Republic of Iraq

ministryHigher education and scientific research

deviceScientific supervision and evaluation

circleQuality assurance and academic accreditation

to divideAccreditation



Academic program and course description guide

2025

Introduction:

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

Academic Program Description: A brief summary of the main features of the program and its courses, indicating the skills that students are working to acquire based on the objectives of the academic program. The importance of this description is evident because it represents the cornerstone in obtaining program accreditation, and the teaching staff participates in writing it .under the supervision of the scientific committees in the scientific departments

This guide, in its second version, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the developments and changes in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, semester) system, in addition to adopting the description of the academic program circulated pursuant to the letter of the Department of Studies TM3/2906 .dated 5/3/2023 regarding programs that adopt the Bologna process as the basis for their work

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

Concepts and terminology:

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

Course Description: Provides a concise summary of the most important characteristics of the course and the learning outcomes expected from the student, demonstrating whether he has made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture of the future of the academic program to be an advanced, inspiring, motivating, realistic and applicable program.

Program Mission: It briefly explains the goals and activities required to achieve them, and it also identifies the paths and directions of the program's development.

Program Objectives: These 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 (semester, yearly, Bologna track) whether required (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by the student after successfully completing the academic program. The learning outcomes for each course must be determined in a way that achieves the program objectives.

Teaching and Learning Strategies: The strategies used by the faculty member to develop the student's teaching and learning. They are plans that are followed to achieve the learning objectives. That is, they describe all classroom and extracurricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: Northern Technical University

Faculty/Institute: Polytechnic College Hawija

Scientific Department: Department of Electrical Engineering Technology

Academic or Professional Program Name: Diploma and Bachelor of Technology

Final Certificate Name: Technical Diploma + Technical Bachelor

Study System: Bologna Process and Courses System

Description Preparation Date: 2025/9/8

File Completion Date: 2025/9/8

Signature:

Head of Department Name:

Parween Raheem Kareem

Date: 2025/9/8

Signature:

Scientific Associate Name:

Dr. Mohammad Ali Fares

Date: 2025/9/8

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Ahmed Abdul Khalaf

Date: 2025/9/8

Signature:

Approval of the Dean

Professor: Omar Khalil Ahmed

1. **Program Vision**
To equip students with both theoretical and practical knowledge in the field of electrical technologies, meeting the demands of the job market and expanding the horizons of technical education by developing the curriculum
2. **Program message**
-Prepare technical electrical personnel capable of managing the operation of electrical machinery, power generation methods, electrical networks, and transmission and distribution lines while being equipped with academic knowledge and practical skills. -Train students both theoretically and practically to meet job market requirements through a modern curriculum and advanced laboratory equipment. -Stay abreast of scientific advancements in global institutes and universities. -Adhere to the ethics of the profession, ensuring compliance with applicable standards and regulations. - Strive for excellence in service delivery that meets quality standards.
3. **Program objectives**
-Prepare intermediate-level personnel with advanced technical skills in the field by manufacturing and maintaining electrical equipment. -Train students in scientific research through graduation project studies. -Offer practical courses in the specialization for all segments of society. -Manufacture laboratory equipment and electrical devices that support the educational process. -Operate and maintain electrical units for power generation stations.
4. **Program accreditation**
Under study
5. **Other external influences**
nothing

6. **Program structure** For levels one and two				
Program structure	**Number of courses**	**Study unit**	**Percentage**	**comments** *
University requirements	**6**	**13**	**19.35%**	**6th grade**
Department requirements	**25**	**102**	**80.64%**	**23 basic, 2 optional**
Summer training	**Complete**	**-------**	----------	
Other	nothing			

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

7. Program Description

Year / Level	Course code	Course name	Credit Hours	
			theoretical	practical
2025–2026 / First Bologna Route	NTU100	Democracy and human rights	2	0
	NTU101	English language	2	0
	ELTP104	mathematics	3	2
	ELTP105	Electrical circuits 1	4	3
	ELTP108	Electrical Circuits 2	4	3
	ELTP106	Mechanical and electrical workshops	0	4
	ELTP107	Electronics	3	2
	NTU102	computer	1	2
	NTU103	Arabic	2	0
	ELTP109	Digital electronics	3	2
	ELTP110	Engineering drawing	0	4
	ELTP111	Electrical and industrial installations	2	2
	ELTP101	Engineering Mechanics	2	2
2025–2026 / Second Course system	NTU200	English language	2	0
	NTU201	Professional ethics	2	0
	ELTP204	DC machines	2	3
	ELTP205	Electrical Networks 1	2	2
	ELTP206	Power Electronics 1	2	3
	ELTP207	Maintenance Workshop 1	0	3
	ELTP208	Industrial establishments 1	2	2

	ELTP209	**electrical drawing**	**0**	**3**
	ELTP210	**Project 1**	**0**	**2**
	ELTP211	**AC machines**	**2**	**3**
	ELTP212	**Electrical Networks 2**	**2**	**2**
	ELTP213	**Power Electronics 2**	**2**	**3**
	ELTP214	**Maintenance Workshop 2**	**0**	**3**
	ELTP215	**Industrial establishments 2**	**2**	**2**
	ELTP216	**Programmable Logic Controller**	**1**	**2**
	ETP217	**Project 2**	**0**	**2**
	ETP218	**Prevention system**	**1**	**1**
	ETP219	**microcontroller**	**1**	**2**

8. Expected learning outcomes of the program

Knowledge (**a**)

1-Learn the principles and foundations of electrical circuits.

2-Knowledge of the work of electrical installations of all kinds.

3-Knowledge of winding of various electrical motors and machines.

4-Knowledge of examining and measuring electrical systems.

Skills (**b**)

1 **-**Teamwork skills.

2-Computer and Internet skills.

3-Communication skills such as English.

4-Leadership skills and taking responsibility.

Values (**C**)

1-The student acquires the concepts and basics of electrical circuits.

2-Analyze the problems facing workers in it and how to develop the necessary solutions.

3-Evaluate the proposed solutions and choose the best of them.

4- Integrity, loyalty and dedication to work.

9. Teaching and learning strategies

Theoretical explanation of the subject, the use of a data viewer to illustrate the practical aspect, and playing the educational video for students, as well as the weekly reports assigned to the student for each experiment, along with scientific trips to electrical power stations and various state laboratories

10. Evaluation methods

Daily, semester and final tests, weekly reports

11. Faculty

Faculty members

academic rank	Specialization		Special requirements/skills (if any)		Faculty preparation	
	general	private			angel	lecturer
assistant professor	Electrical Engineering	electrical power			angel	
Assistant teacher	Electrical Engineering	Power and machinery			angel	
Assistant teacher	Electrical Engineering	Power and machinery			angel	
Assistant teacher	Electrical Engineering	Electrical Power Engineering			angel	
Assistant teacher	Electrical Engineering	Electrical Engineering			angel	
Assistant teacher	Field crop science	Field crop science			angel	

Evaluation methods						
Daily, semester and final tests, weekly reports						
teacher	Electrical Engineering	Electrical Engineering			angel	

12. **Admission standard**
The student's acceptance criteria are determined according to the central acceptance within the ministry's plan, the student's branch in the preparatory school, his average and his desire, and this is after the student has been interviewed in a special interview at the institute.
Professional development
Orientation of new faculty members through seminars, symposia and conference attendance.
Professional development for faculty members
Through conferences, seminars, discussion groups and the attendance of faculty members at postgraduate discussions .

13. The most important sources of information about the program
1 .Methodological books prescribed by the Northern Technical University. 2 .Resources available in the Technical Institute's library. 3. Resources available on the Internet

14. Program Development Plan

1- Adding information on all topics related to the principles and foundations of electricity.

2- Identifying modern scientific developments.

3- Participating in international and local conferences.

4- Participating in scientific workshops inside and outside Iraq.

5- Hosting scientific competencies in the field of specialization

15. Key sources of information about the program

-Lieutenant

-External sources (Internet)

-Scientific research and its latest developments

- Textbooks

16. Program development plan

1- Adding information on all topics related to the principles and foundations of electricity.

2 - Getting acquainted with the latest scientific developments.

3 - Participating in international and local conferences.

4 - Participating in scientific workshops inside and outside Iraq.

5- Hosting scientific experts in the field of specialization

Curriculum Skills Plan															
				Required Learning Outcomes of The Program											
Year/Level	Course code	Course Name	Mandatory or Elective	Knowledge				Skills				Values			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2025–2026 First Bologna Route	NTU100	Democracy and human rights	University mandatory					✓			✓				✓
	NTU101	English language								✓					
	ELTP104	mathematics	Department mandatory						✓						
	ELTP105	Electrical circuits 1							✓						
	ELTP108	Electrical Circuits 2								✓					
	ELTP106	Mechanical and electrical workshops							✓	✓					
	ELTP107	Electronics								✓					
	NTU102	computer	University mandatory			✓									
	NTU103	Arabic				✓									
	ELTP109	Digital electronics	Department mandatory	✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP110	Engineering drawing		✓	✓		✓	✓			✓		✓	✓	
	ELTP111	Electrical and industrial installations		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP101	Engineering Mechanics		✓	✓	✓	✓	✓				✓	✓	✓	

	NTU200	English language	University mandatory					✓		✓					
	NTU201	Professional ethics									✓				✓
	ELTP204	DC machines	Department mandatory					✓							✓
	ELTP205	Electrical Networks 1						✓		✓					
	ELTP206	Power Electronics 1							✓						
	ELTP207	Maintenance Workshop 1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP208	Industrial establishments 1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP209	electrical drawing		✓	✓	✓	✓	✓				✓	✓	✓	
2025–2026 the second	ELTP210	Project 1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP211	AC machines		✓	✓	✓	✓	✓				✓	✓	✓	
Course system	ELTP212	Electrical Networks 2		✓	✓				✓			✓	✓	✓	
	ELTP213	Power Electronics 2		✓	✓	✓	✓	✓			✓	✓	✓	✓	
	ELTP214	Maintenance Workshop 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP215	Industrial establishments 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP216	Programmable Logic Controller		✓	✓	✓	✓	✓				✓	✓	✓	
	ETP217	Project 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ETP218	Protection system	Department Elective 5 units	✓	✓	✓	✓	✓				✓	✓	✓	
	ETP219	microcontroller		✓	✓				✓			✓	✓	✓	

Module Information Course Information			
Module Title	Electronic		Module Delivery
Module Type	Basic		☒Theory □Lecture ☒Lab ☒Tutorial □Practical □Seminar
Module Code	ELTP107		
ECTS Credits	8		
SWL (hr/sem)	200		
Module Level	first	Semester of Delivery	first
Administering Department	Elec. Eng.Tech.	College	Al-Hawija Polytechnic College
Module Leader	Alaa A.Yass	e-mail	alaaalyass85@ntu.edu.iq
Module Leader's Acad. Title	Assistant lecture	Module Leader's Qualification	Master
Module Tutor	Name (if available)	e-mail	Email
Peer Reviewer Name	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	12/1/2025	Version Number	1.0

Relation with other Modules Relationship with other study subjects			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	1. This course aims to give a general introduction to Electronic materials and semiconductors. 2. Be familiar with the current and voltage characteristics in the semiconductor materials. 3. Types of semiconductor material. 4. Current generating and movement of electron in the material. 5. It also introduces the student to voltage rectifying and filtering. 6. Type of semiconductors and their function and specifications.
Module Learning Outcomes Learning outcomes for the subject	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. Recognize how currents generates in the material. Elements of semiconductors and their functions and specifications. How to build half wave rectifiers. How to build a full wave rectifier. How to add filter to the rectifier circuits. How to design a voltage regulating circuits. How to build a power supply circuit. Describe how noise affects a communication system. Discuss the electron movement in material and how to improve it. Identify the basic voltage multiplier circuit elements and their applications. Identify the basic voltage lamp and clipping circuit elements and their applications. Family with Multisim programming.
Indicative Contents Guidelines	Indicative content includes the following. •Principle of electronic device concepts: Electronic devices such as diodes, rectifying circuits are made of a semiconductive material. To understand how these devices work, you should have a basic knowledge of the structure of atoms and the interaction of atomic particles. An important concept is that of the pn junction that is formed when two different types of semiconductive material are joined. The pn junction is fundamental to the operation of devices such as the solar cell, the diode, and certain types of transistors.[15 hrs] •Representation of Diode. You learned that many semiconductor devices are based on the pn junction. In this section, the operation and characteristics of the diode are covered. [15] •Also, three diode models representing three levels of approximation are presented and testing is discussed. [45] •The importance of the diode in electronic circuits cannot be overemphasized. Its ability to conduct current in one direction while blocking current in the other direction is essential to the operation of many types of circuits. One circuit in particular is the ac rectifier.[15] Other important applications are circuits such as diode limiters, diode clampers, and diode voltage • multipliers. [27] A datasheet is discussed for specific diodes.[3 hrs]

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	The main strategies that will be adopted in this module will be focused on engaged learning. This is achieved by keeping the students working together throughout the semester by engaging them in lab groups in addition to a project to be built during the semester and presented on final week. Engagement will be stimulated in the class for better comprehension of the lectures.

Student Workload (SWL) The student's academic workload is calculated for 15 weeks.			
Structured SWL (h/sem) Regular academic workload for the student during the semester	78	Structured SWL (h/w) Student's regular weekly study load	5.2
Unstructured SWL (h/sem) Irregular student workload during the semester	122	Unstructured SWL (h/w) Irregular weekly study load for the student	8.13
Total SWL (h/sem) The student's total academic workload during the semester	200		

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

Delivery Plan (Weekly Syllabus) Weekly theoretical curriculum	
	Material Covered
Week 1	Material used in electronic, current in semiconductor
Week 2	N-type and P-type semiconductor, the PN-junction
Week 3	Diode operation, voltage-current characteristic of diode
Week 4	Diode models
Week 5	Half-wave and full-wave rectifiers
Week 6	Filters and regulators
Week 7	Diode limiter and clampers
Week 8	diode multiplier
Week 9	Zener diode characteristic
Week 10	The Varactor diode
Week 11	The optical diode
Week 12	Other types of diodes
Week 13	Application activity: regulator DC power supply
Week 14	Troubleshooting on all diode's types
Week 15	Preparatory week before the final exam

Delivery Plan (Weekly Lab. Syllabus) Weekly laboratory schedule	
	Material Covered
Week 1	characteristic diode
Week 2	Half wave rectifier
Week 3	full wave rectifier
Week 4	Half wave rectifier and filters
Week 5	full wave rectifier and filters
Week 6	Diode clipping
Week 7	Diode clampers
Week 8	Diode Voltage Doubler
Week 9	Zener characteristic
Week 10	Zener voltage regulators
Week 11	Light emitter diode
Week 12	Photocell diode
Week 13	DC power supply activity
Week 14	Photosensor circuits using diodes
Week 15	Varactor diode

Learning and Teaching Resources Learning and teaching resources		
	Text	Available in the Library?
Required Texts	electronic-devices-by-floyd-9th-edition	Yes
Recommended Texts		
Websites		

Grading Scheme Grade chart				
Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C - Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E - Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	Failed (Under Review)	(45-49)	More work required but credit awarded
	F – Fail	Precipitate	(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 Information Course Information					
Module Title	Democracy and Human rights			Module Delivery	
Module Type	Basic			☒Theory □Lecture □Lab □Tutorial □Practical □Seminar	
Module Code	NTU100				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	first		Semester of Delivery	first	
Administering Department	Elec. Eng.Tech.		College	Al-Hawija Polytechnic College	
Module Leader	Ahmed Zaky Habeeb		e-mail	AhmedZaki-Haw@ntu.edu.iq	
Module Leader's Acad. Title	Assistant lecture		Module Leader's Qualification	Master	
Module Tutor	Name (if available)		e-mail	Email	
Peer Reviewer Name	Parween R. Kareem		e-mail	preween_hwj@ntu.edu.iq	
Scientific Committee Approval Date	12/1/2025		Version Number	1.0	

Relationwith other Modules Relationship with other study subjects		
Prerequisite module	None	**Semester**
Co-requisitesmodule	None	**Semester**

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	Democracy and human rights aim to preserve and promote individual dignity and fundamental rights, achieve social justice, encourage the economic and social development of society and its cohesion, strengthen national security, and establish a favorable climate for international peace, because human rights and democracy are a fundamental reference for all in protecting Human rights provide an environment for the protection and effective realization of human rights. Today, after a period of democratization in various parts of the world, many democratic systems appear to be regressing. Some governments seem to be deliberately weakening independent oversight of their powers, eliminating criticism, dismantling democratic checks and balances, and ensuring their long-term rule, with negative consequences for the rights of the people.
Module Learning Outcomes Learning outcomes for the subject	1 - Understanding, knowing and realizing his rights that God has granted him and all of humanity, and therefore they are a gift and not a gain from anyone, and no one has the right to take them away. 2-The student expresses and defends these rights in his own way. 3-Explaining phenomena and providing interpretations of human rights and freedom violations by identifying shortcomings or gaps based on available information. 4- Understanding the most important political systems, which are a guarantee of human rights and political freedoms, and trying to implement them on the ground, namely the democratic system.
Indicative Contents Guideline Contents	Human Rights in Contemporary and Modern History: International Recognition of Human Rights since World War I and the League of Nations Human rights, their definition, objectives, and human rights in ancient civilizations, especially the Mesopotamian civilization, guarantees, respect, and protection of human rights at the international level: The role of the United Nations and its specialized agencies in providing guarantees; the role of regional organizations (the Arab League, the European Union, the African Union, the Organization of American States, and the Asian Organization); the role of international and regional non-governmental organizations and public opinion in respecting and protecting human rights; problems, obstacles, and student discussions.

