and protective relaying systems. 2. The construction, operation, and characteristics of H.R.C. fuses. 3. Circuit breakers as protective and isolating equipment. 4. The philosophy and requirements of protective devices in power systems. 5. The role and operation of current transformers and voltage transformers. 6. Overcurrent and earth-fault protection principles and

	requirements. 7. Directional protection for looped circuits. 8. High-impedance and low-impedance differential protection principles. 9. Power transformer protection schemes. 10. Bus-bar differential protection principles and applications.. .

9. Teaching and Learning Strategies

Strategy	The main strategy for delivering this module is to encourage students' participation in the exercises while refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	Analysis and Design	Overview of switch-gears and protective relaying systems and their developments	Theoretical	Quizzes & home works
Week 2	3	Analysis and Design	Overview of switch-gears and protective relaying systems and their developments	Theoretical	Quizzes & home works
Week 3	3	Analysis and Design	H.R.C. Fuse: Construction and characteristics	Theoretical	Quizzes & home works
Week 4	3	Analysis and Design	H.R.C. Fuse: Construction and characteristics	Theoretical	Quizzes & home works
Week 5	3	Analysis and Design	Circuit Breakers as protective isolating equipment	Theoretical	Quizzes & home works
Week 6	3	Analysis and Design	Circuit Breakers as protective isolating equipment	Theoretical	Quizzes & home works

Week 7	3	Analysis and Design	Protective devices and their philosophy of protection, including	Theoretical	Quizzes & home works
Week 8	1.5		Mid-Semester Exam	Theoretical	Theoretical
Week 9	3	Analysis and Design	Current and voltage transformers CTs & VTs	Theoretical	Quizzes & home works
Week 10	3	Analysis and Design	Current and voltage transformers CTs & VTs	Theoretical	Theoretical
Week 11	3	Analysis and Design	Overcurrent and earth fault protection and their requirements	Theoretical	Quizzes & home works
Week 12	3	Analysis and Design	Protection of looped circuits using directional	Theoretical	Quizzes & home works
Week 13	3	Analysis and Design	High impedance and low impedance differential current protective relaying principles of operation and application	Theoretical	Quizzes & home works
Week 14	3	Analysis and Design	Power transformer protection	Theoretical	Quizzes & home works
Week 15	3	Analysis and Design	Bus-bar differential current protective relay	Theoretical	Quizzes & home works

11. Course Grading Policy

Grading Policy:

Quizzes	8pts
Homework	5pts
Report	7pts
Term Exam	20pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:

حماية نظم القدرة /د عبدالغني عبدالرزاق

1- **FUNDAMENTALS OF POWER SYSTEM PROTECTION by Y.G. Paithankar and S.R. Bhide ,2003.**
2- **Transmission Network Protection: Theory and Practice by Yeshwant G. Paithankar.**
3- **Practical Power System Protection by Hewitson ,L.G., M. and Balakrishnan , R, Newness, New york ,2004**

Electronics References	*Google Classroom Page:* *POWER SYSTEM PROTECTION* *Class code:* *qnmrtzcb*

MODULE DESCRIPTION FORM

1. Course Name:
High Voltage Engineering I
2. Course Code:
EEP404
3. Semester / Year:
1st Semester / 4th Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
Yes
6. Number of Credit Hours (Total) / Number of Units (Total)
30/2
7. Course administrator's name (mention all, if more than one name)
Name: Asst Prof. Dr. Dawood Najem Saleh Email: dnsaij@uomosul.edu.iq
8. Course Objectives

Course Objectives	This course aims to provide students with a foundational understanding of high voltage engineering and its applications. By the end of the course, students will be able to: Understand High Voltage Fundamentals • Learn the principles of high voltage generation, measurement, and applications in power systems. • Study electric field distribution and breakdown mechanisms in gases, liquids, and solids. Study Insulation Materials &Techniques • Analyze different types of insulation materials and their properties under

	high voltage stress. • Examine insulation coordination and design for high voltage equipment. Learn High Voltage Testing & Safety • Understand standard testing methods for transformers, cables, and switchgear. • Emphasize safety protocols and precautions in high voltage laboratories. Explore High Voltage Equipment & Applications • Study the construction and working principles of transformers, circuit breakers, and surge arresters. • Examine high voltage applications in power transmission, industrial systems, and research. • Develop problem-solving skills for real-world high voltage challenges. • Understand emerging trends like HVDC transmission and smart grid technologies.

9. Teaching and Learning Strategies	
Strategy	• Active Learning: Encourage student engagement through interactive class discussions, problem-based learning, and real-world case studies. • Integration with Laboratory Sessions: Align theoretical lectures with laboratory classes to provide parallel hands-on experience and reinforce practical understanding

	• Blended Learning Support: Utilize the Google Classroom platform to enhance learning, facilitate communication, and provide access to supplementary materials and resources.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Define the concept of electric field and potential in high voltage systems. Analyze field distribution in simple electrode configurations. Apply field plotting techniques (analytical/numerical) to evaluate stress in insulation.	Electrical field in High Voltage Engineering	Interactive lecture with visual field plots and stress control examples.	Quiz (5)
2	2	Apply field plotting techniques (analytical/numerical) to evaluate stress in insulation.	Electrical field in High Voltage Engineering	Problem-solving sessions on field equations and electrode geometry.	Homework (5)
3	2	Explain ionization processes in gases under high electric fields.	Breakdown Mechanism of Gases	Lecture with animations explaining Townsend & Streamer theories.	Report (5)
4	2	Compare Townsend's and Streamer breakdown theories.	Breakdown Mechanism of Gases	Numerical exercises on Paschen's law	Quiz (5)
5	2	Solve numerical examples on Paschen's law for breakdown voltage estimation.	Breakdown Mechanism of Gases	Case studies of gas-insulated systems (GIS, SF_6).	Homework (5)

6	2	Describe conduction and breakdown mechanisms in insulating liquids. Differentiate between electronic, suspended particle, and bubble theories.	Breakdown Mechanism of Liquid	Lecture with real-world examples of transformer oils and synthetic liquids. Group discussion on the impact of impurities and aging.	
7	2	Identify intrinsic, electromechanical, and thermal breakdown mechanisms in solids. Evaluate the long-term degradation processes (tracking, treeing, partial discharge).	Breakdown Mechanism of Solid Materials	Lecture + visuals explaining tracking, treeing, and partial discharge. Case study on XLPE cable failures.	Quiz (5)
8	2				Mid-Term Exam (25)
9	2	Explain the principle of cascaded transformers and resonant circuits.	Generation of high A.C voltages.	Lecture on cascaded transformers and resonant circuits.	Homework (5)
10	2	Design and analyze circuits for high AC voltage generation.	Generation of high A.C voltages.	Mathematical derivation & circuit design exercises.	Report (5)
11	2	Explain rectifier circuits (single stage and multistage) for HV DC generation.	Generation of high D.C voltages.	Lecture with circuit diagrams (rectifiers, multipliers).	Quiz (5)

12	2	Explain rectifier circuits (single stage and multistage) for HV DC generation.	Generation of high D.C voltages.	Problem-solving session: design of Cockcroft–Walton multipliers.	Homework (5)
13	2	Explain Marx generator operation and its applications. Design impulse voltage circuits to achieve required waveform parameters (front time, tail time).	Generation of high impulse voltages.	Lecture with wave-shaping principles. Simulation of Marx generator to visualize impulse waveforms.	Homework (5)
14	2				Tutorial and revision
15	3				Final Exam (60)

Grading Policy:

11. Course Grading Policy

Quizzes	5pts
Homework	5pts
Report	5pts
Term Exam	25pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:

- Andreas Küchler, High voltage Engineering, Springer-Verlag GmbH Germany, 2018.
- E. Kuffel, W.S. Zaengl, and J. Kuffel, High Voltage Engineering: Fundamentals, 2nd edition, Butterworth Heinemann, 2000.
- C.L. Wadhwa, High Voltage Engineering, 2nd ed., New Age International, 2007

Electronics References	*Google Classroom Page:* *High Voltage Engineering I* *Class code:* *pwz2dzye*

M

ODULE DESCRIPTION FORM

1. Course Name:	
Special Electrical Machines I	
2. Course Code:	
EEP403	
3. Semester / Year:	
Semester	
4. Description Preparation Date:	
September/2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45/3	
7. Course administrator's name	
1- Dr. Ahmed Alsammak, Email: ahmed_alsammak@uomosul.edu.iq 2- 2- Mr. Omar Turath, Email: omartawfeeq_1981@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	Introduction about Special Electrical Machines SPEM, Single phase synchronous motors: Variable reluctance type motors, Switched reluctance motors, hysteresis motor. Single phase AC series commutator motor. The universal motor. The repulsion motor. Stepper motors: Types, construction, characteristics, and applications. Linear induction machines: Types and characteristics and applications. Three-phase ac commutator machines. Schrage motor. Permanent Magnet Synchronous Motor (PMSM). The rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers. Generator excitation and voltage control.
9. Teaching and Learning Strategies	
Strategy	The teaching for SPEM starts with fundamental concepts like AC motors and rotating magnetic fields. Use active learning strategies, such as class discussions, problem-solving, and hands-on lab work, to engage students. Incorporate visual aids, simulations, and real-world case studies to enhance understanding. Teach the theoretical models and performance parameters like torque and efficiency. Conclude with assessments, including quizzes, projects, and feedback, to ensure students can apply their knowledge effectively.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Understanding the principle of operation of SPEM	Introduction about Special Electrical Machines: Principal of operations, Types of Special Electrical Machines	Lecture using the whiteboard and PowerPoint on Datashow and sometimes Using clarifications and practical applications	-
2	2	Understanding the Single phase synchronous motors: Variable reluctance type motors	Single phase synchronous motors: Variable reluctance type motors including: Types, construction, characteristics, and applications.+ Examples	=	Homework
3	2	Understanding and analysis switched reluctance motors	Switched reluctance motors including: Types, construction, characteristics, and applications.+ Examples	=	Quiz
4	2	Understanding and analysis Hysteresis motor.	Hysteresis motor including: Types, construction, characteristics, and applications.+ Examples	=	-
5	2	Study the Single phase AC series commutator motor. The universal motor+ Examples	Single phase AC series commutator motor. The universal motor, including: Types, construction, characteristics, and applications.+ Examples	=	Homework

6	2	Study the The repulsion motor + Examples	The repulsion motor + Examples	=	Quiz
7	2	Study the Stepper motors: Types, construction, characteristics, and applications.+ Examples	Stepper motors: Types, construction, characteristics, and applications.+ Examples	=	Quiz
8	2	Study the Linear induction machines: Types and characteristics and applications + Examples.	Linear induction machines: Types and characteristics and applications + Examples	=	-
9	2	Study the three-phase AC commutator machines	Three-phase ac commutator machines	=	Quiz
10	2	Review the Schrage motor + Examples	Schrage motor + Examples	=	Homework
11	2	Review the Permanent Magnet Synchronous Motor (PMSM) + Examples	Permanent Magnet Synchronous Motor (PMSM) + Examples	=	-
12	2	-	Course Exam	=	Course Exam

13	2	Review on the rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers	The rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers	=	Homework
14	3	Review on the types of generator excitation and voltage control.	Generator excitation and voltage control.	=	Quiz
15	3	-	Final Exam	=	Final Exam

11. Course Evaluation

Evaluation Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports ....
etc Marking:

Evaluation type	Degree
Quizzes	10pts
Homework+ Report	10pts
Term Exam	20pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:

1- Rotating electrical machine, S.K. Sen, 1975

2- Alternating current machines, M.G. Say, 1984

3- Electric Machinery and their Application, J.Hindmarsh 3rd, 1979

4- Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003.

5- 1989 مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي،

6- Electric Machinery Fundamentals, Stephen J. Chapman, 2005

7- Electric Motors and Drives, Austin Hughes, 3rd, 2006

8- Electromechanical Motion Devices, Second Edition,

9- Paul Krause, Oleg Wasynczuk, Steven Pekarek, Wiley-IEEE Press, Year: 2012

10- P. C. Sen, Principles of Electric Machines and Power Electronics, Third Edition, Wiley, 2014.

https://classroom.google.com/c/NzI1NzYyNjAyNjgy?cjc=u4236yb

COURSE DESCRIPTION FORM

1. Course Name:
Electrical Power Generation Station
2. Course Code:
PGST406
3. Semester / Year:
Semester
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
30/2
7. Course administrator's name (mention all, if more than one name)
Name: Mohammad Ahmed Ali Email: mohammadalijuboori66@uomosul.edu.iq
8. Course Objectives

Course Objectives	OC 1. *Define about primary energy sources, their classifications, generator construction and operation, and the relationship between different speeds and frequency.* OC 2. *Understand and study the equipment attached to power plants.* OC 3. *Study the construction, operation, and components of thermal power plants, and calculate efficiency and fuel quantities..* OC 4. *Be able to understand the construction and operation of gas*

	turbines and diesel generators, fuel calculations, and work within combined cycle power plants. *OC 5. Identify hydropower plants, study their classifications according to height, and perform power generation calculations with examples.* *OC 6. Study the operation and installation of nuclear power plants.* *OC 7. Define DC, AC, and static excitation systems, as well as voltage regulators and their components, and control speed and frequency using a speed governor. Also, understand the operation of a SCADA system.*