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	1- Discussion strategy 2-Strategy high thinking skills 3- Critical thinking strategy in learning 4- Brainstorming

Student Workload (SWL) Student's academic workload			
Structured SWL (h/sem) Regular academic workload for the student during the semester	33	Structured SWL (h/w) Student's regular weekly study load	2.2
Unstructured SWL (h/sem) Irregular student workload during the semester	17	Unstructured SWL (h/w) Irregular weekly study load for the student	1.13
Total SWL (h/sem) The student's total academic workload during the semester	50		

Module Evaluation Course Material Assessment					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	0	0	-	-
	Projects / Lab.	0	0	-	-
	Report	0	0	-	-
Summative assessment	Midterm Exam	1 hr	30% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly theoretical curriculum	
Material Covered	
Week 1	Human rights: their definition, objectives, and human rights in ancient civilizations, especially the Mesopotamian civilization.
Week 2	Human rights in divine laws, with a focus on human rights in Islam.
Week 3	Human Rights in Contemporary and Modern History: International Recognition of Human Rights since World War I and the League of Nations
Week 4	Regional recognition of human rights: The European Convention on Human Rights1950, American Convention on Human Rights; 1969, African Charter on Human Rights; 1981, Arab Charter on Human Rights; 1994
Week 5	Human Rights in Contemporary and Modern History: International Recognition of Human Rights since World War I and the League of Nations
Week 6	Human rights in Iraqi constitutions: between theory and reality
Week 7	Economic, social, and cultural human rights and civil and political human rights
Week 8	Modern human rights: Facts about development, the right to a clean environment, the right to solidarity, the right to religion
Week 9	Guarantees for respecting and protecting human rights at the national level; guarantees in the constitution and laws; guarantees in constitutional oversight; guarantees in freedom of the press and public opinion; the role of non-governmental organizations in respecting and protecting human rights.
Week 10	Guarantees, respect, and protection of human rights at the international level: The role of the United Nations and its specialized agencies in providing guarantees The role of regional organizations (the Arab League, the European Union, the African Union, the Organization of American States, and the Asian Organization), the role of regional and international non-governmental organizations, and public opinion in respecting and protecting human rights.
Week 11	The term democracy, its origin, its meaning, the history of democracy.
Week 12	Islam, democracy, and the disadvantages of authoritarian rule.
Week 13	Criticisms directed at democracy, and the merits of the democratic system.
Week 14, 15	Democratic systems in the world / Democracy in the Third World / Problems facing Arab countries in democratic transition

Learning and Teaching Resources

Learning and teaching resources

	Text	Available in the Library?
Required Texts	Human Rights and Democracy – Concepts and Foundations, by Dr. Samah Mahdi Al-Ulayawi and Dr. Salman Kadhim Al-Bahadli	Yes
Recommended Texts	Democracy and Human Rights in Islam by Dr. Rashid Al-Ghannouchi	No
Websites	https://www.neelwafurat.com https://studies.aljazeera.ne	

GRADING SCHEME

Grade chart

Group	Grade	Appreciation	Marks (%)	Definition
Success Group (50 - 100)	A – Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C – Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E – Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	Precipitate (under processing)	(45-49)	More work required but credit awarded
	F – Fail	Precipitate	(0-44)	Considerable amount of work required

Note:

NB 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 Information

Course Information

Module Title	Mathematics	Module Delivery	
Module Type	Basic	☒Theory ☐Lecture ☐Lab ☒Tutorial ☐Practical ☐Seminar	
Module Code	ELTP104		
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	First	Semester of Delivery	First
Administering Department	Elec. Eng. Tech.	College	Al-hawija Polytechnic College
Module Leader	Alaa A.Yass	e-mail	Alaaalyass85@ntu.edu.iq
Module Leader's Acad. Title	Assistant lecture	Module Leader's Qualification	Msc
Module Tutor	Name (if available)	e-mail	Email
Peer Reviewer Name	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	12/1/2025	Version Number	1.0

Relation with other Modules

Relationship with other study subjects

Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	This course introduces and teaches some fundamental mathematical concepts (derivatives, integration, matrices, and related topics). These topics can also be taught through advanced mathematics courses. It is related to the study of some engineering topics found at all levels in the Biomedical Engineering Technology Department.
Module Learning Outcomes Learning outcomes for the subject	1. Understanding how mathematics is used in the educational program. 2. List the different mathematical symbols associated with the curriculum. 3. Summarize the meaning of the derivative. 4. Summarize the meaning of integration. 5. Summarize the meaning of the matrix. 6. Discuss how to find the derivative using the definition. 7. Describe the integral, the derivative, and the matrix. 8. Understanding trigonometric functions and derivatives of trigonometric functions. 9. Identifying inverse trigonometric functions and derivatives of inverse functions. 10. Discussion of the properties of arrays and operations on them. 11. Explanation of solving systems of linear equations using the inverse of the coefficient matrix and Cramer's rule.
Indicative Contents Guideline Contents	The instructional content includes the following: Part A – Derivative Theory • Limits and continuity. Derivatives using definition. The derivative rule and the higher derivative. The implicit derivative and the chain rule. Transcendental functions. Trigonometric functions and derivatives of trigonometric functions. Inverse trigonometric functions and derivatives of inverse functions.15] hours • Logarithms and exponential functions with derivatives. Applications of the derivative. Concavity and curve plotting. Applied refinements. Associated rates.15] hours **Part B – Integration Theory** • Definite and indefinite integrals. Integration of transcendental functions. Integration of trigonometric functions. Integration of inverse trigonometric functions.15] hours •Integration of exponential and logarithmic functions. Integration methods. Integration by parts. Applications of integration: area.15] hours **Part C – Linear Algebra** • Matrices, their properties and operations. Determinants and their properties. 10 hours • Inverse of a square matrix using determinants. Solving systems of linear equations using the inverse of the coefficient matrix and Cramer's rule. 10 hours •Eigenvalues. Eigenvectors. 10 hours

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	Main strategy: Collaborative learning, brainstorming, dialogue Discussion, collaborative learning, and solving mathematical problems The strategy to be adopted in delivering this unit will be to encourage student participation in exercises, while improving And simultaneously, they will develop their critical thinking skills. This will be achieved through lessons, interactive educational programs, and by considering simple experiments that include concrete activities that engage the students.

Student Workload (SWL) The student's academic workload is calculated for15 weeks			
Structured SWL (h/sem) Regular academic workload for the student during the semester	48	Structured SWL (h/w) Student's regular weekly study load	3.2
Unstructured SWL (h/sem) – Irregular student workload during the semester	52	Unstructured SWL (h/w) Irregular weekly study load for the student	3.46
Total SWL (h/sem) The student's total academic workload during the semester	100		

Module Evaluation Course Material Assessment					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	6	10% (10)	continuous	LO #1,3,5,8,10,12
	Assignments	7	10% (10)	2,4,6,8,10,12.14	LO #1,3,5,8,10
	Lab	0	0	-	-
	Report	0	0	-	-
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO from #1 to 5
	Final Exam	3hr	60% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) – Theoretical Weekly Curriculum

	Material Covered
Week 1 +Week 2 +Week 3 +Week 4 +Week 5	Derivative theory • Boundaries and Continuity •Recognition using derivative •The rule of derivative and higher derivative • Implicit derivative and chain rule •Transcendental functions • Trigonometric functions and derivatives of trigonometric functions • Inverse trigonometric functions and derivatives of inverse functions • Logarithms and exponential functions with derivatives •Derivative applications • Concavity and drawing curves •Applied improvement • Associated rates
Week 6 +Week 7 +Week 8 +Week 9 +Week 10	Integration theory •Definite and indefinite integration •Integration of transcendental functions Integration of trigonometric functions Integration of inverse trigonometric functions Integration of exponential and logarithmic functions • Integration methods • Retail integration •Integration applications: • Area
Week 11 Week 12, Week 13, Week 14	linear algebra • Arrays, properties and operations • Determinants and characteristics of determinants • Inverse of a squared matrix using determinants Solving systems of linear equations using the inverse of the coefficient matrix and Cramer's rule •Eigenvalues, eigenvectors
Week 15	Final exam for the course

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	1.Thomas_Calculus_by_George_B_Thomas, _Joel_R_Hass, _Christopher_Heil.2018. 2.Linear Algebra, Serge Lang, 1987	Yes No
Recommended Texts	Advanced Engineering Mathematics, Erwin Kreyszig. 2010	Yes
Websites	1. https://www.google.iq/books/edition/Thomas_Calculus/U6kZvgAACAAJ?hl=ar 2. https://www.google.iq/books/edition/Linear_Algebra/0DUXym7QWfYC?hl=ar&gbpv=1&dq=linear+algebra&printsec=frontcover	

Grading Scheme Grade chart				
Group	Grade	Appreciation	Marks %	Definition
Success Group (50 – 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C - Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E - Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	Sediment (under processing)	(45-49)	More work required but credit awarded
	F – Fail	Precipitate	(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 Information

Course Information

Module Title	English Language	Module Delivery	
Module Type	Basic	☒Theory ☐Lecture ☐Lab ☐Tutorial ☐Practical ☒Seminar	
Module Code	NTU101		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	First	Semester of Delivery	First
Administering Department	Elec. Eng. Tech.	College	Al-Hawija Polytechnic College
Module Leader	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Module Leader's Acad. Title	Assistant professor	Module Leader's Qualification	M.sc
Module Tutor	Name (if available)	e-mail	Email
Peer Reviewer Name	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	12/1/2025	Version Number	1.0

Relation with other Modules

Relationship with other study subjects

Prerequisite module	None	Semester	

Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	The objectives of this course are to assess language proficiency levels, build foundational grammar and vocabulary, develop speaking and writing skills, expand vocabulary, and consolidate learning and assess progress. Through a diagnostic assessment, students' proficiency levels will be determined, allowing for tailored instruction. The course will review and reinforce basic grammar concepts and vocabulary while focusing on developing speaking and writing abilities through various activities. Vocabulary expansion will be achieved by introducing new words and expressions. Finally, the course will consolidate learning through listening tasks, speaking practice, and a final exam to assess students' progress and proficiency.
Module Learning Outcomes Learning outcomes for the subject	1.Gain a solid understanding of basic grammar concepts and tenses, including present simple, past simple, present continuous, future simple, adjectives and adverbs, comparatives and superlatives, present perfect, modal verbs, reported speech, and conditional sentences. 2.Expand vocabulary related to daily routines, past events, future plans, descriptions of people and places, achievements, obligations, and hypothetical situations. 3.Develop effective speaking skills through regular practice in expressing personal experiences, describing routines and habits, discussing future plans, giving advice, and engaging in conversations. 4.Enhance reading comprehension abilities by understanding and interpreting texts on various topics, including personal anecdotes, future technologies, comparisons, and reported speech. 5.Improve writing skills through exercises in narrating memorable experiences, expressing future goals, describing people and places, writing advice letters or emails, and crafting hypothetical scenarios.

Indicative Contents Guideline Contents	Part A: 1.Introduction to the course and syllabus (2 hours) 2.Diagnostic assessment to determine language proficiency levels (1hours) 3.Review of basic grammar concepts and vocabulary (2 hours) 4.Speaking practice: Introducing oneself and interacting with classmates (1 hour) 5.Grammar focus on various topics(10 hours): a.Present simple tense b.Past simple tense c.Present continuous tense d.Future simple tense e.Adjectives and adverbs f.Comparatives and superlatives g.Present perfect tense h.Modal verbs i.Reported speech j.Conditional sentences 6.Vocabulary expansion related to the grammar topics (2 hours) 7.Listening comprehension exercises to improve listening skills (2 hours)
	8.Writing practice: Narrating personal experiences and expressing future goals (2 hours) Part B: 9.Reading comprehension exercises with texts relevant to the grammar topics (2 hours) 10.Final exam to assess language proficiency (2 hours) 11.Various speaking practice activities throughout the course (2 hours) 12.Review and consolidation of learned grammar and vocabulary (2 hours)

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	1.Diagnostic Assessment: Conduct an initial assessment to determine the language proficiency levels of students and tailor the instruction accordingly. 2.Review of Basic Grammar and Vocabulary: Begin with a review of fundamental grammar concepts and vocabulary to ensure a strong foundation for further language development. 3.Speaking Practice: Provide opportunities for students to practice speaking by introducing themselves, getting to know classmates, and engaging in discussions on various topics. 4.Grammar Focus: Introduce and practice different grammar tenses and structures, such as present simple, past simple, present continuous, future simple, adjectives, adverbs, comparatives, superlatives, present perfect, modal verbs, reported speech, and conditional sentences. 5.Vocabulary Expansion: Expand students' vocabulary through themed units, such as daily routines, past events, current actions, future plans, describing people and places, comparisons, personal achievements, everyday situations, conversation expressions, and hypothetical scenarios. 6.Listening and Reading Comprehension: Enhance listening and reading skills through exercises and texts that cover a range of topics, including daily life, personal anecdotes, future technologies, comparisons, and reported speech. 7.Writing Practice: Develop writing skills through activities such as narrating memorable experiences, writing about future goals, describing people and places, sharing personal achievements, writing advice letters or emails, and expressing hypothetical scenarios. 8. Review and Consolidation: Dedicate time for reviewing and consolidating grammar concepts, vocabulary, listening skills, and speaking skills through comprehensive exercises, role plays, and discussions.

Student Workload (SWL) The student's academic workload is calculated for15 weeks			
Structured SWL (h/sem) – Regular student workload during the semester	33	Structured SWL (h/w) Student's Regular Weekly Study Load	2.2
Unstructured SWL (h/sem) – Irregular student workload during the semester	17	Unstructured SWL (h/w) Irregular weekly study load of the student	1.13
Total SWL (h/sem) The student's total academic workload during the semester	50		

Module Evaluation Course Material Assessment					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	continuous	LO #1, 2, 3,
	Assignments	5	10% (10)	2, 4, 6, 8, 12	LO #1,2,3,4
	Lab	0	0	–	–
	Report	0	0	–	–
Summative assessment	Midterm Exam	2hr	20% (20)	13	LO #1,2,3
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly theoretical curriculum	
	Material Covered
Week 1	Introduction to the course and syllabus • Diagnostic assessment to determine language proficiency levels • Review of basic grammar concepts and vocabulary Speaking practice: Introducing oneself and getting to know classmates
Week 2	Grammar focus: Present simple tense and frequency adverbs • Vocabulary expansion: Daily routines and activities • Listening comprehension: Conversations about daily life • Speaking practice: Describing daily routines and habits
Week 3	Grammar focus: Past simple tense (regular and irregular verbs) • Vocabulary expansion: Past events and experiences • Reading comprehension: Texts about personal anecdotes • Writing practice: Narrating a memorable experience
Week 4	Grammar focus: Present continuous tense • Vocabulary expansion: Current actions and temporary situations • Speaking practice: Describing ongoing activities and future plans Writing practice: Writing about future goals and aspirations
Week 5	Grammar focus: Future simple tense and expressing future plans • Vocabulary expansion: Future events and predictions • Reading comprehension: Texts about future technologies • Speaking practice: Discussing future plans and aspirations
Week 6	Grammar focus: Adjectives and adverbs • Vocabulary expansion: Describing people, places, and things • Speaking practice: Describing people and objects • Writing practice: Describing a place or person
Week 7	Grammar focus: Comparatives and superlatives • Vocabulary expansion: Describing size, quantity, and quality • Reading comprehension: Texts comparing different products or places Speaking practice: Comparing and contrasting objects or places
Week 8	Grammar focus: Present perfect tense • Vocabulary expansion: Personal achievements and life events • Speaking practice: Sharing personal experiences and achievements Writing practice: Writing about memorable moments

Week 9	Grammar focus: Modal verbs (ability, possibility, necessity) • Vocabulary expansion: Everyday positions and obligations • Speaking practice: Giving advice and suggestions Writing practice: Writing advice letters or emails
Week 10	Grammar focus: Reported speech (statements and questions) • Vocabulary expansion: Conversation and dialogue expressions • Reading comprehension: Texts featuring reported speech • Speaking practice: Practicing reported speech in different contexts
Week 11	Grammar focus: Conditional sentences (zero, first, and second conditionals) • Vocabulary expansion: Hypothetical situations and consequences • Speaking practice: Discussing hypothetical situations and giving advice Writing practice: Writing about hypothetical scenarios
Week 12 Week 13	Review of grammar concepts and tenses covered so far • Vocabulary expansion: Review and consolidation of vocabulary • Listening skills: Listening to dialogues and answering comprehension questions • Speaking practice: Reviewing and applying learned language skills
Week 14 Week 15	Review and consolidation of grammar and vocabulary • Speaking practice: Role plays and discussions on various topics

Learning and Teaching Resources Learning and teaching resources		
	Text	Available in the Library?
Required Texts	1."English Grammar in Use" by Raymond Murphy: A comprehensive grammar reference book that covers essential grammar concepts and provides clear explanations and practice exercises. 2."Oxford Wordpower Dictionary" by Oxford University Press: A reliable dictionary for expanding vocabulary and understanding word meanings in context.	No
Recommended Texts	1."English Vocabulary in Use" by Michael McCarthy and Felicity O'Dell: A vocabulary resource book that offers a wide range of vocabulary exercises and activities to enhance vocabulary acquisition. 2."Cambridge IELTS Series" or "Official Guide to the TOEFL Test": Test preparation books that include practice tests and strategies for the IELTS or TOEFL exams, depending on the course focus.	No

Websites	1.Duolingo (www.duolingo.com): A popular language learning platform that offers interactive exercises and gamified lessons for grammar and vocabulary practice. 2.BBC Learning English (www.bbc.co.uk/learningenglish): A website providing a variety of English learning resources, including grammar lessons, vocabulary exercises, and listening practice.

Grading Scheme Grade chart				
Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C - Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E - Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	Precipitate (processing)	(45-49)	More work required but credit awarded
	F – Fail	Ras B	(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 Information Material informationSiya					
Module Title	Electrical circuits 1			Module Delivery	
Module Type	Core			☒Theory ☐Lecture ☒Lab ☒Tutorial ☐Practical ☐Seminar	
Module Code	ELTP105				
ECTS Credits	8				
SWL (hr/sem)	200				
Module Level	First		Semester of Delivery	First	
Administering Department	Elec. Eng.Tech.		College	Al-Hawija Polytechnic College	
Module Leader	Taha Abdul Salam Taha		e-mail	taha.a.taha@ntu.edu.iq	
Module Leader's Acad. Title	Assist lect.		Module Leader's Qualification	master	
Module Tutor	Name (if available)		e-mail	Email	
Peer Reviewer Name	Parween R. Kareem		e-mail	preween_hwj@ntu.edu.iq	
Scientific Committee Approval Date	12/1/2025		Version Number	1.0	

Relation with other Modules Relationship with other study subjects			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content

Module Objectives Course Objectives	To introduce the student to the DC circuits topologies starting from the resistor types and how to read its value, to ohm's law and the circuit analysis theorems and laws. Also, the independent and the dependent sources are given. Node, mesh, Kirchhoff's, Thevenin's and Norton's all defined and used to analyze electrical circuits and networks. The conversion between Delta and Wye is given which is quite necessary when the circuit components cannot be categorized as combinations of series and parallel resistors.

Module Learning Outcomes Learning outcomes for the subject	1. Giving the necessary information about the resistor. 2. Introducing electrical quantities, sources, and Ohm's law. 3. Power terms, resistivity, conductivity, and heat effect on the resistor. 4. Electric circuit definitions then Kirchhoff's voltage and current laws. 5. Loops, nodes, source connections, and resistors different connections. 6. Voltage and current division. Nodal and mesh analysis. 7. Linearity and superposition theorem. 8. Thevenin's to find the current or voltage in a branch. 9. Norton's to find circuit data. 10. Maximum power transfer in electrical sources.

Indicative Contents Guidelines	Indicative content includes the following. Part A – Electrical DC circuit elements and definitions Defining resistor types, reading, and characteristics. Introducing voltage, current, and power. Explaining dependent and independent voltage and current sources with its internal equivalents. Ohm's Law. Power calculations, resistance, conductivity and heat effect. [16 hrs] Part B – Circuit analysis by direct manipulation Defining nodes, paths, loops, branches, and meshes. Kirchhoff's current and voltage laws. Finding equivalent resistance for all resistors connections. Voltage and current divisions. Nodal and mesh analysis. [20 hrs] Part C – Circuit analysis by theorems Discussing circuit analysis theorems. Superposition for multiple sources circuits. Norton's and Thevenin's for current in a branch. Maximum power transfer for sources optimization, and delta-wye conversion for complicated connections that cannot be minimized by the previous methods. [24 hrs]

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	The strategies needed in this subject are focused on enhancing the students' thinking horizons so that they get familiar with it and can feel able to manipulate its problems details. This can be achieved by using real life examples, videos, and schemes with many problems to be solved. Also, the student is requested to solve a lot of problems. When this is accompanied by good utilization of the laboratory, students will be able to go through the course successfully.

Student Workload (SWL) The student's academic workload is calculated for15 weeks			
Structured SWL (h/sem) Regular academic workload for the student during the semester	108	Structured SWL (h/w) Student's regular weekly study load	7.2
Unstructured SWL (h/sem) Irregular student workload during the semester	92	Unstructured SWL (h/w) Irregular weekly study load for the student	6.13
Total SWL (h/sem) The student's total academic workload during the semester	200		

Module Evaluation Course Material Assessment					
		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	3, 6, 9, 13	LO #3, #6, #9, #10
	Assignments	-	-	-	-
	Projects /Lab.	15	20% (20)	Continuous	All
	Report	-	-	-	-
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly theoretical curriculum	
	Material Covered
Week 1	Symbols and abbreviations. Resistor types, and how to read resistors values. Resistor values according to different series.
Week 2	Voltage, current, charge, and power. Independent voltage and current sources. Dependent four types of voltage and current sources. Network and circuit definitions. Ohm's law.
Week 3, 4	Power absorption. Resistivity and Conductivity. Effect of heat on resistance value.
Week 5, 6	Nodes, Paths, Loops, and Branches. Kirchhoff's current and voltage laws.
Week 7	The single loop circuit and, the single node-pair circuit. Series and parallel connected sources. Resistors in series and parallel.
Week 8, 9	Voltage and current division. Nodal analysis, the super node, mesh analysis, the super mesh and, comparison between nodal and mesh analysis.
Week1011	Linearity and superposition and, source transformation.
Week 12	Thevenin's equivalent circuit.
Week 13	Norton's equivalent circuit.
Week 14	Maximum power transfer.
Week 15	Delta-Wye conversion.