9. Teaching and Learning Strategies	
Strategy	1- Explanation and clarification through lectures and question-answering. 2- Use classroom discussions and tests. 3- Use the Google Classroom platform for additional education and completing the requirements for clarifying topics.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	2	OC1	Primary energy sources and their classifications	Lecture	HW
2	2	OC1	Energy equivalents and its conversions	Lecture –	Quiz
3	2	OC2	The major equipments of power plants	Lecture	Exam
4	2	OC3	Thermal power plants	Lecture	Exam HW
5	2	OC4	Gas generating stations	Lecture	Quiz
6	2	OC5	Hydroelectric power stations	Lecture	-
7	2	OC6	Nuclear power plants	Lecture	Quiz
8	2	OC4	Diesel stations	Lecture	-
9	2	OC6	Automatic Voltage Regulation (AVR) Concept	Lecture	-
10	2	OC7	DC excitation system and AC excitation system Static excitation system	Lecture	HW
11	2		Course Exam		
12	2	OC7-OC1	Frequency and active power control	Lecture	-
13	2	OC7	Speed Governing Basics	Lecture	
14	2	OC7	Supervisory Control and Data Acquisition (SCADA)	Lecture	Quiz
15	2		Final Exam		

11. Course Evaluation	
• Mid term examinations: 30% • Quizzes & Assignments: 10% • Final examination: 60%	

12. Learning and Teaching Resources	
Required textbook	1. Anderson, P.M and Fouad, A., Power System Control and Stability, (2nd Edition), Wiley-IEEE Press, New Jersey, 2002.
Main references	2. Casazza, J and Delea, F., Understanding Electric Power Systems: An Overview of The Technology and The Marketplace, Wiley-IEEE Press, New Jersey, 2003.
Recommended books and references	3. Ilic, M and Zaborszky, J., Dynamics and Control of Large Electric Power Systems, Wiley Press, New York, 2000.
Electronics References	*Google Classroom Page:* Power generation stations *Class code:* *https://classroom.google.com/c/NjMwMTQ0NzEzMjEw?cjc=pz4h6ey*

Google Classroom Page: Power generation stations

Class code: *pz4h6ey*

COURSE DESCRIPTION FORM

1. Course Name:
Power and Machines Lab III
2. Course Code:
EEP406
3. Semester / Year:
1^{st} Semester / 4^{th} Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
90/6
7. Course administrator's name (mention all, if more than one name)
1- Prof. Dr. Ahmed Nasser B. Alsammak (Supervisor) Email:-ahmed_alsammak@uomousl.edu.iq 2- Asst. Prof. Dr. Omer Sharaf Alden Yehya Email:- o.yehya@uomosul.edu.iq 3- Dr. Wael Hashim Hamdoon Email:- waelhashem_67@uomosul.edu.iq 4- Dr. Hasan Adnan Mohammed Email:- hasan82adnan@uomosul.edu.iq 5- Dr. Dawood Najem Saleh Email:- dnsaij@uomosul.edu.iq 6- Ibrahim Isamel abdulhameed Email:- ibrahim- 85353@uomosul.edu.iq 7- Dr. Saad Enad Mohammed Email:- saadmohamed@uomosul.edu.iq 8- Shaker Mahmood Khudher Email:- shakeralhyane@uomosul.edu.iq

9- Ammar shamil Ghanim
Email:- ammarshamilhanon@uomosul.edu.iq

Dr. Ryadh Zaki Sabry
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10- Raghad Adeeb Othman
Email:- raghadeeb@uomosul.edu.iq

11- Asst. Prof. Dr. Shamil H. Hussein
Email: shamil_alnajjar84@uomosul.edu.iq

12 - Ali Abbawi Mohammed Alabbawi
Email - ali.abbawi@uomosul.edu.iq

13-Ghassan Mohsin Ahmed
Email:- ghassab208@uomosul.edu.iq

8. Course Objectives

Course Objective	1- Machines Laboratory: - In this lab. student can performed sum of experiments that related with different types of machines. 2- Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represents for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. 3- Transmission Line Laboratory: - To study the behavior of transmission line under open and short circuit tests and show the Ferranti effect of Long Transmission Line model in order to calculate the transmission line parameters for PI representation also to understand the principles of compensation and voltage regulation along with load flow analysis and fault study. 4- Renewable Energy Laboratory: - Recently, renewable energy has been more popular in the household and rarial locations application due to reduction of the conventional energy sources. This laboratory helps the student to understand, test and design different types of renewable energy such as photovoltaic energy system, wind energy system and etc. 5- High Voltage Laboratory: - The first course provides principal knowledge associated with high voltage engineering methods, techniques and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating and impulse

	voltages for testing high-voltage equipment.

9. Teaching and Learning Strategies

Strategy	Focus on hands-on experiments that reinforce theoretical concepts. Use a combination of demonstrations, simulations, and real-world case studies to illustrate the functioning of machines and power systems. Encourage problem-solving and data analysis during experiments to foster critical thinking. Incorporate safety protocols and real-time troubleshooting to prepare students for industrial applications. Finally, assess learning through practical reports, quizzes, and project-based assignments.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	6		Divideding and organizing the students into sum of groups and teams	Practical Experiments in the Laboratory	
2	6	Analysis	No load and blocked rotor tests of single phase induction motor	Practical Experiments in the Laboratory	Reports
3	6	Analysis	variable load varaible capacitor tests of single phase induction motor	Practical Experiments in the Laboratory	Quiz and Reports
4	6	Analysis	Study the transfer function in control system.	Practical Experiments in the Laboratory	Reports
5	6	Design	Block diagram reduction of control system in MATLAB.	Practical Experiments in the Laboratory	Quiz and Reports
6	6	Design	The power station and transmission system model short circuit and no-load test on a logic line	Practical Experiments in the Laboratory	Reports
7	6	Analysis	Possibility of compensation and voltage regulation of T.L	Practical Experiments in the Laboratory	Reports
8	6	Mid Derm Exam	Theory and Practical		
9	6	Analysis	Study of photovoltaic energy system	Practical Experiments in the Laboratory	Reports

10	6	Design	State Space Mode	Practical Experiments in the Laboratory	Quiz and Reports
11	6	Analysis	Servo motor	Practical Experiments in the Laboratory	Reports
12	6	Study	polarity effects on breakdown voltage	Practical Experiments in the Laboratory	Quiz and Reports
13	6	Design	Breakdown of air in uniform & non-uniform AC Field	Practical Experiments in the Laboratory	Reports
14	6	Study	**Review**	Practical Experiments in the Laboratory	Quiz and Reports
15	6	Final Exam	Theory and Practical		

11. Course
Evaluation Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc Marking:

Grading Policy:

Quizzes	10pts
Homework+ Report	20pts
Term Exam	30pts
Final Exam	40pts
Total	100pts

12. Learning and Teaching Resources

References:

1- Rotating electrical machine, S.K. Sen, 1975
2- Alternating current machines, M.G. Say, 1984
3- Electric Machinery and their Application, J.Hindmarsh 3rd, 1979
4- Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003.
5- **مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي، 1989**
6- Electric Machinery Fundamentals, Stephen J. Chapman, 2005
7- Feedback Group Company. www.feedback.group.com.
8- Roland S. Burns, " Advanced Control Engineering", University of Plymouth. UK. 2021.
9- B.M. Weedy, Electric Power System, 5th edition, John Wiley and Sons, 2012.
10- William D. Stevenson, Jr, Elements of Power System Analysis, 4th Edition, McGraw Hill, 1982.
11- Wim Turkenburg "Renewable Energy".
12- John Twidell and Tony Weir "Renewable Energy Resources " second edition.
https://classroom.google.com/c/NzE4OTQ2ODg5MDQ3

MODULE DESCRIPTION FORM

1. Course Name:
Control System II
2. Course Code:
EEP417
3. Semester / Year:

2/ 2025-2026

4. Description Preparation Date:

September/2025

5. Available Attendance Forms:

On-Campus Lectures

6. Number of Credit Hours (Total) / Number of Units (Total):

60/4

7. Course administrator's name (mention all, if more than one name)

Name: Mohammed Obaid Mustafa
Email: mohammed.obaid@uomosul.edu.iq

8. Course Objectives

Course Objectives The **objective of control system analysis** is to understand how a system behaves under various inputs and conditions, and to evaluate whether it meets the desired performance and stability requirements. Specifically, the key objectives include:	**1. Understanding System Behavior** Analyze how the system responds to different types of inputs (step, ramp, sinusoidal, etc.). Examine time-domain and frequency-domain responses. **2. Determining Stability** • Identify whether the system will remain bounded and predictable for all bounded inputs. • Use methods like: o Routh-Hurwitz criterion o Nyquist plot o Bode plot o Root locus **3. Control System Design (GO -2)** • Provide a foundation for designing controllers (PID, fuzzy, optimal, etc.) to achieve desired dynamic behavior.

9. Teaching and Learning Strategies

Strategy	-Active Learning: Through class discussions and real world problems. - Coordination with lab classes to provide a parallel hands-on experience. -Use google classroom platform to enhance learning and provide supplementary material.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	2	OC1	Review … Basic fundamental of control systems	Lecture	HW
	2	OC1	Stability of Linear Control Systems Methods of Determining Stability Routh-Hurwitz Criterion	Lecture	HW
2	2	OC1	Routh-Hurwitz Criterion	Lecture – tutorial	Exam Quiz
	2	OC3	State feedback	Lecture	HW
3	2	OC2	Root Locus Analysis Basic Properties of the Root Loci (RL)	Lecture	HW
	2	OC2	Design Aspects of the Root Loci	Lecture	HW
4	2	OC2	Examples about Root Locus	Tutorial Class Discussion	HW
	2	OC2	Root Locus Analysis	Lecture Tutorial	Exam
5	4	OC2	Frequency-Domain Analysis	Lecture	HW
6	4	OC2	Nyquist Stability concept	Lecture Tutorial	HW
7	4	OC2	Nyquist Stability - examples	Lecture Tutorial	Exam Quiz
8	4	OC2	Nyquist Stability	Lecture Tutorial	Exam
9	2	OC2	Boele Plot Analysis	Lecture	Exam
9	2	OC2	Stability Analysis with the Magnitude-Phase Plots	Lecture Tutorial	HW
10	4	OC2	Boele Plot Analysis With Logarithmic Graph Paper	Lecture Tutorial	Exam Quiz
11		OC4	Design of Control System	Exam Quiz	HW
12		OC4	Design of PID	Exam Quiz	HW
13		OC4	P, PI, PD , PID Controller	Lecture Tutorial	Exam Quiz
14		OC4	ziegler-nichols Method	Lecture	HW
15		OC4	ziegler-nichols Examples	Lecture Tutorial	Exam Quiz

11. Course Evaluation	
• Mid term examinations: 30% • Quizzes & Assignments: 10% • Final examination: 60%	
12. Learning and Teaching Resources	
Required textbook	Automatic Control Systems 9th edition, BENJAMIN C. KUO
Main references	Modern Control Engineering 5th edition, Katsuhiko Ogata
Recommended books and references	
Electronics References	*Google Classroom Page: Power Electronics* *Class code:* *bism4ey*

Google Classroom Page: Power Electronics

Class code:

bism4ey

MODULE DESCRIPTION FORM

6. Course Name:
Power System Analysis II
7. Course Code:
EEP411

8. Semester / Year:	
2 / 2025-2026	
9. Description Preparation Date:	
September/ 2025	
10.Available Attendance Forms:	
On-Campus Lectures	
6. Number of Credit Hours (Total) / Number of Units (Total):	
45 / 3	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. Saad Enad Mohammed Email: saadmohamed@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	The objective of Power system analysis is for designing entire power systems consisting of generators, transformers, capacitor banks, shunt elements, transmission lines and so on. Power system analysis makes sure the equipment works together so that the required power is delivered to the load centers at the prescribed voltage and frequency, and no component in the network is overloaded and no-fault condition jeopardizes the system.

9. Teaching and Learning Strategies	
Strategy	1- Electronic illustration tools, such as presentations, slides, images, videos, and others, can be used to clarify concepts and scientific information to students. These tools can be used to illustrate examples and practical applications, present graphs and charts to clarify relationships and processes, and demonstrate results and statistical data. 2- Surprise daily tests can be conducted without prior notice to students to motivate them to regularly review the materials and prepare well for any test. These daily tests can be sudden and short-term, aiming to test students' immediate understanding of the study materials and concepts. As for weekly tests, they can be announced in advance to students, giving them sufficient time to prepare. The purpose of weekly tests is to assess the overall progress of students and their understanding of the study materials over a longer period. 3- Students can be given the opportunity to participate in open discussion sessions on the study topics. These sessions can be organized to allow students to discuss scientific materials, exchange ideas and opinions, ask questions, and clarify any doubts. These discussion sessions can be organized as part of the lessons or as independent activities. Additionally, students can be assigned research tasks to explore the latest applications of the scientific subject matter.
10. Course Structure	

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	3	OC1	Introduction of Fault Analysis	Lecture	Exam HW
2	3	OC1	Balanced Faults: Importance of short circuit analysis	Lecture – tutorial	Exam Quiz
3	3	OC1/OC3	Assumptions in fault analysis fault analysis using Thevenin's theorem.	Lecture	Exam
4	3	OC3	Z-bus building algorithm analysis using Z-bus.	Lecture	Exam HW
5	3	OC2	Computations of short circuit capacity, Post fault voltage and currents.	Lecture	Exam Quiz
6	3	OC2	MATLAB Applications in balance faults.	Lecture	Exam
7	3	OC4	Fault Analysis- Unbalanced Faults: Introduction to symmetrical components.	Tutorial Class Discussion	
8	3	OC4	Mid-EXAM	Lecture Tutorial	Exam Quiz
9	3	OC5	Sequence impedances- sequence circuits of synchronous machine transformer and transmission lines.	Lecture	Exam
10	3	OC5	Sequence networks analysis of single line to ground, line to line and double line to ground faults using Thevenin's theorem and Z-bus sequence matrix.	Lecture Tutorial	Exam HW
11	3	OC6	MATLAB Applications in unbalance faults.	Lecture	Exam Quiz
12	3	OC7	Stability Analysis: Importance of stability analysis in power system planning and operation - classification of power system stability.	Lecture Tutorial	Exam
13	3	OC7	Angle and voltage stability- Single Machine Infinite Bus (SMIB) system: Development of swing equation.	Lecture	Exam

14	3	OC6-OC7	Equal area criterion, determination of critical clearing angle and time - solution of swing equation by modified Euler method and Runge-Kuta fourth order method.	Lecture Tutorial	Exam/Quiz
15	3		Final Exam		

11. Course Evaluation

- Mid-term examinations: 30%
- Quizzes & Assignments: 10%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbook	*POWER SYSTEM ANALYSIS by William D. Stevenson*
Main references	*Power System Analysis and Design by Glover*
Recommended books and references	*Power System Analysis by Hadi Saadat*
Electronics References	*Google Classroom Page: Power System Analysis II* *Class code: paas2y7b*

MODULE DESCRIPTION FORM

1. Course Name:
Power System Protection II
2. Course Code:
EEP412

3. Semester / Year:
2^{nd} Semester / 4^{th} Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total)
30/2
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Shaker Mahmood Khudher Email: shakeralhyane@uomosul.edu.iq
8. Course Objectives

Course Objectives	The aim of this course is to: 11. Provide students with a comprehensive understanding of power system protection principles for major components including generators, motors, and transmission lines. 12. Develop the ability to analyze and evaluate protection schemes for electrical machines under normal and fault conditions. 13. Introduce the fundamental concepts of distance (impedance) protection, including relay characteristics, comparators,, and performance under practical conditions. 14. Enhance students' knowledge of modern protection techniques, particularly digital (numerical) protective relays and their advantages over conventional systems. 15. Familiarize students with communication-based protection systems, specifically Power Line Carrier Communication (PLCC), and their applications in transmission networks. 16. Enable students to integrate and select appropriate protection strategies to ensure reliability, selectivity, and stability in power system operation.

9. Teaching and Learning Strategies

Strategy	The main strategy for delivering this module is to encourage students' participation in the exercises while refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and simple experiments involving some sampling activities that are interesting to the students.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Week 1	3	Analysis and Design	Introduction	Theoretical	Quizzes & home works
Week 2	3	Analysis and Design	Generator Protection	Theoretical	Quizzes & home works
Week 3	3	Analysis and Design	Generator Protection (Cont.)	Theoretical	Quizzes & home works
Week 4	3	Analysis and Design	Generator Protection Schemes	Theoretical	Quizzes & home works
Week 5	3	Analysis and Design	Motor Protection	Theoretical	Quizzes & home works
Week 6	3	Analysis and Design	Motor Protection Schemes	Theoretical	Quizzes & home works
Week 7	3	Analysis and Design	Distance Protection Basics	Theoretical	Quizzes & home works
Week 8	1.5		**Midterm Exam**	Theoretical	
Week 9	3	Analysis and Design	Distance Protection – Comparators	Theoretical	Quizzes & home works
Week 10	**3**	**Analysis and Design**	**Distance Relay Characteristics**	**Theoretical**	**Theoretical**
Week 11	3	Analysis and Design	Relay Performance	Theoretical	Quizzes & home works
Week 12	3	Analysis and Design	Digital Protective Relays	Theoretical	Quizzes & home works
Week 13	3	Analysis and Design	Digital Relay Algorithms	Theoretical	Quizzes & home works
Week 14	3	Analysis and Design	PLCC in Protection	Theoretical	Quizzes & home works
Week 15	3	Analysis and Design	Review & Integration	Theoretical	Quizzes & home works

11. Course Grading Policy

Grading Policy:

Quizzes	8pts
Homework	5pts
Report	7pts
Term Exam	20pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:

حماية نظم القدرة /د عبدالغني عبدالرزاق

4- **FUNDAMENTALS OF POWER SYSTEM PROTECTION by Y.G. Paithankar and S.R. Bhide ,2003.**
5- **Transmission Network Protection: Theory and Practice by Yeshwant G. Paithankar.**
6- **Practical Power System Protection by Hewitson ,L.G., M. and Balakrishnan , R, Newness, New york ,2004**

Electronics References	*Google Classroom Page:* *POWER SYSTEM PROTECTION II* *Class code:* *6l2bspz3*

MODULE DESCRIPTION FORM

1. Course Name:
High Voltage Engineering II
2. Course Code:
EEP414
3. Semester / Year:
2nd Semester / 4th Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
Yes
6. Number of Credit Hours (Total) / Number of Units (Total)
30/2
7. Course administrator's name (mention all, if more than one name)
Name: Asst Prof. Dr. Dawood Najem Saleh Email: dnsaij@uomosul.edu.iq
8. Course Objectives

Course Objectives	The module aims (derived from the course description) are: 1. To develop advanced knowledge of high voltage systems, measurements, and testing techniques. 2. To analyze over-voltage phenomena (temporary, slow-front, fast-front) and their impact on power systems. 3. To study protection methods such as earthing, shielding, and surge protection. 4. To understand insulation behavior and coordination in high voltage equipment. 5. To prepare students for safe, reliable, and efficient operation of high voltage systems in industry and research.

9. Teaching and Learning Strategies

Strategy	• Active Learning: Encourage student engagement through interactive class discussions, problem-based learning, and real-world case studies. • Integration with Laboratory Sessions: Align theoretical lectures with laboratory classes to provide parallel hands-on experience and reinforce practical understanding • Blended Learning Support: Utilize the Google Classroom platform to enhance learning, facilitate communication, and provide access to supplementary materials and resources. •

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Explain principles of measurement of high AC, DC, and impulse voltages.	High Voltage Measurements	Demonstration of sphere gap, voltage dividers, and CRO methods.	Quiz (5)
2	2	Evaluate techniques using sphere gaps, capacitive dividers, resistance dividers, and CROs.	High Voltage Measurements	Problem-solving session: error calculation and measurement accuracy.	Homework (5)
3	2	Explain principles of testing of high AC, DC, and impulse voltages.	High Voltage Testing	Problem-solving session: error calculation and testing accuracy.	Report (5)
4	2	Identify sources of Temporary over-voltages	Overvoltage	Demonstration of overvoltage	Quiz (5)
5	2	Quantify the effect of the Slow-front over-voltages.	Overvoltage	Problem-solving session:	Homework (5)
6	2	Identify sources of the Fast-front over-voltages	Overvoltage	Lecture + visuals explaining	Quiz (5)
7	2	Types of the overvoltage protection	Overvoltage Protection	Lecture on surge arresters and protection devices.	Homework (5)