Delivery Plan (Weekly Lab. Syllabus) Weekly laboratory schedule	
	Materials Covered
Week 1	Lab 1: Basic Information (types of, and how to use the multi-meters. Method of writing the reports).
Week 2, 3, 4	Lab 2, 3, 4: Reading the resistors by color code. Ohm's law. Series and parallel connection. Effect of temperature on resistor value.
Week 5, 6	Lab 5, 6: Mesh analysis. Nodal analysis.
Week 7	Lab 7: Delta-Wye conversion.
Week 8, 9	Lab 8, 9: Thevinin's theorem, with maximum power transfer. Norton's theorem with maximum power transfer.
Week 10	Lab 10: Super position theorem.
Week 11,12	Lab 11, 12: Effect of internal resistor for voltage source. Effect of internal resistor for current source.
Week 13, 14, 15	Lab 13, 14, 15: Network topology and experimenting simplifying circuits, then checking the steps practically to make sure of ordinary simplifying strategies.

Learning and Teaching Resources Learning and teaching resources		
	Text	Available in the Library?
Required Texts	"Engineering Circuit Analysis"; William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin. Eighth edition, 2012, McGraw Hill.	No
Recommended Texts	"Hughes Electrical and Electronic Technology"; Edward Hughes, 10th edition, 2008, Pearson Education Limited.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme Grade chart				
Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C - Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E - Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	Sediment (under processing)	(45-49)	More work required but credit awarded

	F – Fail	Precipitate	(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 Information

Course Information

Module Title	Mechanical and electrical workshops	Module Delivery	
Module Type	Basic		☐Theory
Module Code	ELTP106		☐Lecture
ECTS Credits	6		☒Lab
SWL (hr/sem)	150		☐Tutorial
			☐Practical
			☐Seminar
Module Level	First	Semester of Delivery	First

Administering Department	Elec. Eng. Tech.	College	Al-hawija Polytechnic College
Module Leader	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Module Leader's Acad. Title	Assistant lecture	Module Leader's Qualification	Msc
Module Tutor	Name (if available)	e-mail	Email
Peer Reviewer Name	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	12/1/2025	Version Number	1.0

Relation with other Modules Relationship with other study subjects			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	The Mechanical and Electrical Workshops course aims to introduce students to the fundamental concepts of mechanical and electrical workshop processes, and to develop their practical skills in using tools, equipment, and measuring devices, while adhering to occupational safety procedures. It also seeks to provide them with initial experience in manufacturing, assembly, simple electrical wiring, and basic maintenance, thereby enhancing their readiness for engineering studies and practical applications in the workplace..
Module Learning Outcomes Learning outcomes for the subject	After successfully completing the Mechanical and Electrical Workshops course, the student is expected to be able to: 1.Understanding and applying occupational safety rules within mechanical and electrical workshops. 2.Use the number, hand tools, and basic equipment correctly and safely.. 3.Performing engineering measurements using mechanical and electrical measuring instruments with appropriate accuracy. 4.Performing basic workshop operations such as measuring, marking, cutting, drilling, filing, and assembling. 5.Applying the principles of simple electrical connections and using electrical testing and measuring devices.. 6.Identifying the basic components of motors and electrical devices and performing initial tests on them. 7.Performing simple preventive maintenance and initial fault diagnosis in mechanical and electrical systems. 8.Working efficiently as part of a team while adhering to technical instructions and work ethics within the workshop.. 9.Employing practical skills to solve simple technical problems encountered during workshop activities. 10.Completing a project or applied task that combines mechanical and electrical skills while considering quality and safety..
Indicative Contents Guideline Contents	The guidance content includes the following: 1- Introduction to Mechanical and Electrical Workshops •The concept of workshops and their importance in the engineering field. •Occupational safety rules and use of personal protective equipment. 2- Number and hand tools •Identifying mechanical and electrical tools. •Proper usage and simple maintenance methods for it. 3- Engineering measurements •Using measuring instruments such as the vernier caliper, micrometer, and multimeter. •Accurately reading measurements and recording results.

	4- Basic mechanical operating procedures •Measurement, planning, and labeling. •Cutting, sawing, filing, drilling, and assembling. 5- Electrical work fundamentals •Identifying wires, cables, and connectors. •Implementing simple electrical circuits and using testing devices. 6- Simple electrical connections and welding •Principles of secure connection and routing. •Practical applications of electrical component connection. 7- Electric motors and maintenance •Identifying the main components of small electric motors. •Principles of inspection, operation, and preventive maintenance. 8- Fault diagnosis and applied projects •Detecting and repairing simple mechanical and electrical faults. •Implementing a practical project that combines mechanical and electrical skills while adhering to quality and safety standards..

Learning and Teaching Strategies Learning and teaching strategies	
Strategies	The material relies on a combination of theoretical and practical methods to ensure that students acquire essential knowledge and skills, and includes: • Explanatory lectures to explain basic concepts. • Practical training within workshops using various tools and equipment.. • Learning by doing through practical exercises and tasks. • Discussions and interactive learning to enhance understanding and problem-solving. • Teamwork in implementing practical activities and projects. • Continuous assessment through direct observation, tests, and practical reports.

Student Workload (SWL) The student's academic workload is calculated for15 weeks			
Structured SWL (h/sem)	63	Structured SWL (h/w) Student's regular weekly study load	42.

Regular academic workload for the student during the semester			
Unstructured SWL (h/sem) – Irregular student workload during the semester	87	Unstructured SWL (h/w) Irregular weekly study load for the student	5.8
Total SWL (h/sem) The student's total academic workload during the semester	150		

Module Evaluation Course Material Assessment

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	6	10% (10)	continuous	LO #1,3,5,8,10,12
	Assignments	7	10% (10)	2,4,6,8,10,12.14	LO #1,3,5,8,10
	Lab	0	0	–	–
	Report	0	0	–	–
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO from #1 to 5
	Final Exam	3hr	60% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
Weekly curriculum

Material Covered

week	address practical activity
1	Workshop Introduction, Safety Guidance, and Personal Protective Equipment
2	Hand tools Use the tools
3	Engineering measurements Vernier/micrometer/multimeter
4	Labeling/Layout Planning exercise
5	Cutting/Drilling Manufacturing a part
6	buckle crowd
7	electrical appliances V/I/R measurement
8	Fundamentals of electrical conductivity Simple electrical circuit
9	Connections/Soldering Secure connection
10	small engines Inspection
11	maintenance Preventive tasks

12	Compositions Lighting circuit
13	Troubleshooting Fault identification
14	Integrated project Building/Testing
15	Final review practical exam

Learning and Teaching Resources

Learning and teaching resources

	Text	Available in the Library?
Required Texts	1. Workshop Technology, Part 1 – WAJ Chapman. 2. Basic Electrical Installation Work – Trevor Linsley. 3. Electrical Wiring Industrial – Stephen L. Herman	Yes
Recommended Texts	1-Mechanical Workshop Practice – KC John. 2. Electrician's Guide to Basic Electrical Practices – Brian Scaddan. 3. Workshop Processes, Practices and Materials – Bruce J. Blac	Yes
Websites	1. https://nptel.ac.in 2 All About Circuits: https://www.allaboutcircuits.com 3. Electrical4U: https://www.electrical4u.com	

Grading Scheme

Grade chart

Group	Grade	Appreciation	Marks %	Definition
Success Group (50 - 100)	A - Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	very good	80 - 89	Above average with some errors
	C - Good	good	70 - 79	Sound works with notable errors
	D - Satisfactory	middle	60-69	Fair but with major shortcomings
	E - Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	RAsp (under processing)	(45-49)	More work required but credit awarded
	F – Fail	Precipitate	(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 Information

Course Information

Module Title	**Computer**		**Module Delivery**	
Module Type	**Supported**		☒Theory **Lecture** ☐ ☒Lab **Tutorial** ☐ **Practical** ☐ **Seminar** ☐	
Module Code	**NTU102**			
ECTS Credits	**3**			
SWL (hr/sem)	75			
Module Level	**First**	**Semester of Delivery**	**second**	
Administering Department	**Elec. Eng. Tech.**	**College**	**Al-Hawija Polytechnic College**	
Module Leader	Muqdad Daham jasim	**e-mail**	muqdad.da@ntu.edu.iq	
Module Leader's Acad. Title	**Assistant lecturer**	**Module Leader's Qualification**	**Master**	
Module Tutor	**Name (if available)**	**e-mail**	**Email**	
Peer Reviewer Name	**Parween R. Kareem**	**e-mail**	preween_hwj@ntu.edu.iq	
Scientific Committee Approval Date	**12/1/2025**	**Version Number**	**1.0**	

Relation with other Modules

relationship with Materials Study The other

Prerequisite module	N/A	**Semester**	
Co-requisites module	N/A	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

Goals Material Study and results Learning Contents Guidance

Module Objectives Course Objectives	1. study principles computer. 2. DefinitionKeyboards and mice. 3. Presentation of memory principles. 4. to explain engines discs. 5. to explain principles system Operation Windows. 6. clarification Accessories system Operation Windows.
Module Learning Outcomes outputs Learning For the material Study	1. CapacityTo identify the different parts of the computer components 2. identificationDifferent types of keyboards and mice. 3. Acquiring knowledge about computer memory and disk drives 4. AcquisitionKnowledge about the Windows operating system. 5. Display Accessories different For the system Operation Windows.
Indicative Contents Contents Guidance	ContentThe guidelines include the following:. Types computers: Digital, Analog and hybrids. Types Memories different: memory Access random(RAM) , memory Reading only(ROM) , memory programmable(PROM), EEPROM (Electrically Erasable Erasable Memory), and EEPROM (Electrically Erasable Erasable Memory). TypesDifferent drives: magnetismvisual. Services system Operation Windows: The notebook, Word Bad, The painter, Accessories and others.

Learning and Teaching Strategies Strategies Learning Education	
Strategies	Strategies that It will be Its adoption To present This is amazing Unity include Lectures The theory, Experiments The process, Duties Homeand exams.This will be achieved through classroom instruction, interactive lessons, and taking practical experiences into account..

Student Workload (SWL) Pregnancy Academic For the student calculated for 15 week			
Structured SWL (h/sem) Pregnancy Academic Regular For the student during the chapter	48	**Structured SWL (h/w)** Pregnancy Academic Regular For the student weekly	32.
Unstructured SWL (h/sem) Pregnancy Academic not Regular For the student during the chapter	27	**Unstructured SWL (h/w)** Pregnancy Academic not Regular For the student weekly	1.8
Total SWL (h/sem) Pregnancy Academic The whole For the student during the chapter	**75**		

Module Evaluation evaluation Material Study					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	N/A	LO #2, #4
	Assignments	8	10% (10)	10	LO #1, #3, #5
	Projects /Lab.	15	10% (10)	Continuous	All
	Report	0	0% (0)	N/A	N/A
Summative assessment	**Midterm Exam**	2hr	20% (20)	10	All
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Curriculum Weekly theory	
	Material Covered
1st	Introduction to computer systems includinginthatWhat is a computer? Computer system, computer functions (input, storage, processing) And the exit(Classification of computers and computer units)
2nd3rd4th	to explainTypes of computer keyboards and types of keyboard keys
5th	to explainTypes of computer mice and mouse functions
6th	to explainVarious plugs and ports for some computer components
7th	Explanation of computer disks and drives
8th	memorynotVolatile and cache memoryRandom Access Memory (RAM)
9th, **10th**, **11th**	Displaying the hardware components of a computer and their definitions
12th, **13th**	Introducing the Windows desktop operating system inWindows,and tapeTasksYWindows
14th, **15th**	Explaining the Start Menu and Windows operating system accessories

Delivery Plan (Weekly Lab. Syllabus) Curriculum Weekly For the laboratory	
	Material Covered
1st	Introduction to computer systems, includingWhat is a computer? Computer system, computer functions (input, storage, processing) And the exit(Classification of computers and computer units)
2nd3rd4th	to explainTypes of computer keyboards and types of keyboard keys
5th	to explainTypes of computer mice and mouse functions
6th7th	to explain Various plugs and ports for some computer components
8th	Explanation of computer disks and drives
9th, **10th**, **11th**, **12th**	memorynotVolatile and cache memoryRandom Access Memory (RAM)
13th, **14th**, **15th**	Displaying the hardware components of a computer and their definitions

Learning and Teaching Resources sources Learning and teaching		
	Text	**Available in the Library?**
Required Texts	Umar Farooq, "What is Computer - Definition & Basic Concept of Computer", Study Lecture Notes, 2016. [1] University Information Technology Services, "Microsoft Windows 10, Getting Started Guide", Kennesaw State University – UITS, 2016. [2]	On the internet
Recommended Texts	Cre8te Opportunities, "Introduction to Computers (Windows 10)", Digital Skills Academy, 2016.	On the internet
Websites	[1]http://www.studylecturenotes.com/computer-science/what-is-computer-definition-basic-concept-of-computer [2]http://ergonomictrends.com/different-types-of-computer-keyboards/ [3]UKEssays, "Wireless Mouse: History and Types", 2018. [Online]. Available:https://www.ukessays.com/essays/computer-science/wireless-mouse-history-types-5302.php?vref=1. [4]https://searchstorage.techtarget.com/definition/RAM-random-access-memory [5]https://tldp.org/HOWTO/Network-boot-HOWTO/a610.html#:~:text=PROM%3A%20Pronounced%20prom%2C%20an%20acronym,the%20computer%20is%20turned%20off.	

Grading Scheme Grade chart				
Group	**Grade**	Appreciation	**Marks %**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	good very	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	Precipitate (Restriction) Treatment(	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(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 Information Course Information			
Module Title	**Arabic Language**		**Module Delivery**
Module Type	**Basic**		☒Theory **Lecture**☐ **Lab**☐ **Tutorial**☐ **Practical**☐ **Seminar**☐
Module Code	**NTU103**		
ECTS Credits	**2**		
SWL (hr/sem)	50		
Module Level	**First**	**Semester of Delivery**	**Second**
Administering Department	**Elec. Eng. Tech.**	**College**	**Al-Hawija Polytechnic College**
Module Leader	**Dr. Salam H. Ali**	**e-mail**	**salamha-hti@ntu.edu.iq**
Module Leader's Acad. Title	**Assist. Prof**	**Module Leader's Qualification**	**PhD**
Module Tutor	**Name (if available)**	**e-mail**	**Email**
Peer Reviewer Name	**Parween R. Kareem**	**e-mail**	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	**01/10/2024**	**Version Number**	**1.0**

Relation With Other Modules relationship with Materials Study The other		
Prerequisite module	None	**Semester**
Co-requisites module	None	**Semester**

Module Aims, Learning Outcomes and Indicative Contents Goals Material Study and results Learning Contents Guidance	
Module Objectives Course Objectives	The student grows up loving the Arabic language, the language of the Holy Quran.To recognize the beauty of the Arabic language and its literature, and to enable the student to study the various branches of Arabic. To introduce the student to correct Arabic vocabulary, structures, and proper styles in an engaging and attractive manner. To encourage the student to utilize their free time by reading, researching, and visiting the library. To empower the student to read correctly and to acquire the ability to use the language correctly in communication with others, such as fluency, effective delivery, and clear expression, and to cultivate good listening skills, which will facilitate their affairs and help them fulfill their needs. To develop the student's literary taste so they can appreciate the aesthetic aspects of language, its meanings, and imagery. To train the student to express their thoughts and feelings clearly and correctly, both orally and in writing, and to use punctuation effectively. To develop the student's spelling and handwriting skills so they can write correctly in all aspects. To awaken The student's awareness of the honor of the word and its guidance; to preserve its purity and cleanliness so that it is only used for goodHelping the student understand complex structures and obscure methods.

Module Learning Outcomes Learning outcomes for the subject Study	1. Knowledge of grammatical and morphological rules. 2. Introducing the most prominent linguistic and literary works. 3. Identifying the linguistic and literary problems of the students. 4. Contemporary reading of linguistic and literary texts. 5. Reading and writing literary texts according to grammatical and morphological standards 6. Enhancing self-confidence, boldness, and eloquence 7. Competition and excellence in the labor market.
Indicative Contents Contents Guidance	Introduction to linguistic errors: the closed and open "taa"(4 Hours) (Applications of common linguistic errors and parts of speech(6 Hours) The rules for writing the alif mamdudah and alif maqsurah, the sun letters, the moon letters, and the letters dad and dha. (12 hours) Problems, obstacles, and discussions (6 Hours)

Learning and Teaching Strategies Strategies Learning Education	
Strategies	1. Simplifying and organizing information 2.Facilitating the information retrieval process 3.Linking new concepts to prior knowledge . 4. Finding the relationship between concepts. 5. Facilitating the recall of knowledge Information

Student Workload (SWL) Pregnancy Academic For the student			
Structured SWL (h/sem) Pregnancy Academic Regular For the student during the chapter	33	**Structured SWL (h/w)** Pregnancy Academic Regular For the student weekly	2.2
Unstructured SWL (h/sem) Pregnancy Academic not Regular For the student during the chapter	17	**Unstructured SWL (h/w)** Pregnancy Academic not Regular For the student weekly	1.33
Total SWL (h/sem) Pregnancy Academic The whole For the student during the chapter	50		

Module Evaluation Course Material Assessment					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	3, 5, 7, 10	LO #1, 2, 5 and 7
	Assignments	0	0		
	Projects / Lab.	0	0		
	Report	4	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3 hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Curriculum Weekly theory	
	Material Covered
Week 1	Introduction to linguistic errors
Week 2	T tied and the letter T Open
Week 3	Hamzat al-Wasl and Hamzat al-Qat'
Week 4	The medial and final hamza
Week 5	Rules for writing the long and short alif
Week 6	Solar and lunar letters
Week 7	The letters ضand ظ
Week 8	Number
Week 9	Objects
Week 10	Parts of Speech
Week 11	Meanings of prepositions
Week 12	Applications for common grammatical errors
Week 13	Noon and Tanween
Week 14	Introduction to linguistic errors
Week 15	Final exam

Learning and Teaching Resources sources Learning and teaching		
	Text	**Available in the Library?**
Required Texts	The complete in the language Literature Laby Abbas Cooler	Yes
Recommended Texts	mistakes Linguistic Common For Khalid son crescent moon son supporter Hebrew	No
Websites	https://www.eshamel.ne https://www.ektebsa7.com	

GRADING SCHEME Grade chart				
Group	**Grade**	Appreciation	**Marks (%)**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	good very	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	acceptable By decision	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(0-44)	Considerable amount of work required
Note:				

NB 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 Information Course Information					
Module Title	**Electrical Circuit Analysis 2**			**Module Delivery**	
Module Type	**Core**			☒Theory **Lecture**☐ ☒Lab ☒Tutorial **Practical**☐ **Seminar**☐	
Module Code	**ELTP108**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level	**First**		**Semester of Delivery**	**Second**	
Administering Department	**Elect. Eng. Tech.**		**College**	**Al-Hawija Polytechnic College**	
Module Leader	Taha Abdul Salam Taha		**e-mail**	taha.a.taha@ntu.edu.iq	
Module Leader's Acad. Title	Assist lect.		**Module Leader's Qualification**	Master	
Module Tutor	**Name (if available)**		**e-mail**	**Email**	
Peer Reviewer Name	**Parween R. Kareem**		**e-mail**	preween_hwj@ntu.edu.iq	
Scientific Committee Approval Date	**12/1/2025**		**Version Number**	**1.0**	

Relation with other Modules relationship with Materials Study The other			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Goals Material Study and results Learning Contents Guidance	
Module Objectives Course Objectives	This course aims to introduce the electrical components other than the resistor to the student. Starting by knowing their structure and how they respond to the electrical or magnetic fields, then establishing their current voltage relationships, and time constants. Also introducing the principle of Alternating Current (AC) generating, wave characteristics and the components response to the sine wave. The power triangle is of great importance in such circuits so it should be considered also. Also studying the three phase systems being with a wide range of applications, with balanced and unbalanced loads.
Module Learning Outcomes **Learning outcomes for the subject**	1. Introduction to capacitors and inductors with integral v or I relationships. 2. Connections combinations of capacitors and inductors. 3. Unit-step and rectangular pulse functions, with natural and forced responses. 4. The laws needed to analyze RLC circuits. 5. An introduction to Electromagnetics. 6. Duality between magnetic circuit and electric circuit. 7. Generating sine waves, generator principles. 8. The mean, and RMS of different signals. 9. The power considerations in AC circuits. 10. The poly-phase circuits. 11. Balanced and Unbalanced three phase loads with power considerations.

Indicative Contents Contents Guidance	Indicative content includes the following. Part A – AC circuits components and sine waves This part shows the AC circuit components, the capacitor and the inductor regarding their construction and their behavior in response to the AC signal, the voltage and current integral relationships and their physical meanings. Introducing the unit-step function and the rectangular pulse function. The combinations include RC, RL, and RLC. [20 hrs] Electromagnetics and sine waves: Principles of electromagnetics and sine wave generation. Comparison with electrical circuits, mean and RMS calculation. [20 hrs] Part B-Power calculations and poly-phase circuits Instantaneous power calculation, active power, apparent power…etc. Single phase, poly phase, and three phase systems. Balanced and unbalanced three phase systems. [20 hrs]

Learning and Teaching Strategies Strategies Learning Education	
Strategies	The strategies needed in this subject are focused on enhancing the students' thinking horizons so that they get familiar with it and can feel able to manipulate its problems details. This can be achieved by using real life examples, videos, and schemes with many problems to be solved. Also, the student is requested to solve a lot of problems. When this is accompanied by good utilization of the laboratory, students will be able to go through the course successfully.

Student Workload (SWL) Pregnancy Academic For the student calculated for 15 week			
Structured SWL (h/sem) Pregnancy Academic Regular For the student during the chapter	**108**	**Structured SWL (h/w)** Pregnancy Academic Regular For the student weekly	**72.**
Unstructured SWL (h/sem) Pregnancy Academic not Regular For the student during the chapter	**92**	**Unstructured SWL (h/w)** Pregnancy Academic not Regular For the student weekly	**6.13**
Total SWL (h/sem) Pregnancy Academic The whole For the student during the chapter	**200**		

Module Evaluation evaluation Material Study					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	5% (5)	3, 6, 9, 13	LO #3, #6, #9, #11
	Assignments	5	5% (5)	2, 5, 7, 11	LO #2, #5, #7
	Projects /Lab.	15	10% (10)	Continuous	All
	Report	15	10% (10)	Continuous	All
Summative assessment	**Midterm Exam**	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Curriculum Weekly Theory	
	Material Covered
Week 1	Capacitors, integral voltage current relationships, energy storage.
Week 2	Inductors, integral voltage current relationships, energy storage.
Week 3	Inductors and capacitors combinations (series and parallel), linearity and duality.
Week 4	The unit-step function, physical sources and the unit-step, the rectangular pulse function, driven RL circuits, driven RC circuits. Natural and forced responses.
Week 5	The RLC circuit.
Week 6	Electromagnetics.
Week 7, 8	Similarity in principles in simplifying magnetic circuits, with electric circuits.
Week 9	Generation of alternating current. The sinusoidal current.
Week 10	The mean and effective values of current and voltage.
Week 11	The instantaneous power and, mean power of AC relatives. Apparent power.
Week 12	Poly-phase and three phase systems.
Week 13	The power in balanced phase circuits.
Week 14, 15	Unbalanced Wye and Delta loads, the rotating magnetic field.

Delivery Plan (Weekly Lab. Syllabus) Curriculum Weekly For the laboratory	
	Material Covered
Week 1, 2	Lab 1, 2: Principles and block diagram of the oscilloscope. Operating the Oscilloscope.
Week 3	Lab 3: Using the oscilloscope to measure DC, AC sine wave, average, and root mean square values.
Week 4, 5	Lab 4, 5: RC circuit time constant. RL circuit time constant.
Week 6	Lab 6: RLC circuits.
Week 7, 8	Lab 7, 8: RC circuit response to sine waves. RL circuits respond to sine waves. (Phasor diagram, etc)
Week 9, 10	Lab 9, 10: RLC response to sine waves (Phasor diagram and power triangle).
Week 11, 12	Lab 11, 12: Balanced three phase loads with different loads, pure resistive, capacitive, and inductive. Then combination of loads. Giving all power considerations.
Week 13, 14, 15	Lab 13, 14, 15: Un-balanced three phase loads, with different pure loads and combinations of them. Giving load measurements and neutral current measurement.

Learning and Teaching Resources sources Learning and teaching		
	Text	**Available in the Library?**
Required Texts	"Engineering Circuit Analysis"; William H. Hayt, Jack E. Kemmerly, and Steven M. Durbin. Eighth edition, 2012, McGraw Hill.	No
Recommended Texts	"Hughes Electrical and Electronic Technology"; Edward Hughes, 10th edition, 2008, Pearson Education Limited.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme Grade chart				
Group	**Grade**	Appreciation	**Marks %**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	very good	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	Precipitate(Under processing)	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(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 Information
informationStudy material

Module Title	**Digital Electronics**	**Module Delivery**	
Module Type	**Core**		☒ Theory Lecture□ ☒ Lab ☒Tutorial Practical□ Seminar□
Module Code	**ELTP109**		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		

Module Level	**First**	**Semesterof Delivery**	**Second**
Administering Department	**Elec.Eng. Tech.**	**College**	**Al-Hawija Polytechnic College**
Module Leader	Alaa Ahmed Yass	**e-mail**	**alaalayass85@ntu.edu.iq**
Module Leader's Acad. Title	**Assistant lecturer**	**Module Leader's Qualification**	**Master**
Module Tutor	**Name (if available)**	**e-mail**	**Email**
Peer Reviewer Name	**ParweenR. Kareem**	**e-mail**	preween_hwj@ntu.edu.iq
Scientific Committee Approval Date	**12/1/2025**	**Version Number**	**1.0**

Relation withother Modules
Relationship with other study subjects

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

Module Aims, Learning Outcomes and Indicative Contents GoalsCourse material, learning outcomes, and guidance content	
Module Objectives Course objectives	1.Examinethe structure of various number system 2.codes and logic gatesKnowledge 3.List out different types of number system 4.code and convert one to another 5.Perform various binary arithmetic operations. 6.To acquirethe basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 7.To imparthow to design Digital Circuits.
Module Learning Outcomes Learning outcomes for the subject	1.Convert differenttype of codes and number systems which are used in digital communication and computer systems. 2.Employthe codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency. 3.Analyze different types of digital electronic circuit using various mappingand logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods. 4.Design different types of withand without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints. 5.Applythe fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with
Indicative Contents Guidelines	Indicative content includesthe following. Part A – Digital logic and circuit Numbersystem:Binary,Octal and Hexadecimal representation and their conversion, Signed binary numbers representation with 1's and 2's complement methods, Binary arithmetic. PartB - Measurements Number system, logic gates, Additional gates, binary codes, De Margan's theorems, Boolean algebra, Simplifying logic circuits, fundamentals products, algebraic simplification, Karnaugh map, Application of BCD and don't care in Karnaugh map,

Learning and Teaching Strategies

StrategiesLearning and teaching

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

Student Workload (SWL)

Pregnancy Academic For the student Calculated for 15 weeks

Structured SWL (h/sem) Regular academic loadFor the student during the semester	78	Structured SWL (h/w) Regular academic loadFor the student	5.2
Unstructured SWL (h/sem) Irregular academic loadFor the student during the semester	72	Unstructured SWL (h/w) Irregular academic loadFor the student	4.8
Total SWL (h/sem) academic loadTotal student during the semester	**150**		

Module Evaluation

evaluation Study material

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4.10	LO #1,4
	Assignments	0	0	-	-
	Projects/Lab.	15	10% (10)	Continuous	All
	Report	3	10% (10)	3,7,13	LO #2,3,6
Summative assessment	**Midterm Exam**	2hr	20% (20)	8	LO#1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) CurriculumWeekly theory	
	Material Covered
Week 1	Number system
Week 2	Basic logic gate
Week 3	Additional logic gate
Week 4	Binary code
Week 5	Demorgan's theorem
Week 6	Boolean algebra
Week 7	Fundamentalof product
Week 8	Algebraic simplification
Week 9	Karnaugh map
Week 10	Applicationof BCD and don't care in karnaugh map
Week 11	Type of logic circuit
Week 12	Latch and flip-flop.
Week 13	Special counterand shift register
Week 14, 15	Digital/Analog Converter

Delivery Plan (Weekly Lab. Syllabus) Curriculum Weekly lab	
	Material Covered
Week 1	**Introduction about the deviceand components in the laboratory**
Week 2	**Logic gate**
Week 3	**Design AND,OR and NOT from NAND and NOR gate**
Week 4	**EX-OR, EX-NOR**
Week 5	**Demorgan's theorem**
Week 6	**The realizationof Boolean function**
Week 7	**Designinga combinational logic circuit**
Week 8	**HA, FA**
Week 9	**HS, FS**
Week 10	**COMPARETOR**
Week 11	**DECODER**
Week 12	**ENCODER**
Week 13	**MUX, DE-MUX**
Week 14	**FLIP-FLOP** (1)
Week 15	**FLIP-FLOP** (2)

Learning and Teaching Resources

Learning and teaching resources

	Text	Availablein the Library?
Required Texts	DIGITAL FUNDAMENTALby Thomas L. Floyd	Yes
Recommended Texts	DIGITAL CIRCUITS AND DESIGNby S. Salivahanan And S. Arivazhagan	No
Websites	https://india.oup.com/product/digital-circuits-and-design-9780199488681	

Grading Scheme

a plan Grades

Group	Grade	Appreciation	Marks%	Definition
Success Group(50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –VeryGood	very good	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fairbut with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX–**Fail	Precipitate (under	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(0-44)	Considerable amountof work required

Note:Marks Decimal placesAbove 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 Information

Course Information

Module Title	**Engineering drawing**	**Module Delivery**	
Module Type	**Support**	**Theory☐** **Lecture☐** ☒Lab **Tutorial☐** **Practical☐** **Seminar☐**	
Module Code	**MDMT108**		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	**First**	**Semester of Delivery**	**Second**
Administering Department	**Med. Dev Tech. Eng.**	**College**	**Al-Hawija Polytechnic College**
Module Leader	**Mahdi Qahraman fakhreddin**	**e-mail**	**mahdiq.f-haw@ntu.edu.iq**
Module Leader's Acad. Title	**Assistant Lecturer**	**Module Leader's Qualification**	**Master**
Module Tutor	**Name (if available)**	**e-mail**	**Email**
Peer Reviewer Name	**Munef A. Ahmed**	**e-mail**	**Muneef_hwj@ntu.edu.iq**
Scientific Committee Approval Date	**12/1/2025**	**Version Number**	**1.0**

Relation with other Modules

relationship with Materials Study The other

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

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives Course Objectives	1.Learn how to use the AutoCAD program. 2.Learn to draw 2D drawings using basic elements (line, circle, rectangular…etc.). 3.Learn to modify, edit the 2D drawing (move, copy, mirror…etc.). 4.Learn to add dimensions to the 2D drawings. 5.Learn to add text to the 2D drawings. 6.Identify, formulate and solve engineering problems
Module Learning Outcomes Learning outcomes for the subject	At the completion of the course, students will be able to 1.Understand fundamentals of the AutoCAD drawings, engineering drawings. 2.Analyze and draw any engineering drawing using the facilities that the 2010 AutoCAD program produces such as using basic elements (line, circle, rectangular…etc.). 3.Modify any drawing using the tools (move, copy, mirror, offset, array,…etc.) 4.After completing the 2D drawing the student could add the dimensions to the drawing. 5.Design and draw any engineering drawing using any AutoCAD Program Version. 6.Draw any drawing using different methods, techniques and facilities submitted by the AutoCAD program.

Indicative Contents Contents Guidance	**Getting started with** **AutoCAD**Opening and creating drawings Exploring the AutoCAD interface Zooming and panning [4 hr] Basic Draw Commands Lines, Circles, Rectangles..ect [12 hr] Drawing Precision in AutoCAD Polar and Ortho Tracking Entering Coordinates and Angles Object Snaps and Tracking [4 hr] Modify commands Move, Copy, Rotate, Mirror...ect [4 hr] **Advanced Draw Commands** Polylines, Arcs, Polygons, Ellipses...ect [12 hr] **Advanced Modify Commands** Trim, Extend, Fillet, Chamfer, Polyline Edit, Spline, Offset, Explode, Join...ect [8 hr] **Creating More Complex Objects [4 hr]** **Adding Dimensions** Using Dimensioning Tools Dimension Styles Editing Dimensions [4 hr] **Hatching / Text** The Hatch Command The Multiline Text Tool The Single Line Text Tool Editing Text [4 hr] Setting Up a Layout Using Layouts and Viewports, Scaling Viewports [4 hr]

Learning and Teaching Strategies

Learning and teaching strategies

Strategies	• A lecturer explains the proper commands needed to create a simple drawing. • A lecturer uses the data projector to show the students the various commands needed to draw a simple drawing. • A lecturer uses active learning to help the students complete their assignments. • A lecturer uses Problem-Based Learning method that challenges students to "learn to learn" by working in groups to seek solutions to problems. The students will work in groups to complete the drawings assigned.

Student Workload (SWL)

Pregnancy Academic For the student calculated for 15 week

Structured SWL (h/sem) Regular academic workload for the student during the semester	63	Structured SWL (h/w) Student's regular weekly study load	4.2
Unstructured SWL (h/sem) Irregular student workload during the semester	12	Unstructured SWL (h/w) Irregular weekly study load for the student	0.8
Total SWL (h/sem) The student's total academic workload during the semester	**75**		

Module Evaluation

Course Material Assessment

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	5 and 9	LO #1, #2, #8, #9
	Assignments	0	0		
	Projects /Lab.	15	10% (10)	Continuous	All
	Report	5	5% (5)	4, 6, 8, 10, 13	All
Summative assessment	**Midterm Exam**	1hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) Curriculum Weekly For the laboratory	
	Material Covered
Week 1	Lab 1: Getting Started with AutoCAD
Week 23, 4	Lab 2,3,4: Basic Draw Commands
Week5	Lab5: Drawing Precision in AutoCAD
Week6	Lab 6: Modify commands
Week8,9,7	Lab 8,9,7: Advanced Drawing Commands
Week10,11	Lab 10,11: Advanced Modify Commands
Week 12	Lab 12: Creating More Complex Objects
Week 13	Lab 13: Adding Dimensions
Week 14	Lab 14: Hatching / Text
Week 15	Lab 15: Setting Up a Layout

Learning and Teaching Resources Learning and teaching resources		
	Text	**Available in the Library?**
Required Texts	Textbook of Engineering Drawing	No
Recommended Texts	Introduction to AutoCAD	No
Websites	https://www.unm.edu/~bgreen/autocad/AutoCAD%201.pdf	

Grading Scheme Grade chart				
Group	**Grade**	Appreciation	**Marks %**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	very good	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	Precipitate(Under processing)	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(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 DESCRIPTOR FORM

description

Module Information Course Information			
Module Title	Industrial Installation	Module Delivery	
Module Code	ELTP111	☒ **Theory** ☒ **Lecture** ☒Lab ☐**Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	4		
SWL (hr/sem)	100		
Module Level	First	Semester of Delivery	second
Administering Department	Elec. Eng.Tech.	College	Al-Hawija Polytechnic College
Module Leader	AHMED ADNAN JAWAMEER	e-mail	Ahmedadnan85t@ntu.edu.iq
Module Leader's Acad. Title	Assist Lect.	Module Leader's Qualification	msc
Module Tutor	None	e-mail	None
Peer Reviewer Name	Parween R. Kareem	e-mail	preween_hwj@ntu.edu.iq
Review Committee Approval	12/1/2025	Version Number	1.0

Relation With Other Modules relationship with Materials Study The other			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents Course objectives, learning outcomes, and guidance content	
Module Objectives **Course Objectives**	1- Training the student on industrial installation methods and comparing different types of installations 2 - Understanding the main concepts and knowing the rules and laws used in calculating electrical loads and cable size The required circuit breaker capacity 3 - Introducing the student to the types of cables and the maximum current that each cable can carry. 4 - Preparing the student to study the various calculations required in electrical installations and to become familiar with the different theories for studying those calculations . 5. Preparing and enabling the student to establish factories and heavy equipment, and how to control them in factories and electrical plants.
Module Learning Outcomes **Learning outcomes for the subject**	By the end of this course, the student is expected to be able to: 1)Understanding the basics of industrial mechanics (voltage, current, resistance). 2)Installation of foundations(Lighting, control circuits, factory foundation motors). 3)Use of protective devices (circuit breakers, fuses, grounding and controllers). 4)Reading electrical diagramsAnd implementing it practically. 5)Implementing safety proceduresAnd risk prevention. 6)Fault repair(Detection and repair of common faults).
Indicative Contents Guideline Contents	1.Introducing the student to the principles and methods of electrical installations for residential and industrial buildings. 2.Enabling the student to read installation diagrams and understand the approved electrical symbols. 3.Developing skills in designing and extending lighting and power circuits. 4.Training the student to perform electrical installations practically and safely according to approved standards.

Learning and teaching strategies Learning and Teaching Strategies	
Strategies	1- Interactive lectures Presenting key theoretical concepts using visuals, diagrams, and practical examples. Encouraging students to ask questions and participate in discussions during the lecture to enhance understanding.. 2- practical laboratory experiments Conducting laboratory experiments designed to apply theoretical concepts practically. Training students in the use of electrical devices and measuring instruments. 3- Using simulation and software Employing programs such asMATLAB/Simulink for simulating the performance of motors and transformers. Enabling students to safely test multiple scenarios without the cost of actual equipment.. 4- Group learning and collaborative work Dividing students into groups to work on applied projects or solve complex problems. Enhancing communication and teamwork skills

Student Workload (SWL) Student's academic workload			
Structured SWL (h/sem) Regular academic workload for the student during the semester	63	Structured SWL (h/w) Student's regular weekly study load	4.2
Unstructured SWL (h/sem) Irregular student workload during the semester	37	Unstructured SWL (h/w) Irregular weekly study load for the student	2.4
Total SWL (h/sem) The student's total academic workload during the semester	100		

Module Evaluation Course Material Assessment					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	4	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3-12
	Projects / Lab.				
	Report				
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-8
	Final Exam	3 hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) Weekly theoretical curriculum	
	Material Covered
1	Explanation of curriculum vocabulary for the student 2- Identifying the classification of materials (conductors, semiconductors, and insulators) and the properties of each type
2	The student's understanding of the fundamentals of electricity, including potential difference, current intensity, resistance, and influencing factors. Identifying the components of electrical circuits 3- Knowledge of electrical switches, lamps, their types and uses
3	Introducing the student to electrically conductive materials Understanding the properties and uses of materials in the field of electricity 3- Understanding the properties that make conductive materials a good element in the electrical field
4	Introducing the student to insulating materials Understanding and studying the properties of insulating materials and their temperature resistance 3- Introducing the student to solid insulating materials
5	Studying the properties of magnetic materials Understanding the types of magnetic materials and their associated terminology 3- Studying the laws related to magnetism
6	Introducing the student to the protection devices used in industrial and electrical installations Understanding fuses, their types, advantages, and disadvantages 3- Teaching the student how to choose a fuse and coordinate the fuses in the same electrical circuit
7	Solving questions to strengthen the student
8	Study of electrical wiring systems 2- Knowing how to number wires and cables in the work and taking into account the wire colors during installation.
9	Teaching the student about the types of home electrical installations 2- Understanding the advantages and disadvantages of each type, safety requirements, general layout, and tools used in its construction.
10	Studying grounding, understanding its components, and connection and linking equipment. Understanding the different methods for reducing grounding resistance and the devices and equipment that need to be grounded. 3- Teaching the student the importance of good grounding, the difference between a grounded and ungrounded system, and methods of measurement
11	1- To introduce the student to the protection devices used in industrial and electrical installations 2- Identifying fuses, their types, advantages, and disadvantages

	3- Teaching the student how to choose a fuse and coordinate the fuses in the same electrical circuit
12	Solving questions to strengthen the student
13	1- Study of electrical wiring systems 2- Knowing how to number wires and cables in the work and taking into account the wire colors during installation.
14	1-Teaching the student about the types of home electrical installations 2- Understanding the advantages and disadvantages of each type, safety requirements, general layout, and tools used in its construction.
15	1- Studying grounding, understanding its components, and connection and linking equipment 2- Knowledge of the different methods for reducing grounding resistance and the devices and equipment that must be grounded 3- Teaching the student the importance of good grounding, the difference between a grounded and ungrounded system, and methods of measurement