8	2	Quantify the effect of system parameters on overvoltage magnitudes.	Overvoltage Protection	Design exercise: simple substation protection scheme.	Quiz (5)
9	2				Mid-Term Exam (25)
10	2	Explain the significance of earthing in HV systems. Analyze earth resistance and potential distribution around electrodes.	Earthing	Lecture on grounding theory and safety requirements.	Report (5)
11	2	Design grounding systems to ensure safety and reliable operation.	Earthing	Problem-solving: calculation of earth resistance for electrode systems.	Quiz (5)
12	2	Define insulation coordination and its importance in HV engineering.	Insulation Coordination	Lecture on withstand voltage, risk factors, and coordination.	Homework (5)
13	2	Apply statistical methods and withstand voltage concepts.	Insulation Coordination	Numerical analysis: insulation design with probabilistic methods.	Homework (5)
14	2				Tutorial and revision
15	3				Final Exam (60)

11. Course Grading Policy

Grading Policy:

Quizzes	5pts
Homework	5pts
Report	5pts
Term Exam	25pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:

- Andreas Küchler, High voltage Engineering, Springer-Verlag GmbH Germany, 2018.
- E. Kuffel, W.S. Zaengl, and J. Kuffel, High Voltage Engineering: Fundamentals, 2nd edition, Butterworth Heinemann, 2000.
- C.L. Wadhwa, High Voltage Engineering, 2nd ed., New Age International, 2007

Electronics References	*Google Classroom Page:* *High Voltage Engineering II* *Class code:* *jixjnjli*

COURSE DESCRIPTION FORM

1. Course Name:	
Special Electrical Machines II	
2. Course Code:	
EEP413	
3. Semester / Year:	
Semester	
4. Description Preparation Date:	
September/2025	
5. Available Attendance Forms:	
On-Campus Lectures	
6. Number of Credit Hours (Total) / Number of Units (Total)	
45/3	
7. Course administrator's name	
1- Dr. Ahmed Alsammak, Email: ahmed_alsammak@uomosul.edu.iq 2- Mr. Omar Turath, Email: omartawfeeq_1981@uomosul.edu.iq	
8. Course Objectives	
Course Objectives	Introduction about Special Electrical Machines SPEM, Single-phase synchronous motors: Variable reluctance type motors, Switched reluctance motors, hysteresis motor. Single-phase AC series commutator motor. The universal motor. The repulsion motor. Stepper motors: Types, construction, characteristics, and applications. Linear induction machines: Types and characteristics and applications. Three-phase ac commutator machines. Schrage motor. Permanent Magnet Synchronous Motor (PMSM). The rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers. Generator excitation and voltage control.
9. Teaching and Learning Strategies	
Strategy	The teaching for SPEM starts with fundamental concepts like AC motors and rotating magnetic fields. Use active learning strategies, such as class discussions, problem-solving, and hands-on lab work, to engage students. Incorporate visual aids, simulations, and real-world case studies to enhance understanding. Teach the theoretical models and performance parameters like torque and efficiency. Conclude with assessments, including quizzes, projects, and feedback, to ensure students can apply their knowledge effectively.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Understanding the principle of operation of SPEM	Introduction about Special Electrical Machines: Principal of operations, Types of Special Electrical Machines	Lecture using the whiteboard and PowerPoint on Datashow and sometimes Using clarifications and practical applications	-
2	2	Understanding the Single phase synchronous motors: Variable reluctance type motors	Single phase synchronous motors: Variable reluctance type motors including: Types, construction, characteristics, and applications.+ Examples	=	Homework
3	2	Understanding and analysis switched reluctance motors	Switched reluctance motors including: Types, construction, characteristics, and applications.+ Examples	=	Quiz
4	2	Understanding and analysis Hysteresis motor.	Hysteresis motor including: Types, construction, characteristics, and applications.+ Examples	=	-
5	2	Study the Single phase AC series commutator motor. The universal motor+ Examples	Single phase AC series commutator motor. The universal motor, including: Types, construction, characteristics, and applications.+ Examples	=	Homework
6	2	Study the The repulsion motor + Examples	The repulsion motor + Examples	=	Quiz

7	2	Study the Stepper motors: Types, construction, characteristics, and applications.+ Examples	Stepper motors: Types, construction, characteristics, and applications.+ Examples	=	Quiz
8	2	Study the Linear induction machines: Types and characteristics and applications + Examples.	Linear induction machines: Types and characteristics and applications + Examples	=	-
9	2	Study the three-phase AC commutator machines	Three-phase ac commutator machines	=	Quiz
10	2	Review the Schrage motor + Examples	Schrage motor + Examples	=	Homework
11	2	Review the Permanent Magnet Synchronous Motor (PMSM) + Examples	Permanent Magnet Synchronous Motor (PMSM) + Examples	=	-
12	2	-	Course Exam	=	Course Exam
13	2	Review on the rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers	The rotating frequency changer. AC shunt commutator motor. AC Drives. Static frequency changers	=	Homework
14	3	Review on the types of generator excitation and voltage control.	Generator excitation and voltage control.	=	Quiz
15	3	-	Final Exam	=	Final Exam

11. Course
Evaluation Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc Marking:

Grading Policy:

Quizzes	10pts
Homework+ Report	10pts
Term Exam	20pts
Final Exam	60pts
Total	100pts

12. Learning and Teaching Resources

References:
1-Rotating electrical machine, S.K. Sen, 1975
2-Alternating current machines, M.G. Say, 1984
3-Electric Machinery and their Application, J.Hindmarsh 3rd, 1979
4-Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003.
5-**1989** مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي،
6-Electric Machinery Fundamentals, Stephen J. Chapman, 2005
7-Electric Motors and Drives, Austin Hughes, 3rd, 2006
8-Electromechanical Motion Devices, Second Edition,
9-Paul Krause, Oleg Wasynczuk, Steven Pekarek, Wiley-IEEE Press, Year: 2012
10- P. C. Sen, Principles of Electric Machines and Power Electronics, Third Edition, Wiley, 2014.
https://classroom.google.com/c/NzAwODk2ODk0MzEz?cjc=hjccvdw

MODULE DESCRIPTION FORM

1. Course Name:
Power and Machines Lab IV
2. Course Code:
EEP418
3. Semester / Year:
2nd Semester / 4th Year (Power and Machines)
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
90s/6
7. Course administrator's name (mention all, if more than one name)
1- Prof. Dr. Ahmed Nasser B. Alsammak (Supervisor) Email:- ahmed_alsammak@uomousl.edu.iq 2- Asst. Prof. Dr. Omer Sharaf Alden Yehya Email:- o.yehya@uomosul.edu.iq 3- Dr. Wael Hashim Hamdoon Email:- waelhashem_67@uomosul.edu.iq 4- Name: Dr. Hasan Adnan Mohammed Email:- hasan82adnan@uomosul.edu.iq 5- Dr. Dawood Najem Saleh Email:- dnsaij@uomosul.edu.iq 6- Ibrahim Isamel abdulhameed Email:- ibrahim-85353@uomosul.edu.iq 7- Dr. Saad Enad Mohammed Email:- saadmohamed@uomosul.edu.iq 8- Shaker Mahmood Khudher Email:- shakeralhyane@uomosul.edu.iq 9- Ammar shamil Ghanim Email:- ammarshamilhanon@uomosul.edu.iq Dr. Ryadh Zaki Sabry Email:- Riyadhzaki@uomosul.edu.iq 10- Raghad Adeeb Othman Email:- raghadeeb@uomosul.edu.iq 11- Asst. Prof. Dr. Shamil H. Hussein Email: shamil_alnajjar84@uomosul.edu.iq 12 - Ali Abbawi Mohammed Alabbawi Email - ali.abbawi@uomosul.edu.iq 13- Ghassan Mohsin Ahmed Email:- ghassab208@uomosul.edu.iq