Delivery Plan (Weekly Syllabus) Curriculum Weekly practical	
	Material Covered
1	1-Implementing safety procedures in workshops and factories. 2-First aid for electric shock. 3- Taking fire prevention measures.
2	Identifying symbols for electrical tools and components.
3	to implementTwist connector and T connector for VIR cable
4	Implementing a linkMarried Joint and T-joint with its welding.
5	Implementing a linkStraight and T-connector for CTS wire with solder.
6	The key to a switch and how to use it to control an electrical circuit – and how to protect the user from the dangers of sparks
7	Multiple keys – using their different types – using specific keys to end the movement
8	Measuring the resistance of the ground pole using a grounding device – Measuring the grounding network for the laboratory, grounding circuit breakers for ground leakage, and selecting the tripping current.
9	1- Use voltage regulators for leakage current. 2- Create an automatic tank filling circuit using a float switch.
10	Use the specified keys 1- In elevators, a circuit is created to demonstrate and implement the theory of elevator operation. 2- Using the specified switches on the crane, create a circuit illustrating the crane's operation in both lifting and hoisting states, and implement the circuit.
11	Stopping the engines (braking) by way of 1- Direct currentDC Brake 2- Reverse currentCounter current braking
12	3D electrical energy meters – disassembly and assembly

	Connection and operation – How to adjust the meter to measure the power factor using an ammeter and using the magnetic loop to measure current and voltage
13	How to create a control circuit to operate a three-phase induction motor using pickups?
14	Three-phase induction motor start switch (/)Y) Mapping (connection and disconnection diagram for different switch states) Study of possible faults. Rotary switches and their use in operating a three-phase induction motor – for reversing direction – for operating a motor from two sources – for operating two motors alternately
15	Installation of metal pipes (cutting pipes - threading them - connecting them using connection bushings - bending the pipe using a bending machine)

Learning and Teaching Resources sources Learning and teaching		
	Text	**Available in the Library?**
Required Texts	**Home and industrial electrical installations** **•Fundamentals of electricity and electrical circuits** **•International Electrical Code (IEC) – Latest Version**	**no**
Recommended Texts	**"Electrical Engineering: Principles and Applications"** **"Electrical Engineering: An Introduction"** **"Fundamentals of Electrical Engineering"** **"Electricity and Electronics for HVAC"**	**Online**

Websites	https://elt.oup.com/student/headway/beg/?cc=global&selLanguage=en

GRADING SCHEME Grade chart				
Group	**Grade**	Appreciation	**Marks (%)**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	very good	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D –Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	Accepted by decision	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(0-44)	Considerable amount of work required
Note:				

NB 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 Information Course Information					
Module Title	**Engineering Mechanics**			**Module Delivery**	
Module Type	**Core**			☒Theory ☒Lecture ☒Lab Tutorial Practical☐ ☒Seminar	
Module Code	**ELTP112**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		**First**	**Semester of Delivery**		**second**
Administering Department		**Elec. Eng. Tech.**	**College**	**Al-Hawija Polytechnic College**	
Module Leader	**Wisam Sattam**		**e-mail**	**wisamsattam_hwj@ntu.edu.iq**	
Module Leader's Acad. Title		**Assistant lecturer**	**Module Leader's Qualification**		**MASTER**
Module Tutor	**Name (if available)**		**e-mail**	**Email**	
Peer Reviewer Name		**Parween R. Kareem**	**e-mail**	preween_hwj@ntu.edu.iq	
Scientific Committee Approval Date		**12/1/2025**	**Version Number**	**1.0**	

Relation with other Modules Relationship with other study subjects			
Prerequisite module	**None**	**Semester**	
Co-requisites module	**None**	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents **Course objectives, learning outcomes, and guidance content**	
Module Objectives **Course Objectives**	Module Objectives for Engineering Mechanics/Statics: Introduce students to the essential principles of engineering mechanics with emphasis on static equilibrium and force systems. Develop the ability to represent and manipulate vectors for solving engineering problems involving forces and moments. Enable students to analyze rigid bodies subjected to external loads using equilibrium equations in two- and three-dimensional applications. Strengthen students' skills in constructing free-body diagrams and identifying reaction forces in engineering structures. Provide knowledge of frictional behavior and its influence on mechanical and structural systems. Familiarize students with the concepts of centroids, centers of gravity, and moments of inertia and their engineering applications. Develop analytical skills for evaluating trusses, frames, and other statically determined structures. Enhance problem-solving abilities through practical engineering examples and quantitative analysis. Encourage logical reasoning and critical thinking in evaluating structural stability and load distribution. Prepare students for advanced engineering courses by establishing a solid foundation in statics and engineering analysis.motion.
Module Learning Outcomes **Learning outcomes for the subject**	Explain the fundamental principles governing engineering mechanics and static equilibrium. Perform vector operations and apply coordinate systems to engineering calculations. Analyze force systems and determine resultant forces and moments acting on rigid bodies. Apply equilibrium conditions to solve engineering problems involving particles and rigid bodies. Construct accurate free-body diagrams for various mechanical and structural configurations. Evaluate internal forces in simple structures using recognized analytical techniques. Calculate centroids, centers of gravity, and second moments of area for common geometric sections. Assess the effects of friction in engineering systems and determine limiting equilibrium conditions. Analyze trusses and structural members using methods such as joints and sections. Present engineering solutions and technical analyzes clearly using appropriate mathematical and professional communication skills.

Indicative Contents **Guideline Contents**	Indicative content includes the following. 1- Fundamentals of Engineering Statics • Scope and applications of statics • Basic concepts of force systems • Engineering relevance and practical examples 2- Vector Mechanics • Vector notation and graphical representation • Cartesian coordinate systems • Vector algebra and resolution of forces 3- Force Systems and Moments • Characteristics and classification of forces • Resultant forces and equivalent systems • Moments, couples, and torque calculations 4- Static Equilibrium • Development of free-body diagrams • Equilibrium equations in planar and spatial systems • Applications to engineering components 5- Analysis of Trusses • Structural idealization • Joint method for member-force evaluation • Section method for efficient analysis 6- Frictional Effects • Static and kinetic friction principles • Equilibrium engaging friction • Applications in wedges, inclined planes, and mechanical devices 7- Centroids and Centers of Gravity • Determination of geometric centers • Composite areas and distributed loading • Engineering applications 8- Area Moments of Inertia • Concept and engineering significance • Computation for standard cross-sections • Parallel-axis and perpendicular-axis relationships • Applications in structural analysis and design

Learning and Teaching Strategies SstrategiesLearning and teaching	
Strategies	The delivery of this module will combine theoretical instruction with active learning approaches to strengthen students' understanding and analytical capabilities. Teaching strategies include: Interactive lectures supported by engineering illustrations and multimedia presentations. Guided problem-solving sessions that emphasize analytical reasoning and numerical techniques. Classroom discussions encouraging student participation and collaborative learning. Tutorial exercises focusing on real engineering applications of statics concepts. Practical demonstrations and case studies to relate theoretical knowledge to engineering practice. Individual and group assignments designed to reinforce independent learning and teamwork. Continuous formative assessment through quizzes, homework, and in-class activities. Use of engineering software or graphical methods where appropriate to support visualization and analysis.

Student Workload (SWL) **pregnancybadFor the student, calculated for15 weeks**			
Structured SWL (h/sem) **pregnancybadRegular student during the semester**	**63**	**Structured SWL (h/w)** **pregnancybadRegular weekly attendance for the student**	**4.2**
Unstructured SWL (h/sem) **pregnancybadgyerRegular student during the semester**	**37**	**Unstructured SWL (h/w)** **pregnancyC gyrRegular weekly attendance for the student**	**2.46**
Total SWL (h/sem) **pregnancybadThefor meFor the student during the semester**	**100**		

Module Evaluation: Course Material Assessment					
		Time/Number ber	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	6	15% (15)	5, 7, 9 and 13	LO #2, #3, #5 and #8
	Assignments	12	15% (15)	2,6,8,10 and 14	LO #1, #4, #6, #7 and #9
	Projects / Lab.				
	Report	8	10% (10)	5, 7, 9 and 13	LO #2, #3, #5 and #8
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 Syllabus) Weekly theoretical curriculum	
	Material Covered
1	Static science – Definitions •
2	Forces, Curers (bi–axis) •
3	Force components •
4.5	Composition • Resolution of forces •
6.7	Moment of a force •
8	Coupling •
9	Equilibrium of planar forces
10	Free–body diagram •
11,12	Centroid & center of gravity (for area & bodies) •
13	Moment of inertia •
14	Direct stress & direct strain and their relationship • Shearing forces and bending moment s diagrams. •
15	Final Examination •

Learning and Teaching ResourcesLearning and teaching resources		
	Text	**Available in the Library?**
Required Texts	Engineering Mechanics/ Statics, Fourteen Edition, RC Hibbeler	Yes
Recommended Texts	Engineering Mechanics Volume 1 Statics Seventh Edition JL Meriam LG Kraige Virginia Polytechnic Institute and State University Engineering Mechanics, Lectures, Notes and Solutions, University of AL Qadisiyah Roads & Transport Department by Alaa J. Alnsrawy Engineering Mechanics, Ferdinand L. Singer -1 Engineering Mechanics, Meriam -2 3- Engineering Mechanics/ Statics, Arthur P. Boresi & Richard J. Schmidt	No
Websites		

Grading Scheme Grade chart				
Group	**Grade**	Appreciation	**Marks %**	**Definition**
Success Group (50 – 100)	**A –**Excellent	privilege	90 - 100	Outstanding Performance
	B –Very Good	good very	80 - 89	Above average with some errors
	C –Good	good	70 - 79	Sound works with notable errors
	D – Satisfactory	middle	60-69	Fair but with major shortcomings
	E –Sufficient	acceptable	50-59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –**Fail	Precipitate(Under processing)	(45-49)	More work required but credit awarded
	F –Fail	Precipitate	(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.

Description of Level Two Courses (Course System)

1- Course Name
DC machines
2- Course code
ELTP204
3- Available forms of attendance
My presence
4- Semester/Year
Decisions
5- Total study hours / Number of units
5*15=75 / 5 units
6- Date this description was prepared
19-6-2025
7- Name of course coordinator
the name:Parveen Rahim Karim e-mail: preween_hwj@ntu.edu.iq
8- Course objectives (general course objectives)
1. Understanding the basic theoretical principles of DC motor operation, including the similarity betwee magnetic and electrical circuits, and the concepts of electromotive force and magnetomotive force. **2**. Distinguishing between the different types of DC machines in terms of their power supply method (parallel, series, compound, self-contained, separate), and understanding their main components and th functions of each. **3**. Analysis of the electrical and mechanical performance of DC generators and motors through the study efficiency and losses, and knowledge of how to calculate power, torque and voltage equations. **4**. Understanding the various operating effects such as product reaction, voltage and speed regulation, operating conditions of generators in parallel, as well as start, stop and reverse applications in motors. **5**. Mastering performance-related calculations such as efficiency calculation, electromotive force, resistanc and critical speed, and regulating speed and torque under different load conditions. **6**. To learn about solar-powered pumping systems associated with DC motors, and to understand their configuration, advantages, and applications in industrial and agricultural fields..
9- Course outcomes, teaching and learning methods, and assessment **Course Outcomes**

- Acquiring basic theoretical knowledge related to DC machines, their components and methods of operation.
- Developing the mathematical and technical skills necessary to analyze the performance of generators and motors.
- Developing the ability to apply concepts in practical fields, especially solar-powered pumping systems.
- Promoting professional values and awareness of the importance of electrical energy and its sustainable uses.

identificationThis is a theoretical course that examines DC machines, including their construction, internal structure, and fundamental operating principles. It focuses on generator and motor types, their operational characteristics, and performance analysis under various operating conditions. The course also covers calculations of electromotive force (EMF), efficiency, torque, and speed regulation, as well as applications of these machines in solar-powered pumping systems. The course aims to equip students with a comprehensive understanding of the theoretical and practical aspects of these machines and their applications in various energy sectors.

Its importance:

1- Understanding the basics of operating electrical machinery, especially DC generators and motors, promotes a deep understanding of the structure of electrical power systems.
2- Enhancing the ability to analyze and design control and simulation systems for DC motors in industrial applications.
3- Enabling students to conduct practical experiments related to electrical and mechanical properties, thus linking the theoretical and applied aspects.
4- Preparing students for renewable energy applications, especially in systems such as solar pumping, which rely primarily on DC motors.
5- Qualifying students to work in the maintenance and operation of machinery within industrial facilities, power plants, and the field of solar energy.
6- Enhancing understanding of the concepts of losses, efficiency, and speed regulation, which are essential concepts in any efficient power system.

How is it determined?:

1. Studying labor market needs
2. Review of professional standards

3. Assessing the capabilities of students and the workshop
4. Formulating clear and measurable goals
5. Linking with other courses
6. Regular updates based on developments

Outputs	Teaching and learning methods	Evaluation methods
أ- Knowledge **A1- Knowledge of the structure and parts of DC machines such as generators, motors and their basic components.** **A2- Understanding the operating principle of a DC generator and motor and the types of power supply (separate, parallel, series, combined).** **A3- Distinguishing between types of losses and efficiency and how to calculate them theoretically.** **A4- Analysis of load characteristics and regulation of voltage and speed for types of DC machines.** **A5- Identifying methods of starting engines and methods of controlling speed and braking (stopping).** **A6- Understanding the relationship between voltage, current and torque in different operating conditions.** **A7- Knowledge of DC motor applications in industrial fields, and renewable energy systems such as solar pumping systems.**	**1-** **Theoretical lectures: to present the basic concepts and provide a detailed explanation.** **2- Presentations and visual media: to illustrate the installation of machines and the stages of operation.** **3- Classroom discussions: to promote critical and analytical understanding.** **4- Solving classroom problems and exercises: to apply mathematical and technical concepts.** **5- Field visits or virtual laboratories: to enhance understanding by linking it to real-world application.** **6- Homework and short research papers: to expand self-knowledge and develop analytical skills.**	**1- Written tests (essay and objective questions).** **2- Analytical reports on security systems.** **1- Theoretical tests** **2- Practical tests** **3 - Reports**
B - Skills **B1 -Operation and testing of DC machines in a laboratory environment.** **B2- Measuring the electrical characteristics of generators and motors (such as voltage, current, efficiency).**	**1- For direct laboratory experiments.** **2- Practical training guided by the instructor.** **3- Cooperative learning (working within small teams).** **Small-scale projects to solve practical problems.**	**1- Detailed laboratory reports for each experiment.** **2- Practical tests inside the laboratory.** **3- Direct observation by the professor during the implementation of the experiment.** **4- Evaluating students' performance in problem-solving and circuit-connection.**

B3– Drawing and analyzing experimental curves such as magnetization curves and load curves. **B4– Diagnosing minor faults and identifying the causes of abnormal performance.** **B4– Implementing and connecting the operational circuits for startup and speed control systems.** **B5– Preparing technical reports based on practical experiences and measured data.**		**5– An oral or written presentation of a simple practical project.**
C– Values **A1–Adherence to occupational safety rules within the laboratory while handling machinery.** **Q2– Teamwork and cooperation with colleagues in carrying out experiments and solving problems.** **A3– Taking responsibility and maintaining discipline in performing duties and practical activities.** **C4– Developing a spirit of initiative and innovation in finding practical solutions to technical problems.** **Q5– Respecting and maintaining laboratory tools and equipment.** **C6– Enhancing self–confidence when conducting experiments and submitting reports.** **Q7– Adherence to scientific ethics in preparing reports and documenting results.**	**1. Group discussions and classroom activities: to encourage cooperation and respect for opinions.** **2– Participating in group laboratory work: to develop team spirit and responsibility.** **3– Direct observation inside the laboratory: to instill commitment and discipline.** **4– Continuous guidance from the teacher: to instill values such as scientific integrity and respect for the laws.** **5– Brainstorming and dramatic situations or real simulations: to instill moral values and professional respect.**	**1–**Direct classroom and laboratory observation: to assess behavior and discipline within the classroom and laboratory. **2– Evaluating teamwork: through the quality of cooperation within the group.** **3– Self–assessment or peer assessment (peer evaluation): to measure interaction, trust, and accountability.** **4– Adherence to deadlines and submission of reports on time.** **5– The student's participation in classroom discussions and positive interaction.**

10- Course structureA- (Theoretical vocabulary)					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	**2**	**1–Explanation of curriculum vocabulary for the student** **2– Identifying magnetic circuits and the**	**Magnetic circuits – Calculating the magnetic motive force – Similarities between magnetic**	**An introductory lecture on the curriculum + definitions of terms in magnetic**	**Short test (theory)**

		similarities between them and electrical circuits.	circuits and electrical circuits.	circuits + mathematical examples	
the second	2	1-The student understands the operating principle of a DC machine. 2-The student's mouth for the parts of a DC machine.	Basic principles of DC machines – Main parts of machines – (Magnetic poles – Product) – The external structure.	A theoretical explanation of the basic principles of DC machines + a presentation of the parts of a DC machine	Theory test
the third	2	1–Introducing the student to the types of DC machines and their classification according to the type of power supply and the method of connecting the field windings. 2–The student learned how to calculate machine efficiency. 3–The student learned how to measure various losses in the machine. 4–The student learned the stages of power distribution in DC machines.	Types of DC machines: Separate power supply – Self–powered (parallel – series – combined) DC machine efficiency – losses – (types of losses – fixed losses and variable losses) Power distribution stages in DC machines – providing mathematical examples of how to calculate efficiency and losses	A presentation on DC machine types + calculation examples for calculating the induced electromotive force (EMF) generated in each machine type, and calculating losses and machine efficiency.	Theory test
Fourth	2	1– The student should define the concept of electromotive force and	Electromotive forc –	Presentation + Calculation Examples	Theory test

		distinguish it from electric potential. 2- The student should explain the factors that affect the magnitude of the electromotive force. 3- The student should apply the appropriate physical laws to calculate the electromotive force. 4- The student should solve numerical problems related to calculating the electromotive force for different types of generators. 5- The student should be able to distinguish between the types of generators (direct current, alternating current) in terms of the method of generating the driving force. 6- The student should use the technical data of the generators to calculateThe resulting EMF. 7- The student should be able to relate physical variables such as the number of turns, magnetic flux, and speed with the magnitudeThe resulting EMF.	Factors affecting strength Electromotive For – Giving mathematical examples of how t calculate force Electric drive for a types Generators.		
Fifth	2	1-The student explains the magnetization curve behavior of a DC machine under no-load conditions and deduces the relationship between	Study of the magnetization curve (magnetic curve) Non-pregnancy (and how to find resistance Critical and critical sp on	1- A theoretical presentation supported by illustrations of the magnetization curve throughdata	1- Practical test inside the laboratory: To assess the student's ability to draw and analyze the magnetization curve and determine the

		voltage and magnetic field.. 2– The student calculates the critical resistance and critical speed theoretically and practically using equations and experimental diagrams, and deduces their effect on the self–excitation process in the generator. 3–The student applies the steps of analyzing and calculating electromotive force in different operating conditions, with a practical explanation of the two inhibitions of magnetization.	Magnetization curves provide examples of h Calculating the drivin force Electrical and critical resistance The critical speed of D machines.	projector and discussion of the curve's behavior when the field and current change. 2– A direct laboratory experiment using a DC machine to measure no–load voltage at different speeds, and to draw the magnetization curve. 3– Analytical activities and group discussions to solve real–world numerical examples involving calculationEMF , critical resistance, and critical velocity.	resistance and critical velocity from the data. 2– Analytical laboratory reports: In which the student is required to document the readings, analyze the results, calculate the critical values, and provide a physical interpretation. 3– Short written test (Quiz)
Sixth	2	1– The student explains the behavior of DC machines under the influence of loads of all types (motors and generators: chain, series, combined), and analyzes their operational characteristics based on performance curves. 2– The student accurately calculates the voltage regulation for different	Studying the load characteristics of all types of DC machines, drawing their corresponding curves, and studying voltage regulation for different types of generators.	Theoretical explanation supported by interactive graphic presentations: Presenting performance curves for each type of DC machine with practical examples from	1– Detailed analytical laboratory report 2– Short written test (Quiz): Theoretical and numerical questions that measure the student's understanding of the concepts of voltage regulation and load characteristics.

		types of DC generators, compares their performance under different load conditions, and is able to deduce the physical effects behind each behavior. 3– The student applies the steps of recording and analyzing experimental data to draw voltage–current, speed–torque, efficiency–load curves, and uses these curves to evaluate the practical performance of the machines.		industrial reality, illustrating how voltage or torque changes with load. A fully integrated practical laboratory: Conducting experiments on machinesDC (mounted, series, compound) to record values of voltage, current, speed and torque. Voltage regulation analysis is conducted practically by comparing the voltage under no load and with full load.	3– Practical assessment within the laboratory
Seventh	2	1– The student explains the operating characteristics of DC machine types under load, with the ability to analyze the change in performance through voltage–current, speed–torque, efficiency–load curves. 2– The student explains the phenomenon of	Product reactions and their effects on pregnancy, and an explanation of ways to minimize product reactions – mathemati examples	1– In–depth theoretical explanation supported by graphs and diagrams: Clarifying the load characteristics and the effect of the load on voltage and	1– Laboratory report 2– Drawing performance curves 3– Calculating voltage regulation and the effect of product reaction 4–Analyzing the method of reducing the effect using an alternating electrode or brush distribution.

		product reaction and its effect on the magnetic field and voltage regulation, and compares methods of reducing it such as winding distribution, use of alternating pole or opposite pole, and brush inclination. 3– The student applies analytical steps to calculate the regulation of effort and the effect of the product's reaction through real numerical examples.		torque, with comparative curves between types of generators. 2– Show a video or simulation of the product's reaction using an explanatory video, then discuss ways to reduce it in detail.	5– Short written test (Quiz) 6– Calculations for voltage regulation and voltage calculation under load
Eighth	2	1– The student defines the rectification process in DC machines, explains its steps and mechanism of operation inside the commutator (megatimeter), and differentiates between ideal and non–ideal rectification. 2– The student analyzes the effect of various factors such as load, product reaction and rotation speed on uniformity quality, and suggests practical means to improve it such as alternating electrodes, brush inclination and winding distribution.	Monotheism (communication) in DC machines	1– A detailed theoretical presentation supported by illustrations and timelines of the currents during rectification, with a focus on the change in current within the coils as they pass under the brushes. 2– A visual simulation or virtual/realistic laboratory experiment demonstrating the spark resulting from poor uniformity, and comparing performance	1– A written test that includes explanatory questions and drawing diagrams illustrating the unification process, in addition to case analysis questions (Case Study) on the effects of poor monotheism. 2– Laboratory report or analytical simulation: In which the student is required to analyze machine performance dataDC when there are unification problems and submit a technical report that includes realistic solutions. 3– Oral presentation or small project

				when using alternating electrodes or without them. **3– Analytical discussions and classroom activities**	
Ninth	**2**	**1– The student explains the need to operate DC generators in parallel in industrial electrical systems and power plants, and clarifies the operational and technical advantages of this (reserve, maintenance, voltage stability).** **2– The student identifies the conditions necessary for connecting two or more generators in parallel, such as voltage matching, polarity, and compatibility of voltage regulation curves, and understands the consequences of violating these conditions.** **3– The student solves numerical problems for load distribution between generators connected in parallel, and calculates the current drawn by each generator based on its internal resistance and voltage regulation curve.**	**Operating DC generators in parallel** **Reasons for operating DC generators in parallel** **• Conditions for operating DC generators in parallel** **• Load distribution across generators connected in parallel, with examples of calculations**	**1– A detailed theoretical explanation supported by diagrams to illustrate the steps of parallel connection, and the effect of internal resistance and voltage curve on the distribution of current between generators.** **2– Practical or virtual activity within the laboratory** **3– Solving applied numerical problems**	**1– Written test (short or monthly):** **2– Questions about the basic requirements for parallel connection** **3– Numerical problems to calculate load distribution and currents using the internal resistance of each generator** **4– Laboratory report or practical activity sheet:** **5– The student connects two generators in parallel** **6– Oral discussion/presentation**
tenth	**2**	**1– The student explains the theory of operation of a DC motor, and analyzes how torque is generated**	**DC motors** **Theory of Motor Operation – Reverse Electromotive Force**	**1– A detailed theoretical explanation supported by**	1-A written test including interpretive questions and numerical examples:

		as a result of the effect of the magnetic field on the current conductors. **2– The student explains the concept of back electromotive force (EMF)Back EMF), and its equation is derived and its role in regulating the motor speed and protecting it from high current at startup is explained**. **3– The student compares generators and motorsDC in terms of function, direction of power flow, operating characteristics, and internal component composition, and concludes the similarities and differences practically and theoretically**.	**Equation of reverse electromotive force – Comparison between DC motors and generators**	**animations and videos illustrating the principle of torque generation, how the opposing force is generated during rotation, and its effect on current and speed**. **2– Classroom discussions and comparative analysis are required**.	2-Laboratory practical report 3-Classroom analytical activity or oral discussion:
eleventh	**2**	**1– The student explains the difference between electromagnetic torque($T_e$and the net mechanical torque on the drive shaft (T_s), with the ability to calculate each of them, and analyze the losses resulting from friction and mechanical losses**.	**Determination – Determination on the product – Determination on the management column (Shaft) Power distribution in DC motors – Maximum electromagnetic power state in DC motors**	**1**-A theoretical explanation supported by diagrams and illustrative curves showing the relationship between torque, current, and speed, while clarifying the concepts of torque produced within the product and torque delivered to the drive shaft. **2– A simulation or practical**	**1–**Written test. **2– Practical/Laboratory Report** **3**-Classroom discussion or individual/group presentation:

		2–The student analyzes the power distribution in a DC motor, starting with the input electrical power, then the internally generated power.(Electromagnetic Power), up to the output mechanical power. 3–The student will deduce the maximum electromagnetic power condition in motors, understand its operational risks, and apply the equations associated with it.		**laboratory activity to record operating data (voltage, current, speed) and use it to calculate torque and power in different cases, including the dangerous case (maximum power).** **3– Analytical activities and numerical problems**	
twelfth	**2**	**1– The student explains the relationship between speed and torque(Speed–Torque Characteristics) for each type of DC motor** **2–The student applies mathematical and analytical concepts to calculate the effect of a change in current or load on speed and torque, and deduces typical operating characteristics and problems associated with each type.**	**General characteristics of speed and torque f motors (parallel) compound sequen** (	**1– A theoretical explanation with drawings of speed and torque curves for each type of motor, showing how these values change with changes in load and current, supported by real–world examples of applications for each type.** **2– A comparative and analytical**	**1– Written test (Quiz/Short Exam):** **2– Calculation problems that illustrate how torque and speed change with load** **3– Analyzing the relationship between current, load, speed, and torque** **4– Presentation or oral discussion:** **The student is tasked with providing a comparison between the three types.**

				group classroom discussion, in which students are asked to compare the different types, and to provide examples from industrial life of each type and why it is used in that application.	
thirteenth	2	1– The student calculates the speed regulation rate for DC motors and explains its significance in evaluating motor performance. 2– The student compares the different types of DC motors in terms of speed regulation, torque behavior, and response under different loads, and relates this to the optimal industrial use of each type.	Speed regulation rate – calculation examples Comparison of DC motors in various industrial applications	1– A theoretical presentation supported by real numerical examples for calculating speed regulation in each type of DC motor, with a technical explanation of the results. 2– A comparative analytical activity within the classroom or using simulation, including tables illustrating the difference in industrial performance between chain, series, and compound motors	1– A written test that includes direct calculation problems to calculate speed regulation, and analysis of the effect of the load on performance. 2– Oral discussion or practical demonstration: In which the student is asked to explain what type of enginesDC is suitable for a particular industrial application and why, with support from calculations.
fourteenth	2	1– The student explains methods of controlling	DC motor speed control – Speed	A theoretical explanation	A written test containing applied

		the speed of DC motors using voltage regulation.Armature Voltage Control) and Magnetic Field Control, and solves mathematical problems that illustrate the effect of each method on speed. 2– The student analyzes the mechanism for reversing the direction of rotation of a motor.DC, and explains the different ways to stop it (natural, dynamic, reversible), with the application of mathematical examples that illustrate the behavior of torque and current during these processes.	regulation by voltage – Speed regulation by field numerical examples Reversing the direction of machine rotation – Methods of stopping engines – Dynamic stopping – Calculation examples	supported by drawings of control circuits and presenting numerical examples to calculate the speed when changing voltage or current in field coils, with a comparison of the results practically.	numerical problems: such as calculating the speed resulting when the voltage is reduced, or determining the braking resistance required to dynamically stop the motor within a certain time.
fifteenth	2	1– The student explains the operating principle of solar–powered pumping systems and distinguishes between their basic components such as: solar cells, control unit, pump, water tank, mounting structure, etc.. 2– The student classifies solar pumping systems according to the type of current.(DC/AC), and compares them in terms of efficiency, system cost, complexity, and suitability for rural applications, and analyzes the advantages and	**Solar–powered water pumping systems** 1–«Solar Pumping Systems 2. Basic components o solar–powered pumpi systems 3. Types of solar pumping systems 1. Classification of wa pumping systems according to operatin current type 1. DC pumpsDC) 2. Alternating current pumps (AC)	A theoretical explanation supported by system installation diagrams and real–life images of solar water pumping projects, with a functional analysis of each system component. ◆A classroom application exercise or a small project (In the Mini	1– Written test or short questions (The quiz includes: –Choosing the appropriate type of system (AC or DC) for a specific application –Analysis of a real–world situation requiring water pumping according to specific solar hours 2– A presentation or application report: In it, the student explains his comparison between the two systems.

		disadvantages of each type.	4. Advantages of solar powered pumping systems 5. Disadvantages of so pumping systems	Project, the student designs a solar pumping system suitable for agricultural or domestic application, selecting appropriate components according to the type of current and consumption.	It presents a preliminary concept for the design of a complete solar pumping system, outlining potential advantages and limitations.

10-Course structureb) Practical vocabulary					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	3	1- The student distinguishes the basic occupational safety procedures in the electrical machinery laboratory and follows them precisely during practical experiments. 2- The student prepares an organized practical report containing the basic elements (introduction, work steps, data, results, discussion, conclusion). 3- The student learns about the components	1- Study of general safety procedures - Report writing method - Introduction to distribution boards for laboratory equipment and a general overview of the different types of DC motors installed by 1-Lamp method	1- Direct instructional explanation at the beginning of the experiment, supported by explanatory panels or an educational video about safety and the method of connection. 2- A practical, applied activity within the laboratory, in which students are divided into	1- On-site assessment during work (Observation Checklist), includes the student's adherence to safety procedures and the accuracy of implementing delivery steps. 2- A practical report that evaluates organization, data comprehensiveness, validity of connections, and analysis of results, with a practical

		of the distribution boards in the laboratory, and the function of each device related to the operation of DC machines. 4– The student identifies the different types of DC machines, and explains the difference between a motor and a generator and the operating principle of each. 5– The student performs the process of assembling a machineDC using the lamp method and resistance measurement, and comparing the two methods in terms of accuracy and safety.	2– Method of measuring resistance	groups to apply the two methods practically and record observations.	comparison between the two methods.
the second	3	1– The student draws the magnetic properties curve (E vs If) for a separate–feed generator at two different speeds, and explains the relationship between excitation and output voltage. 2– The student analyzes the effect of speed on	The magnetic characteristic curve of a separate DC generator is plotted at normal speed and then at half normal speed. The magnetic characteristic	A practical laboratory experiment to record open voltage values versus excitation current, using a separate, self–powered, two–speed generator.	1– Direct practical evaluation of performance within the laboratory, including measurement accuracy, adherence to safety, and accurate curve drawing. 2– A laboratory report that includes a comparison of the curves between the two

		the curveOCC in a self-feeding (parallel) generator, and compares performance at nominal speed and half speed.	**curve of a parallel self-feeding DC generator is plotted at normal speed and then at half normal speed.**	**Representing the results graphically within the classroom and discussing the effect of residual magnetization, and the slope of the curve depending on the type and speed of the generator.**	**cases, and a technical analysis of the effect of speed and type of excitation on the resulting voltage.**
the third	**3**	**1- The student analyzes the relationship between rotational speed and open output voltage**The effect of speed on the magnetic properties curve is deduced.. 2-The student determines the critical resistance of the generator practically, explains its importance in the process of building self-voltage, and draws a straight-line curve of the resistance.	**The relationship between speed and voltage of a separate-current generator and the determination of critical resistance**	**1- A practical laboratory experiment in which voltage is measured at different speeds**With the excitation current constant, then plot the relationship between voltage and speed.. 2-Analytical activity for drawing an OCC curve and intersecting it with lines representing different resistance values**To determine critical resistance.**	**1- Direct practical assessment within the laboratoryAccuracy in taking readings, identifying the point of contact between the OCC curve and the resistance line.** **2-A laboratory report including curve drawing and analysis, with a technical explanation of the nature of the critical resistance and its effect on voltage construction.**

Fourth	3	1– The student determines the critical resistance of a self–powered generator by drawing the magnetic properties curve (OCC) and its intersection with the load lines. 2– The student analyzes the effect of speed on critical resistance, and concludes the difference between its value at normal speed and half speed.	The critical resistance of a self–feeding DC generator is determined in parallel at normal speed and half normal speed.	1– A direct laboratory experiment by measuring the resulting voltage at different excitation currents, and drawing a curveOCC for the generator at both speeds. 2– Interactive classroom discussion to analyze the curve and the slope of the resistance line passing through the origin point, and to determine the critical resistance value graphically.	1– Practical evaluation of students during the experiment in terms of measurement accuracy, speed control, and extraction of correct data for drawing the curve. 2–A laboratory report including drawings and technical analysis to determine critical resistance and commentary on the differences between the two cases.
Fifth	3	1– The student draws the internal properties curve (E vs IL) and external (V vs IL) for two generators: separate and self–feeding, and compare the behavior of each.	A– Load characteristics of a separate DC power generator and determination of the internal and external characteristic curves.	1– Conduct an actual laboratory experiment or simulation to measure the internal and external voltage when the load current changes	1– Direct practical evaluation during the performance of the experiment in terms of the accuracy of measurements, connection of circuits, and extraction of the

		2– The student analyzes the effect of load current on internal and external voltage and explains the role of internal losses (voltage losses within the product).	b) Load characteristics of a self–feeding DC generator and determination of the load curve Internal and external properties.	for each of the two types. 2–An interactive graph within the classroom or in the practical report to represent the characteristics curve and analyze operational differences.	data necessary to draw the curves. 2– A laboratory report containing diagrams and technical explanations of the differences between a separate generator and a self–generating generator, and an explanation of the reasons for the voltage drop.
Sixth	3	1– Distinguishing the load characteristics of the cumulative and differential DC generator in terms of performance and voltage behavior with load changes. 2– Analyzing the curves related to the relationship between voltage and current and interpreting the effect of cumulative or differential conductivity on stability.	Load characteristics of a DC generator (accumulative–differential).	1– A theoretical lecture supported by illustrative diagrams of voltage versus current curves for each type of generator. 2– A practical experiment in the laboratory during which both types (cumulative and differential) are operated and the load properties are measured.	1– A practical test or laboratory report in which the results of the experiment are analyzed and the electrical behavior is compared. 2– Short written or oral questions that measure the student's understanding of the differences between the two genders and the behavior of each under different loads.
Seventh	3	1–Understanding the voltage and	Load characteristics	1– A theoretical explanation	1– A practical laboratory report

		current behavior in a series–powered self–feeding DC generator under the influence of different loads. 2– Drawing and analyzing the internal properties curve (E vs I) and the external (V vs I) of the generator and an explanation of the difference between them.	of a DC generator (self–feeding series) and finding the internal and external characteristics curve.	supported by graphs of the internal and external characteristic curves of the series generator. 2– Practical activity inside the laboratory: *Connecting a series generator circuit. * The generator and its gradual loading. *Measuring the required values (V, I, E). *Drawing curves based on practical values. 3– A group discussion about the generator's behavior, when it is used and why it is not used much in modern applications.	containing the results, tables, graphs, and analysis. 2– An analytical question in the theoretical exam, such as: 3– Observing the student's performance during the experiment (safety of delivery, accuracy of measurement, practical understanding).
Eighth	3	1– The student should be able to identify the conditions that	Parallel operation of a self–powered DC generator.	1– A brief theoretical explanation preceding the	1– Direct observation of the student's performance during

		must be met to operate two self–generating generators in parallel. 2– The student should be able to practically conduct the parallel operation experiment and analyze the behavior of generators during operation.		experiment about the principles and conditions of parallel operation. 2– Practical implementation of the experiment inside the laboratory using two self–generators and current and voltage measuring devices. 3– Group discussion during and after the experiment to interpret the readings and analyze the results.	the experiment (connection, operation, monitoring). 2– Oral or written questions after the experiment to measure understanding of the concepts. 3– A practical report that includes an explanation of the steps of the experiment, the readings, the analysis of the results, and the conclusions.
Ninth	3	1– The student should be able to distinguish between the two main methods of controlling the speed of a parallel DC motor (by field current, and by source voltage). 2– The student should practically	Method of controlling the speed of a parallel DC motor by a–Field current b–Source voltage	1– A short theoretical presentation explaining the principle of each method with speed and torque curves. 2– Practical implementation of a speed control	1–Observing the student's practical performance in implementing the electrical circuit safely and accurately. 2– Ask analytical questions about the effect of changing the field current or

		conduct an experiment to change the motor speed using both methods, and record the relationship between the variables (speed, current, voltage).		experiment inside the laboratory, observing changes in performance. 3– Post–experiment discussion to link theoretical results to the practical process and analyze the differences.	source voltage on speed and torque. 3– A practical report containing a description of the experiment, readings, graphs, observations and conclusions.
tenth	3	1– The student should deduce the relationship between load current, torque, speed and efficiency of a series DC motor during operation under different loads. 2– The student should connect mechanical power (BHP) and the remaining variables to explain the engine's performance in practice.	Load characteristics of a series DC motor and finding the relationship between current, torque, efficiency, and speed.BHP.	1– A brief theoretical explanation that deals with the behavior of a series motor under load, with an explanation of the mathematical relationships and an approximate graph for each relationship. 2– Practical implementation of the motor test with gradual measurements of current,	1– Direct observation of the student's skills in linking, operating, and safe measurement during the experiment. 2– Applied or analytical questions to link theoretical concepts with practical data. 3– A detailed operational report containing: Readings table *Graphs (e.g., current vs. torque, speed vs. current, efficiency vs. load) Analysis of the relationship with

				speed, and torque, along with calculation of efficiency andBHP. 3– Analyzing group data after the end of the experiment to interpret the results and compare them with the theoretical values.	mechanical powerBHP
eleventh	3	1– The student should be able to practically analyze the load characteristics of a series–connected DC motor, and understand the effect of the additional field component on performance.. 2– To deduce the relationship between load current, torque, efficiency, speed, and mechanical power(BHP) through experimental data.	Load characteristics of a series–connected motor and finding the relationship between current, torque, efficiency, and speed.BHP.	1– A brief theoretical introduction explaining the difference between the cumulative compound engine and other engines, and the effect of the series component on performance curves. 2– Practical implementation of the experiment by measuring the load current, motor speed, torque,	1– Direct practical assessment of the student's skill in operating the engine and taking accurate measurements. 2– Analytical or oral questions to test the theoretical understanding of the relationships between variables. 3– A practical report including: *Table of readings for current, speed, torque, power, and efficiency. *Relationship charts: (Current vs. Torque, Speed vs. Current, Efficiency vs.