8. Course Objectives

Course Objective	1- Machines Laboratory: - In this lab. student can performed sum of experiments that related with different types of machines. 2- Control Laboratory: - Demonstrate his/her understanding of the basics of control system laboratory including: Basics of transfer function of any control system and represented in MATLAB software, realization and implementation of control system in time domain and frequency domain response such step response, bode plot response, Nichols. PID controller. State space model represents for transfer function of control system. Implement some controller such state variable feedback design and root locus design for speed control of dc servo motor. Principle of Arduino microcontroller with many applications. 3- AC Motor Drives:-To study the methods of controlling the three-phase induction motor, as well as the use of modern methods to start the induction motor and the use of modern methods of dynamic braking of the motor. Renewable Energy Laboratory: 4- Recently, renewable energy has been more popular in the household and rarial locations application due to reduction of the conventional energy sources. This laboratory helps the student to understand, test and design different types of renewable energy such as photovoltaic energy system, wind energy system and etc. 5- High Voltage Laboratory: - The second course provides principle knowledge associated with high voltage engineering methods, techniques and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage equipment; of the generation of high direct, alternating and impulse voltages for testing high-voltage equipment.

9. Teaching and Learning Strategies

Strategy	Focus on hands-on experiments that reinforce theoretical concepts. Use a combination of demonstrations, simulations, and real-world case studies to illustrate the functioning of machines and power systems. Encourage problem- solving and data analysis during experiments to foster critical thinking. Incorporate safety protocols and real-time troubleshooting to prepare students for industrial applications. Finally, assess learning through practical reports, quizzes, and project-based assignments.

10. Course Structure

Week	**Hours**	**Required Learning Outcomes**	**Unit or Subject name**	**Learning method**	**Evaluation method**
1	6	Design	State Variable Feedback design	Practical Experiments	Quiz
2	6	Analysis	Breakdown voltage for DC Field	Practical Experiments	Reports
3	6	Analysis	Speed Control of Universal motor	Practical Experiments	Quiz and Reports
			Modern Methods to Control	Practical	

4	6	Analysis	the Starting and Braking of a Three Phase Induction Motor / part 1	Experiments	Reports
5	6	Design	Soil resistivity test	Practical Experiments	Quiz and Reports
6	6	Design	PID Controller	Practical Experiments	Reports
7	6	Analysis	Speed Control of Stepper motor	Practical Experiments	Reports
8	6	Mid Derm Exam	Theory and Practical		
9	6	Analysis	Modern Methods to Control the Starting and Braking of a Three Phase Induction Motor / part 2	Practical Experiments	Quiz
10	6	Design	State Space Mode	Practical Experiments	Reports
11	6	Analysis	Servo motor	Practical Experiments	Quiz and Reports
12	6	Study	polarity effects on breakdown voltage	Practical Experiments	Reports
13	6	Design	Root Locus Design In Matlab	Practical Experiments	Quiz and Reports
14	6	Study	High Voltage safety	Practical Experiments	Reports
15	6	Final Exam	Theory and Practical		

11. Course

Evaluation Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports ....
etc Marking:

Quizzes	10pts
Homework+ Report	20pts
Term Exam	30pts
Final Exam	40pts
Total	100pts

12. Learning and Teaching Resources

References:

1- Rotating electrical machine, S.K. Sen, 1975

2- Alternating current machines, M.G. Say, 1984

3- Electric Machinery and their Application, J.Hindmarsh 3rd, 1979

4- Electrical Machinery, A. E. Fitzgerald, Charles Kingsley, Jr., Stephen D. Umans, 2003.

5- مكائن التيار المتناوب ، د.باسل محمد و د.ضياء علي، 1989

6- Electric Machinery Fundamentals, Stephen J. Chapman, 2005

7-	Feedback Group Company. www.feedback.group.com.
8-	Roland S. Burns, " Advanced Control Engineering", University of Plymouth. UK. 2021.
9-	B.M. Weedy, Electric Power System, 5th edition, John Wiley and Sons, 2012.
10-	William D. Stevenson, Jr, Elements of Power System Analysis, 4th Edition, McGraw Hill, 1982.
11-	Wim Turkenburg "Renewable Energy".
12-	John Twidell and Tony Weir "Renewable Energy Resources " second edition.
https://classroom.google.com/c/NzE4OTQ2ODg5MDQ3	

COURSE DESCRIPTION FORM

1.Course Name:
Graduation Project
2.Course Code:
EEP 418
3.Semester / Year:
7/ 2025-2026
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
60/4
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Sharaf Deen Yehya Al-Yozbaky Email: o.yehya@uomosul.edu.iq
8. Course Objectives

Course Objectives	*OC 1. Demonstrate fundamental scientific and engineering knowledge related to the course field. (A1).* *OC 2. Recognize modern technologies, specialized concepts, and current engineering applications. (A3).* *OC 3. Use practical, laboratory, software, or implementation skills relevant to the course. (B1).* *OC 4. Communicate technical results effectively and work individually or within a team. (B4).* *OC 5. Show commitment to discipline, self-learning, and continuous professional development. (C2).* *OC 6. Consider social, environmental, sustainability, and community impacts of engineering practice. (C4).*

9. Teaching and Learning Strategies	
Strategy	The project is delivered through supervised independent work. Students meet regularly with their academic supervisor for guidance, feedback, and progress evaluation. Emphasis is placed on self-learning, problem-solving, and professional responsibility.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	4	OC1/OC2		Lecture	Exam/Quiz
2	4	OC2/OC3		Lecture	HW
3	4	OC3/OC4		Lecture	Exam
4	4	OC4/OC5		Lecture	Exam
5	4	OC5/OC6		Lecture	Exam/Quiz
6	4	OC6/OC1		Lecture	HW
7	4	OC1/OC2		Lecture	Exam
8	4	OC2/OC3		Lecture	Exam
9	4	OC3/OC4		Lecture	Exam/Quiz
10	4	OC4/OC5		Lecture	HW
11	4	OC5/OC6		Lecture	Exam
12	4	OC6/OC1		Lecture	Exam
13	4	OC1/OC2		Lecture	Exam/Quiz
14	4	OC2/OC3		Lecture	HW
15	4	OC3/OC4		Lecture	Exam
16	4	OC4/OC5		Lecture	Exam