				mechanical power, and efficiency at different loads. 3– Analyzing and comparing the results with parallel and series motors to understand the behavior of the combined motor.	Load)BHP vs. Current) *Explaining the behavior of the combined engine compared to other types of engines.
twelfth	3	1– The student should explain the principle of operation of the Sollenbohn test and how to use it to estimate the efficiency of the machine without loading it. 2– The student should practically perform the Hopkinson test on two similar machines and accurately calculate the efficiency under operating conditions. 3– The student should compare the two methods in terms of accuracy, load type, and operating requirements.	A– Determine the efficiency of a DC machine without a load and using the Solinbon method. B– Determining the efficiency of a DC machine (motor generator) with parallel feeding using the Hopkins method.	1– A theoretical presentation explaining both the Sollenbonn and Hopkinson tests, along with the basic equations and illustrative diagrams. 2– Practical implementation: *Solenbonn test on a DC motor without load. *Hopkinson test by connecting two machines in parallel while monitoring the input and output power. 3– A group discussion after each experiment to analyze the differences between the two methods.	1– Monitoring the student's practical performance in terms of accuracy in connecting and operating devices and reading values. 2– Written or oral questions to measure theoretical understanding and practical steps to calculate competence. 3– A practical report for each test including: – Experiment Objectives Measurement chart Solution steps and calculations Comparison between the two methods

thirteenth	3	1– The student should be able to distinguish between the types of losses (copper, iron, mechanical) in a DC machine. 2– The student should apply the practical methods for separating and estimating each type of loss in the engine or generator. 3– To deduce the effect of each type of loss on the performance and efficiency of the machine.	Disconnecting the losses from a DC motor.	1– A preliminary theoretical explanation that clarifies the types of losses in a DC machine and the source of each type. 2– A practical experiment to separate losses using techniques such as: *No–load operation (to estimate iron and mechanical losses) *Measuring current, voltage, and resistance to determine copper losses. *An analytical discussion of the results of the experiment to understand how to improve efficiency and reduce losses.	1– Direct observation of the student's performance while carrying out the steps of the experiment and accurately connecting the devices. 2– Short assessment questions to explain the concepts of losses and their calculation equations. 3– A practical report that includes: *A reading table for each part of the experiment. *Casting losses: Copper =I2RI2R Iron and mechanical = operation without load. *A rough graph of the distribution of losses. 4– Conclusions about the losses that most affect efficiency.
fourteenth	3	1– The student should be able to identify the basic components of a solar pumping system: (Solar panels, charge controller, voltage converter, DC motor, water pump, sensors, electrical protection). 2– The student should understand how to practically connect the components and operate the system	Practical study of the components of a solar pumping system	1– A theoretical and practical explanation of the operating principle of the solar pumping system and the use of DC motors in it. 2– A field study inside the laboratory or at an experimental site of the system components and	1– Observing the students' performance during the process of connecting, operating, and dealing with the system components. 2– Oral or written questions about the functions of each component and how it works. 3– A practical report containing: *A diagram of the system.

		effectively and efficiently. 3– To link the characteristics of DC motors with the behavior of the solar system during changes in solar radiation.		their practical connection. 3– A group discussion to clarify the effect of the change in radiation on the electrical and mechanical performance of the system.	* Explanation of the system's components and their functions. *Linking steps. 4–Observations on system performance under different conditions.
fifteenth	3	1– The student should be able to analyze the relationship between solar radiation, output voltage, load current, and motor speed in a solar pumping system. 2– The student should measure the performance of the water pump in terms of flow rate, hydraulic lift, and motor power under different radiation conditions. 3– The student should evaluate the efficiency of the system as a whole (from the board to the pump) and deduce the factors affecting it.	Performance analysis of a DC motor–driven water pump within a solar pumping system	1– A simplified theoretical presentation of the power, lift, and water flow equations in solar pumping systems using motorsDC. 2– Practical implementation of an experiment to operate a water pump connected to a solar panel (or a simulated source) with a change in the radiation level or voltage. 3– Collecting and analyzing data in terms of: * Voltage and current input to the motor Rotation speed Water pumping rate Hydraulic and electrical efficiency	1– Practical assessment of the student's ability to connect the system and measure readings accurately and safely. 2– Analytical questions about the system's performance under different conditions (e.g., changes in radiation or load). 3– A comprehensive operational report including: *Table of measurements (voltage, current, speed, flow, lift). *Graphs (such as the relationship between voltage and flow, or current and efficiency). *Analyzing the results and comparing the theoretical performance with the actual performance. 4– Recommendations for improving system efficiency.

11- Curriculum Development Plan

Continuously developing educational content to keep pace with the demands of the times, such as:

1- Including specialized fields that align with digital transformation

2- Organizing discussion sessions with leaders in the industrial sector

3- Keeping up with global technological developments in the electrical field

4- Holding applied exhibitions to showcase modern innovations

5- Developing field training programs in leading companies

12- Infrastructure

classrooms, laboratories, and workshops	Well-equipped and prepared halls and laboratories are available to provide a suitable environment for teaching and learning.
1- Required textbooks	Electrical Machines (Dr. Muhammad Zaki Muhammad Khader / University of Mosul)
2- Main references (sources)	Text book of electrical technology by BL Theraja
أ) Recommended books and references (scientific journals, reports, etc.)	IEEE Transactions on Industrial Applications International Journal of Electrical Power & Energy Systems
ب) Electronic references, websites,.....	MIT OpenCourseWare – Massachusetts Institute of Technology Electronics Tutorials

1- Course Name
Maintenance Workshop 1
2- Headquarters code
ELTP207
3- Available forms of attendance
My presence
4- Semester/Year
Decisions
5- Total study hours / Number of units
3*15=45/5 units
6- Date this description was prepared
19-6-2025
7- Name of course coordinator
the name:Alaa Ahmed Yass e-mail: alaaalyass85@ntu.edu.iq
8- Course objectives (general course objectives)
The student will also be able to: 1. Uses the various devices, tools, and components used in workshops. 2. Acquires technical skills and experience in various electrical maintenance works. 3. Gains self-confidence to perform electrical technical work, including troubleshooting a repairing faults.
9- Course outcomes, teaching and learning methods, and assessment **Course Outcomes** A-1Introducing the student to equipment maintenance workElectric. A-2Student definitionOn electrical engineering work, in tracing faults in electrical devices and identifying how to repair them.A-3Student definitionOn the various electrical and electronic components and how to use them in building electrical circuits. A-4Introducing the student to how to disassemble and assemble the parts of electrical machines..A-5Introducing the student to how to inspect electrical machines after winding

them.		
Outputs	Teaching and learning methods	Evaluation methods
Knowledge A-1 Introducing the student to the maintenance work of electrical equipment. A-2 Introducing the student to electrical engineering work in troubleshooting electrical devices and learning how to repair them. A-3 Introducing the student to the various electrical and electronic components and how to use them in building electrical circuits. A-4 Introducing the student to how to disassemble and assemble the parts of electrical machines	**1- Theoretical lectures** **2- Group discussions** **3- Case studies**	**1. Theory tests** **2. Performance evaluation** **3. Class participation** **4. Research reports**
b) Skills for1 - Acquiring the skill of installing DC motors, methods of rewinding DC motors. for2 - Acquiring the skill of designing and studying three-phase electrical transformers. for3 - Acquiring the skill of rewinding the stator windings of a three-phase induction motor and squirrel cage. for-4 Acquiring the skill of assembling the motor and testing the motor under its designated load. for-5 Acquiring the skill of performing periodic maintenance on a split-phase motor, conducting the necessary tests on it, identifying faults and methods of treating them.	**1. Interactive lectures** **2. Real-life case studies** **3. Field visits to facilities**	**1. Short and final tests** **2. Performance evaluation during practical training** **3. Applied projects** **4. Field visit reports**
C- Values C-1 Practical skills that enable the student to research, identify, and fix faults in electrical devices. C-2 Practical skills that enable the student to cooperate in work with others. C-3 Maintaining the safety of the equipment and furniture in the workshop, as it is public property. C-4 The student's ability to think systematically and therefore to make decisions	**1. Interaction and application** **2. Modern technologies** **3. collaborative learning**	**1. Continuous assessment** **2. Performance evaluation during practical training** **3. Final assessment** **4. Field visit reports**

Details of the curriculum for Maintenance Workshop 1 (practical curriculum only): three hours per week

10-Course structure					
Week	Hours	**Required learning outcomes**	**name Unity / or the topic**	**Teaching method**	**Evaluation Method**
the first	3	acquisitionTechnical skill and experience inUnit topic	installation machinery Current Continuous – Ways re He wrapped machinery direct current – fee detailed	to implement exercises	evaluation continuous
the second	3	acquisitionskill and experienceThe art inUnit topic	How toCleaning the surface of the units–Installing carbon brushes–The practical application of carbon brushes	to implement exercises	evaluation continuous
the third	3	acquisitionskill and experienceThe art inUnit topic	a testConnection, disconnection, and isolation	to implement exercises	evaluation continuous
thefour	3	Acquiring skills and experience Artistic in topicUnity	FilesDC generator output member-Preparing and compiling information-He wrapped file member Production Installation Files on sewers the heart Iron- Examples Simplified on Wrapping	to implement exercises	evaluation continuous
Fifth	3	Acquiring skills and experience Artistic in topicUnity	IsolationPalo Arneish–drying–Connecting the final edges– Choice Final For a member Production – fee complete For a member Production In fullIts files, connections, and uses	to implement exercises	evaluation continuous
Sixth	3	acquisitionTechnical skill and experience inUnit topic	Files Field – to gather Information For files parallelism And succession– formation connectors The The clip The big one – Properties Domain filesSeries and parallel connections and methods of connecting	to implement exercises	evaluation continuous

			them in a machine.Wrapping on template .		
Seventh + Eighth	3	acquisitionTechnical skill and experience inUnit topic	a job Files Installation Monotheism poles – Test The complete machine – converter electrician – to equip and cut Sheets Iron heartAnd its assembly, file wrapping, varnishing, and training on a job template (Form) simplified before Wrapping	to implement exercises	evaluation continuous
Ninth	3	Acquiring skills and experience Artistic in topicUnity	deliveryA n d t h e l i n k Arf-a testP o l a r i t y –a t e s t Continuity– Contract testing and insulation testing in files. Examples on design and return He wrapped adapter small ability	to implement exercises	evaluation continuous
tenth	3	Acquiring skills and experience Artistic in topicUnity	dThree–phase transformer installation– Simple design and detailed drawing	to implement exercises	evaluation continuous
eleventh	3	Acquiring skills and experience Artistic in topicUnity	to equipCutting and assembling the iron core plates–Wrapping files–Installation and insulation with varnish–drying	to implement exercises	evaluation continuous
twelfth	3	acquisitionTechnical skill and experience inUnit topic	a testPolarity-Continuity test–Leakage test	to implement exercises	evaluation continuous
thirteenth	3	acquisitionTechnical skill and experience inUnit topic	Engines Inference (Induction) re He wrapped Files Fixed memberFor a three–phase induction motor and squirrel cageAccountDrawing the general shape of the files, removing insulation	to implement exercises	evaluation continuous

			materials, and cleaning the drains.– Insulation of the fixed organ's drainage system–He wrapped Files and its formation then Install it on sewers		
thefourteen	3	acquisitionskill and experienceThe art inUnit topic	He wrappedConnecting the file ends and testing the continuity	to implement exercises	evaluation continuous
fifteenth	3	acquisitionskill and experienceThe art inUnit topic	to chooseThe contract is in the files–Selecting and measuring insulation–Engine ground leakage selection	to implement exercises	evaluation continuous

11- Structure Infrastructure:	
The booklet laboratory private In the workshop	**1-Required textbooks**
1- He wrapped electric motors, d. moon 2- Reference in transformers Electric, Franklin Sticant, SA	**2-Main References(Sources)**
1-Identifying faults and maintaining electrical machinery. 2-World Bank preparation of technical illustrations.	**aRecommended books and references(Magazines)ScientificReports**
1-locationTechnical Institute/Al-Rumaytha 2-Global company websites	**for - the reviewer Electronic, Sites The Internet** ....

-12 Curriculum Development Plan:
-1Participating inThe various courses related to the subject matter are designed to provide workshop instructors with greater experience.. -2 View on last what I arrived for him Technology Modern in This is amazing Material.

1- Course Name
Programmable Logic ControllerPLC
2- Course code
Electrical Engineering Department
3- Available forms of attendance
My presence
4- Semester/Year
Decisions
5- Total number of study hours
3*15=45 / 3 units
6- Date this description was prepared
19-6-2025
7-
Name: Alaa Ahmed Yass e-mail:alaaalyass85@ntu.edu.iq
8- Course objectives (general course objectives)
1-Introducing the student to the principles of programmable logic control. -2 Defining for the student how to programmable logic control the operation of equipment and devices for various purposes.
9- Course outcomes, teaching and learning methods, and assessment **Course Outcomes** A-1 identification student principles a job control Logical programmer.A–2. Student definition of the advantages of using a PLC A-3 identification student system store Information in the PLC A-4 Introducing the student to PLC commands. A-5 Introducing the student to PLC programming languages.

Outputs	Teaching and learning methods	Evaluation methods
ب– Knowledge A-1 identification student principles a job control Logical programmer. A–2. Introducing the student to the advantages of using a PLC	**4– Theoretical lectures** **5– Group discussions** **6– Case studies**	**5. Theory tests** **6. Performance evaluation** **7. Class participation** **8. Research reports**
b) Skills for-1The student acquires programming skills PLC for–2 The student acquires the skill of using PLCs for control purposes in factories and workshops for-3The student acquires the skill of maintaining the unitsPLC	**4. Interactive lectures** **5. Real–life case studies** **6. Field visits to facilities**	**5. Short and final tests** **6. Performance evaluation during practical training** **7. Applied projects** **8. Field visit reports**
C– Values C-1 Encouraging the development of students' professional and technical thinking. C-2 Working to develop a distinctive personality for the student by developing cultural and social awareness that qualifies him after graduation to contribute effectively to serving his community. C-3 Expanding the cognitive horizon and using brainstorming to generate ideas. C-4 Practical skills that enable the student to use PLC applications in future life.	**4. Interaction and application** **5. Modern technologies** **6. collaborative learning**	**5. Continuous assessment** **6. Performance evaluation during practical training** **7. Final assessment** **8. Field visit reports**

Details of the curriculum for Electrical Networks 1 (theoretical and practical components): three hours per week

10- structure The course:					
Evaluation Method	roadeducation	name Unity / or the topic	Learning outcomes Required	Hours	Week
evaluationdirect+ Exams	Lectures+ Applicationspractical	Chapter 1 Introduction to Programmable Controllers 1-1 Definition 1-2 A Historical Background 1-3 Principles of Operation 1-4 PLCs Versus Other Types of Controls. 1-5 PLC Product Application Ranges. 1-6 Ladder Diagrams and the PLC 1-7 Advantages of PLCs	Understanding the subject of unity	3	the first
evaluationdirect+ Exams	Lectures+ Applicationspractical	Number Systems and Codes 2-1 Number Systems 2-2 Number Conversions 2-3 One's and Two's Complement 2-4 Binary Codes 2-5 Register Word Formats ..	Understanding the subject of unity	3	the second
evaluationdirect+ Exams	Lectures+ Applicationspractical	Chapter 3 Logic Concepts 3-1 The Binary Concept **3-2** Logic Functions **3-3** Principles of Boolean Algebra and Logic **3-4** PLC Circuits and Logic Contact Symbology	Understanding the subject of unity	3	the third
evaluationdirect+ Exams	Lectures+ Applicationspractical	Processors, the Power Supply, and Programming Dev es **4-1** Introduction **4-2** Processors **4-3** Processor Scan **4-4** Error Checking and Diagnostics 4-5 The System Power Supply 4-6 Programming Devices	Understanding the subject of unity	3	thefour
evaluationdirect+ Exams	Lectures+ Applicationspractical	The Memory System and I/O Interaction 5-1 Memory Overview **5-2** Memory Types **5-3** Memory Structure and Capacity	Understanding the subject of unity	3	Fifth

		5-4 Memory Organization and I/O Interaction			
evaluationdirect+ Exams	Lectures+ Applicationspractical	Configuring the PLC Memory—I/O Addressing 5- 6 Summary of Memory, Scanning, and I/O Interaction 5-7 Memory Considerations.	Understanding the subject of unity	3	Sixth
evaluationdirect+ Exams	Lectures+ Applicationspractical	The Discrete Input/Output System **7-1** Introduction to Discrete I/O Systems **7-2** I/O Rack Enclosures and Table Mapping 7-3 Remote I/O Systems. **7-3** PLC Instructions for Discrete Inputs 7-5 Types of Discrete Inputs.	Understanding the subject of unity	3	Seventh
evaluationdirect+ Exams	Lectures+ Applicationspractical	PLC Instructions for Discrete Outputs 8-1 Discrete Outputs 8-2 Discrete Bypass/Control Stations 8- 3 Interpreting I/O Specifications 8-4 Summary of Discrete I/O	Understanding the subject of unity	3	Eighth
evaluationdirect+ Exams	Lectures+ Applicationspractical	The Analog Input/Output System **9-1** Overview of Analog Input Signals **9-2** Instructions for Analog Input Modules. 9-3 Analog Input Data Representation. **9-3** Analog Input Data Handling 9-5 Analog Input Connections. 9-6 Overview of Analog Output Signals	Understanding the subject of unity	3	Ninth
evaluationdirect+ Exams	Lectures+ Applicationspractical	Instructions for Analog Output Modules 10-8 Analog Output Data Representation 10-9 Analog Output Data Handling 10-10 Analog Output Connections 10-11 Analog Output Bypass/Control Stations	Understanding the subject of unity	3	tenth
evaluationdirect+ Exams	Lectures+ Applicationspractical	**Special Function I/O and Serial Communication Interface 11–1 Introduction to Special I/O Modules 11–2 Special Discrete Interfaces 11–3 Special Analog, Temperature, and PID Interfaces 11–4 Positioning Interfaces. 11–5 ASCII, Computer, and Network Interfaces 11–6 Fuzzy Logic Interfaces.. 8–7 Peripheral Interfacing**	Understanding the subject of unity	3	eleventh

evaluationdirect+ Exams	Lectures+ Applicationspractical	**Programming Languages 12–1 Introduction to Programming Languages 12–2 Types of PLC Languages**. **12–3 Ladder Diagram Format 12–4 Ladder Relay Instructions 12–5 Ladder Relay Programming 12–6 Timers and Counters 12–7 Timer Instructions**	Understanding the subject of unity	3	twelfth
11- Structure Infrastructure:					
the reviewer	LecturesStudy Related to the material and available at the institute's library				
Books	Scientific journals related to the subject ofPLC basics InstructionsApplications.				
location	Institute, sources Internet different Sites companies Global				
evaluationdirect+ Exams	Lectures+ Applicationspractical	**Counter Instructions 13–9 Program/Flow Control Instructions 13–10 Arithmetic Instructions 13–11 Data Manipulation Instructions**. **13–12 Data Transfer Instructions**. **13–13 Special Function Instructions 13–14 Network Communication Instructions 13–15 Boolean Mne**.	Understanding the subject of unity	3	thirteenth
evaluationdirect+ Exams	Lectures+ Applicationspractical	**PLC System Documentation 14–1 Introduction to Documentation 142 Steps for Documentation 14–3 PLC Documentation Systems –4 Conclusion**.	Understanding the subject of unity	3	thefourteen
evaluationdirect+ Exams	Lectures+ Applicationspractical	**PLC Start–Up and Maintenance 15–1 PLC System Layout 15–2 Power Requirements and Safety Circuitry 15–3 Noise, Heat, and Voltage Considerations 15–4 I/O Installation, Wiring, and Precautions**	Understanding the subject of unity	3	fifteenth

1-Required textbooks

2-Main References(Sources)

aRecommended books and references(Magazines)ScientificReports

for – the reviewer Electronic, Sites The Internet ....

12- Curriculum Development Plan:

1.Participating in various courses related to the subject of Programmable Logic Controllers (PLC)

2. examining on last what I arrived for him Technology Modern in Applications the.PLC

3. Holding developmental training courses for laboratory staff that enhance their ability to train students more efficiently.

. 4 to open laboratorySpecialist in the subject ofPLC For Arsa the components, Principles, Applications,Uses

1. Course Name
Electrical Networks 1
2. Course code
ELTP205

3. Available forms of attendance
My presence
4. Semester/Year
Decisions
5. Total study hours / Number of units
4*15=60 / 4 units
6. Date this description was prepared
19-6-2025
7. Name of course coordinator
Name: Alaa Yass Ahmed e-mail: alaaalyass85@ntu.edu.iq
7- Course objectives (general course objectives)
1- Thorough knowledge of hydroelectric, thermal and gas power plants, and an understanding of some other types of power plants such as diesel. A-2 Use of overhead lines - Mechanical calculations, including- Calculate tension and relaxation when the distances from the ground are equal. - Calculate the weight of snow accumulated on the wire. - Calculate the magnitude of the wind pressure force acting on the wire. A-3 Calculations of the basic elements of overhead lines - electrical calculations, including- Calculating resistance - Calculating the internal and external inductance of a single wire - Calculating the inductance of a three-wire system consisting of three wires spaced equally, unequally, or alternately in position A-4 Calculating the capacity of a single-wire, three-wire system consisting of three wires that are either equally spaced or unequally spaced and alternate in location
8- Course outcomes, teaching and learning methods, and assessment **Course Outcomes** A- Cognitive objectives 1. Operation and maintenance of electrical units for power generation plants.