11. Course Evaluation

- Final Project Report & Oral Defense:

12. Learning and Teaching Resources

Required textbook	
Main references	
Recommended books and references	
Electronics References	

COURSE DESCRIPTION FORM

1. Course Name:
Physics III
2. Course Code:
EEC420
3. Semester / Year:
8/ 2025-2026
Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
45/3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Sharaf Deen Yehya Al-Yozbaky Email: o.yehya@uomosul.edu.iq

8. Course Objectives

Course Objectives	*OC 1. Apply advanced theoretical concepts and analytical understanding in engineering problems. (A2).* *OC 2. Integrate and apply engineering knowledge to interpret systems and solve technical problems. (A4).* *OC 3. Conduct design, investigation, research, or project-based activities within the course area. (B3).* *OC 4. Apply professional ethics and responsible engineering conduct. (C1).* *OC 5. Demonstrate responsibility, reliability, and professional behavior in academic work. (C3).*

9. Teaching and Learning Strategies

Strategy	1. Lectures Structured lectures introduce fundamental concepts, theories, and analytical techniques in control systems. Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. 2. Problem-Solving Sessions Guided tutorials focus on solving numerical and analytical problems.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	3	OC1/OC2/OC3/OC4/OC5	Force Physics: Review of Maxwell's equations and Faraday's law applications in generators.	Group discussion	Discussion
2	3	OC2/OC3	Magnetic Circuits: Permeability, Hysteresis, and energy loss in electric motors. Physics of forces between charged plates and MEMS applications.	Lecture	HW
3	3	OC3/OC4	Electrostatic Relays: Physics of forces between charged plates and MEMS applications	Lecture	Exam
4	3	OC4/OC5	Renewable Energy: Physics of light and photon absorption in semiconductors.	Lecture	Exam
5	3	OC5/OC1	Solar Cells: P-N junction physics under illumination; Short-circuit current and Open-circuit voltage.	Lecture	Exam/Quiz
6	3	OC1/OC2	Energy Efficiency: Physical and environmental factors affecting solar cells (Heat and Shading).	Lecture	HW
7	3	OC2/OC3	Wind Energy: Fluid dynamics, Betz's Law, and converting kinetic motion into electrical energy.	Lecture	Exam
8	3		Midterm Exam		Exam
9	3	OC4/OC5	Solid State Physics: Fermi statistics, energy gaps, and doping levels in semiconductors.	Lecture	Exam/Quiz
10	3	OC5/OC1	Transistor Physics: Transport mechanisms (Drift and Diffusion) and Field-Effect in power transistors.	Lecture	HW
11	3	OC1/OC2	Thyristors: Physical structure (PNPN), triggering mechanisms, and controlled breakdown.	Lecture	Exam

12	3	OC2/OC3	Triacs: Physics of bidirectional operation and AC power control	Lecture	Exam
13	3	OC3/OC4	Thermal Components: Physics of NTC and PTC conductors and thermal protection applications	Lecture	Exam/Quiz
14	3	OC4/OC5	Applied Case Studies: Physical modeling of an integrated system (Solar + Power Electronics).	Lecture	HW
15	3	OC5/OC1	Fabrication Physics: Lithography, deposition, and ion implantation in semiconductor manufacturing.	Lecture	Exam
16	3		Preparatory week before the final Exam		Exam

11. Course Evaluation

- Mid term examinations: 30%
- Quizzes & Assignments: 10%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbook	Principles of Electronic Materials and Devices – S.O. Kasap
Main references	Principles of Electronic Materials and Devices – S.O. Kasap
Recommended books and references	Physics of Solar Cells – Peter Würfel.
Electronics References	-

COURSE DESCRIPTION FORM

1. Course Name:
Chemistry
2. Course Code:
EEC421
3. Semester / Year:
7/ 2025-2026
4. Description Preparation Date:
September/2025
5. Available Attendance Forms:
On-Campus Lectures
6. Number of Credit Hours (Total) / Number of Units (Total):
45/3
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Omar Sharaf Deen Yehya Al-Yozbaky Email: o.yehya@uomosul.edu.iq
8. Course Objectives

Course Objectives	*OC 1. Apply advanced theoretical concepts and analytical understanding in engineering problems. (A2).* *OC 2. Integrate and apply engineering knowledge to interpret systems and solve technical problems. (A4).* *OC 3. Conduct design, investigation, research, or project-based activities within the course area. (B3).* *OC 4. Apply professional ethics and responsible engineering conduct. (C1).* *OC 5. Demonstrate responsibility, reliability, and professional behavior in academic work. (C3).*

9. Teaching and Learning Strategies

Strategy	Lectures, guided problem-solving sessions, practical case studies, self-directed learning using technical references, and continuous feedback through quizzes, assignments, and examinations.

10. Course Structure

Week	Hours	Learning Outcomes	Unit or Subject Name	Learning method	Evaluation Method
1	3	OC1/OC2	Role of chemistry in electrical engineering	Lecture	Exam/Quiz
2	3	OC2/OC3	Atomic structure and bonding	Lecture	HW
3	3	OC3/OC4	Electrical materials: metals and alloys	Lecture	Exam
4	3	OC4/OC5	Polymers and composites in insulation	Lecture	Exam
5	3	OC5/OC1	Chemical aging mechanisms	Lecture	Exam/Quiz
6	3	OC1/OC2	Treeing and insulation lifetime	Lecture	HW
7	3		Midterm Exam		Exam
8	3	OC3/OC4	Dielectric gases and SF6	Lecture	Exam
9	3	OC4/OC5	Eco-friendly gases such as g3	Lecture	Exam/Quiz
10	3	OC5/OC1	Liquid dielectrics and transformer oils	Lecture	HW
11	3	OC1/OC2	Electrochemistry fundamentals	Lecture	Exam

12	3	OC2/OC3	Corrosion and grounding systems	Lecture	Exam
13	3	OC3/OC4	Battery chemistry	Lecture	Exam/Quiz
14	3	OC4/OC5	Sustainability and green materials	Lecture	HW
15	3	OC1/OC2/OC3/OC4/OC5	Review and applied case studies	Group discussion	Discussion
16	3		Preparatory week before final exam		Exam

11. Course Evaluation

- Mid term examinations: 30%
- Quizzes & Assignments: 10%
- Final examination: 60%

12. Learning and Teaching Resources

Required textbook	• A.J. Dekker – Electrical Engineering Materials • Dissado & Fothergill – Electrical Degradation and Breakdown in Polymers • Wadhwa – High Voltage Engineering • Selected IEEE / IEC technical reports
Main references	• A.J. Dekker – Electrical Engineering Materials • Dissado & Fothergill – Electrical Degradation and Breakdown in Polymers • Wadhwa – High Voltage Engineering • Selected IEEE / IEC technical reports
Recommended books and references	-
Electronics References	-