Introducing the student to the types of power stations, explaining the operating mechanism of each type of station, and the efficiency of each type of power station. 2. Operation and maintenance of electrical equipment for the transmission and distribution of electrical power. 3. Maintenance of protection and control devices for the electrical power system. 4. Laying and maintenance of underground and overhead cables. Fundamentals of Engineering Design Knowledge of basic engineering design principles such as the analysis and design of electrical and mechanical systems.		
Outputs	Teaching and learning methods	Evaluation methods
ت– Knowledge 1- The student learns about methods of generating electrical energy 2. Distinguish between each type of energy source 3. Explains the mechanism of electrical energy production.	**9– Theoretical lectures** **10– Group discussions** **11– Case studies**	**9. Theory tests** **10. Performance evaluation** **11. Class participation** **12. Research reports**
b) Skills 1- The student learns about methods of generating electrical energy 2. Distinguish between each type of energy source 3. Explains the mechanism of electrical energy production.	**7. Interactive lectures** **8. Real-life case studies** **9. Field visits to facilities**	**9. Short and final tests** **10. Performance evaluation during practical training** **11. Applied projects** **12. Field visit reports**
C– Values Student participation in classroom activities and submission of assignments on time. Adherence to occupational safety rules while working in laboratories.	**7. Interaction and application** **8. Modern technologies** **9. collaborative learning**	**9. Continuous assessment** **10. Performance evaluation during practical training** **11. Final assessment**

Attention control and attention testing (selective attention)		12. **Field visit reports**

Details of the curriculum for Electrical Networks 1 (Theoretical Curriculum): Two hours per week

12- Course structureA- (Theoretical vocabulary)					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
First and second	**2**	**The student learns about how electrical energy is generated, the evolution of energy uses, the components of an electrical power system from generation to consumption, and the standard voltages used.**	**How electrical energy is generated, the evolution of energy, the electrical power system from generation to consumption, standard voltages**	**Interactive lectures supported by presentationsPowerPoint presentations, documentary videos, and a concept map of the flow of energy in an electrical system.**	**A short quiz + research assignment on the stages of energy systems development**
the third	**2**	**The student understands the operating principles of hydroelectri**	**Hydroelectric and thermal power plants**	**Explanatory video, comparative study, classroom discussion.**	**Analytical report + short descriptive quiz.**

		c and thermal power plants, and compares them in terms of uses, efficiency, and environmen t.			
Fourth	2	It identifies gas and diesel power plants, and distinguishe s between their characteristi cs and applications. .	Gas–fired power plants and an overview of some other plants such as diesel	Real–life case studies + application research	Oral presentati on within a group + individual written assessmen t
Fifth	2	It explains the components of the vertical rail system.(Bus Bars), and analyzes substation layouts inside and outside buildings.	Vertical rail systeml and plans transformer stati inside and outs buildings	Analysis of engineering plans, interactive discussion, practical examples.	Practical test + homework
Sixth	2	It classifies overhead lines and	Overhead lines, tl uses, and the divisior lines into sh	Video lecture + comparison exercises	Essay question + homework exercise

		analyzes their use and types (short – medium – long)	medium, and lo distance.		
Seventh	2	It performs calculations for tension and relaxation, snow weight, and wind pressure on overhead lines..	Overhead lines – mechanical calculations , including: Calculating tension and relaxation when the distances from the ground surface are equal – Calculate the weight of the snow accumulated on the wire. Calculating the amount of wind pressure acting on the wire	Solving applied problems + numerical simulation(via programs such as MATLAB).	Test in class
Eighth	2	It calculates the internal and external resistance and inductance	Calculations for the basic elements of overhead lines – electrical calculations, including:	Practical training + detailed explanations	analytical test

		of single and three–wires.	Resistance calculation Calculating the internal and external inductance of a single wire Calculating the inductance of a three–wire system with three wires spaced apart They are separa from each other equal distances, or different distances they altern locatic		
Ninth	2	It calculates capacity in single and triple systems and analyzes the effect of distance and positional switching.	–Calculating the capacity of a single–phase, three–phase system consisting of three wires spaced apart They are separated from each other by equal or different distances and they alternate locations.	Solving exercises, group discussion	Achievement test
tenth	2	Review and solve problems from previous weeks	Solving various problems from weeks seven and eight	Review session, classroom exercises	Short achievement test
eleventh	2	It analyzes short and medium–	Solving short circuits involves representing them	Drawing electrical circuits + applications	Drawing circles + geometric problems

		length lines and represents them with electrical circuits.(T,π Its efficiency is calculated	as an electrical circuit and calculating their efficiency. Solve the middle lines and divide them into – Representing it as an electrical circuit in the shape of a letterT – Representing it as an electrical circuit in the shape of a letterri		
twelfth	2	It identifies the types of air transport insulators, the phenomenon of vacuuming, its causes and methods of treatment.	Overhead transmission line insulators: types, shapes, installation, vacuum phenomenon, causes, and methods used to eliminate it.	Video presentations + examples of insulation	Practical report + test
thirteenth	2	Understanding the components and types of underground cables	Underground cable their components their classification cable range	Using models or diagrams	Research report
fourteenth	2	Performing capacity and inductance calculations for cables	Calculating the capacitance and inductance of single–pole and three–pole underground cables	Workshop, problem solving	Technical Achievement Test

fifteenth	**2**	**Understanding voltage gradient and insulation loss in cables**	**Voltage gradient in cables, calculation of loss and its angle in insulators, and cable breakdown.**	**Case studies of breakdowns + discussion of causes and prevention.**	**Final comprehensive test**

Details of the curriculum for Electrical Networks 1 (Practical Curriculum): Two hours per week

11-Course structureb) Practical vocabulary					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	**2**	The student learns about the components of the electrical laboratory, the basic equipment, how it works, and the safety procedures within the laboratory.	Identifying laboratory equipment	An introductory session inside the lab + a practical demonstration + a discussion about the use of the tools.	Observing the student's performance inside the lab + direct questions about the components of the equipment + assessing safety behavior.
The second and the third	**2**	The student is able to connect transformers in a Y configuration and load them with balanced and unbalanced loads, and analyze the effect of this on the neutral voltage.	Loading distribution transformers with balanced and unbalanced three-phase resistive and inductive loads in the form ofY,Δ This affected the equalizer effort	Conduct practical experiments to connect transformers to different loads + discuss the results in groups.	A detailed practical report on each experiment + performance evaluation during delivery + analytical questions at the end of the experiment.
Fourth	**2**	The student is able to perform the synchronization process between a three-phase synchronous converter	Synchronization between the three-phase synchronous	Theoretical explanation of synchronization + practical implementation	Evaluate the success of the synchronization process + detailed report

		and the external network and analyze its steps.	transformer and the external network	of the experiment with monitoring of synchronization signals.	+ discussion of potential errors.
Fifth	**2**	The student draws the load curve based on data taken from the experiment and interprets the behavior of the system under different loads.	drawing the pregnancy curve	Compiling data from previous experiments + training on graphing and analysis.	Submit an interpreted graph + analytical questions on pregnancy behavior.
Sixth	**2**	The student explains methods for improving the power factor and practically applies the use of capacitors to improve it.	Improving the power factor of networks	A theoretical explanation of the concept of power factor + conducting an experiment using capacitors.	A report containing the calculations and improvements + a practical test to measure the extent of the improvement.
Seventh	**2**	The student deduces the components of the transmission line (resistance, impedance, inductance) from short-circuit and load tests.	Studying the transmission line model and calculating the basic elements using load and short-circuit testing.	Conduct practical tests using transmission line models + analyze the readings.	A detailed report of the results + oral questions about the accuracy of the measurements and their interpretation.
Eighth and ninth	**2**	The student compares the characteristics of a transmission line when loaded with different types of loads (resistive, inductive, capacitive) in terms of voltage and current.	Studying the characteristics of a transmission line model at the receiving end when loaded with resistive-inductive-capacitive loads	Conduct multiple experiments with each type of load + discuss the differences.	Comparative report + representation of results in tables and graphs + simple practical test.

tenth	**2**	The student calculates the voltage drop in the transmission line model and compares it to the expected results.	Voltage drop on a transmission line model	Voltage measurement on the lines during load + comparison of calculated and measured values.	Analysis of results in writing + a small practical test.
eleventh	**2**	The student applies face compensation techniques to transmission lines and judges their effectiveness in improving performance.	Face compensation for power transmission lines	A detailed explanation of compensation techniques + experiment using simulation or laboratory equipment.	Laboratory report + technical discussion on the impact of compensation.
twelfth	**2**	The student determines the type of fault in the underground cables based on the connection method and readings, whether the phase is connected to the ground or there is a short circuit between the phases.	Identifying faults in underground cables using 1- One phase connected to ground 2- In case of a short circuit between phases	Presenting fault scenarios + conducting practical fault detection experiments.	Analysis of a fault condition in a report + practical questions to identify the fault based on measurements.
Thirteenth and fourteenth	**2**	The student reviews past experiences comprehensively and corrects misconceptions, while enhancing practical skills.	General review of the experiments	Group practical review sessions + re-execution of parts of the experiments as needed.	Active participation + practical or theoretical preparatory test.
fifteenth	**2**	The student applies all the skills acquired in a comprehensive practical exam that covers all the experiments.	Practical exam with experiments	A complete practical test that includes conducting an experiment and analyzing its results under direct supervision.	Immediate correction based on practical performance + verbal feedback + written evaluation.

13- Curriculum Development Plan

Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee) such as 1- Updating the curriculum to keep pace with developments in the field of electrical networks. 2- Holding scientific seminars with specialists in the field. 3- **Monitoring scientific developments in electrical grid systems and power generation**

14- Infrastructure	
classrooms, laboratories, and workshops	Classrooms are available that are equipped to accommodate students and designed to provide a suitable learning environment.
3- Required textbooks	Electrical Networks Lecture Notes 1 Electrical Machines and Power Systems: A Study and Analysis
4- Main references (sources)	"Power System Analysis" – John J. Grainger & William D. Stevenson
ت) Recommended books and references (scientific journals, reports, etc.)	"Electric power transmission and distribution" Author: Dr. Mahmoud Gilani publisherDar Al Fajr Publishing and Distribution House – Cairo
ث) Electronic references, websites,.....	https://www.qrcodechimp.com/page/srcyif3uvk4a4

1) Course Name
Industrial establishments
2) Commissioner
ELTP208
3) Available forms of attendance
My presence

4) Semester/Year
Decisions
5) Total study hours / Number of units
4*15=60 / 4 units
6) Date this description was prepared
19-6-2025
7) Name of course coordinator
Name: Mohamed Ibrahim Ahmed e-mail:mohammedwais-hit@ntu.edu.iq
8) Course objectives (general course objectives)
1- Training the student on industrial installation methods and comparing different types of installations **2 – Understanding the main concepts and knowing the rules and laws used in calculating electrical loads and cable size** **The required circuit breaker capacity** **3 – Introducing the student to the types of cables and the maximum current that each cable can car** **4 –Preparing the student to study the various calculations required in electrical installations and to become familiar with the different theories for studying those calculations** . **5. Preparing and enabling the student to establish factories and heavy equipment, and how to control them, including equipment used in factories and electrical plants.**
9) Course outcomes, teaching and learning methods, and assessment Course Outcomes 7)Understanding the basics of industrial mechanics (voltage, current, resistance). 8)Installation of foundations(Lighting, control circuits, factory foundation motors). 9)Use of protective devices (circuit breakers, fuses, grounding and controllers). 10)Reading electrical diagramsAnd implementing it practically. 11)Implementing safety proceduresAnd risk prevention. 12)Fault repair(Detection and repair of common faults). identificationIt is a theoretical-practical course that aims to teach students the basics of designing, installing, and maintaining electrical systems in facilities (such as homes, factories, and workshops) that the course seeks to achieve in students. Its importance:

1- Providing safe electricityFor homes and factories.
2- Prevent fires and electric shocks.
3- Operate devices and equipment efficiently.
4- Meeting the requirements of regulations and standard specifications.
5- Facilitating maintenance and reducing breakdowns

How is it determined?:

7. Studying labor market needs
8. Review of professional standards
9. Assessing the capabilities of students and the workshop
10. Formulating clear and measurable goals
11. Linking with other courses
12. Regular updates based on developments

Outputs	Teaching and learning methods	Evaluation methods
ث- Knowledge **A1 -During the academic year, the student learns the fundamentals of electrical installations.** **A2 -The student learns about electrical installations, how to read them, and the factors that affect them..** **A3 -The student learns about the types of connections used in home electrical installations..** **A4-knowledgeSafety standardsand the dangers of electric shocks**	**1- Theoretical lectures using presentations.** **2- A study of real-life cases of installation failures.** **3- Short research papers on modern distribution systems**	**1- Written tests (essay and objective questions).** **2- Analytical reports on security systems.** **1- Theoretical tests** **2- Practical tests** **3 - Reports**
B - Skills **B1 -The ability to design, conduct, analyze, and interpret experiments and data.** **B2 -The ability to identify, formulate, and solve problems.** **B3 -Mastering the necessary mathematical, fundamental, and engineering sciences.** **B4-The ability to use the techniques and skills required at work.**	**1- Practical experiments (workshops on electrical installations).** **2- Simulation using software such asAutoCAD Electrical.** **3- Field visits to electrical construction sites**	**1- Practical performance tests (such as installing a lighting circuit).** **2- Evaluating projects (design and implementation of a control circuit)**

C– Values **A1–Commitment**Safety standards during work **Part 2–to bearProfessional responsibilityIn implementing the foundations** **Q3–the jobWith the teamFor the implementation of electrical projects** **C4–respectLaws and Standards(Such as connection requirements)**	**1– Group discussions on professional ethics.** **2– Role–playingFor situations that require ethical decisions.** **3– Observing and imitating examples of outstanding professionals**	**1– Peer evaluationFor the team's performance.** **2– Observing behavior during practical training (commitment to safety).** **3– Self–reports on practical experiences**

10) Course structureA- (Theoretical vocabulary)

Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	**2**	**Cable identification – cable components and operating voltage, cable types according to insulation type (MIMPVCTRSVRI) and lead–sheathed paper cables.**	**• Cables – Cable components and operating voltage, cable types according to insulation type (MIMPVCTRSVRI) and lead–sheathed paper cables.**	**An introductory lecture on the curriculum + classification of materials (conductors, semiconductors, insulators)**	**Short (theoretical) test on material classification**
the second	**2**	**3-Student understanding of the basics of cable laying and faults 4-Identifying faults in electrical circuits**	**Cable laying methods, possible cable faults, how to identify the type and location of the fault.**	**Theoretical explanation of the principles of electricity (potential difference, current, resistance) + presentation of the components of an electrical circuit**	**Testing to identify the components of an electrical circuit.**
the third	**2**	**5–Introducing the student to how to protect motors from overcurrents and how to deal with them**	**Protection of electric motors, protection against overcurrents resulting from short circuits**	**Study of the properties of copper and aluminum (electrical, mechanical) + their applications**	**Practical evaluation (comparison between copper and aluminum)**

Fourth	2	1–Introducing the student to how to protect motors from overcurrents and how to deal with them	Protection agai overcurrents due increased loads	Explanation of insulating materials (air, oil, solids) + permittivity laws	A short test on the properties of insulators
Fifth	2	1–Studying the properties of lines and how to deal with phase loss	Protection against phase loss or failure and protection against voltage drop	A lecture on magnetism (force, magnetic materials, laws)	Students are assessed individually by giving them the opportunity to participate in class by answering questions.
Sixth	2	1–Understanding the topic of magnetic circuit breakers	Circuit breakers, their types (oil, sulfur hexafluoride, vacuum, pneumatic)	Applying Kirchhoff's laws to magnetic circuits	Short tests andEvaluating participation in discussions
Seventh	2	1–Introducing the student to substations, vertical busbars, and switchboards	Substations, vert busbars, pneuma switchboa classificatio alternating curr control boa	Study of mechanical properties (tensile strength, stress, elasticity)	Theoretical test on mechanical properties
Eighth	2	1–Studying the stages of lighting and the fundamentals of optical engineering 2–Understanding how electrical energy is generated, transmitted, and distributed	Lighting, principles of optical engineering, light sources, lighting systems and their types, light measuring devices	Explanation of the power transmission stages (generation, transmission, distribution) + distribution panels	Power transmission diagram drawing + explanation of distribution panels
Ninth	2	1–Solving various questions to strengthen the student's understanding of the subject, such as lighting for halls, workshops, and laboratories.	Solved questions on how to design and calculate electrical lighting for halls, workshops, and courtyards	Theoretical explanation of generation, transmission and distribution systems. +Visual presentation of building water supply diagrams +Practical examples.	A short quiz on substation types and transformer capacities

		2–Teaching the student how to supply a building with electricity, in addition to knowing the capacity of the electrical transformers used.		+ Workshop on the installation of distribution panels	
tenth	2	1–Knowledge and study of electrical switches and their types 2–Teaching the student about isolation and grounding	Grounded and isolated systems: a comparison in case of fault, the advantages and disadvantages of each system.	Explanation of electrical switch types + practical circuit diagrams	Circle drawing test using keys.
eleventh	2	1–Introducing the student to the protection devices used in industrial and electrical installations 2–Understanding fuses, their types, advantages, and disadvantages 3–Teaching the student how to choose a fuse and coordinate the fuses in the same electrical circuit	Voltage drop in single–phase and three–phase feeders, meaning of voltage drop, causes of voltage drop, damage resulting from voltage drop, testing feeder (cable) sizes, factors affecting current ratings	Study of fuses (their types, specifications, and how to choose them)	Evaluating the selection of appropriate fuses for different circuits
twelfth	2	1–Solving questions to strengthen the student	Solved questions on voltage drop calculations	Nice questions and exercises	Short tests andEvaluating participation in discussions
thirteenth	2	1–Study of electrical wiring systems 2–Knowing how wires and cables are numbered during installation and taking into account wire colors during the setup process.	Technical methods of wiring, a study of wiring systems, wiring methods, and techniques used for this purpose.	Wiring systems display(BB, TRS, PVC) + Wire Numbering	Assessing knowledge of wiring systems.

fourteenth	2	1-Teaching the student about the types of home electrical installations 2-Understanding the advantages and disadvantages of each type, safety requirements, general layout, and tools used in the process.	Establishing hazardous areas (examples of hazardous areas): Specificities of establishing hazardous areas and the steps that must be taken for this purpose.	Home building construction study (safety requirements, tools, cost)	Evaluating participation in discussions
fifteenth	2	1-Studying grounding, understanding its components, and connection and linking equipment. 2-Understanding the different methods for reducing grounding resistance and the devices and equipment that need to be grounded. 3-Teaching the student the importance of good grounding, the difference between a grounded and ungrounded system, and methods of measurement.	Grounding, its types, installation of ground conductors for substations and buildings, and lightning arresters	A lecture on grounding (its components, measurement methods, and importance)	Short tests andEvaluating participation in discussions

12-Course structureb) Practical vocabulary					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method

the first	2	3–Implementing safety procedures in workshops and factories. 4–First aid for electric shock. 5–Taking fire prevention measures.	Precautions and warnings to be taken while working in workshops and factories, as well as training on how to administer first aid for electric shock and how to warn of fire.	Lecture and practical application of safety and first aid	Short theoretical test + practical application of first aid and safety
the second	2	Identifying symbols for electrical tools and components.	Knowledge of the symbols for devices, tools, and all necessary fixtures used in electrical installations	Display of electrical symbols and tool classification	Symbol and tool classification test
the third	2	Preparing cables for operation – stripping process – preparing the ends of armored and plastic–insulated cables. Using a mechanical and hydraulic press to crimp the metal ends of cable connectors	Preparing cables for operation – stripping process – preparing the ends of armored and plastic–insulated cables. Using mechanical and hydraulic presses to crimp the metal ends of the cable conductors.	Practical training on creating two linksTwist and T	Practical assessmentImplementing Twist and T–connections
Fourth	2	Using fuses of various types (wired, hose, high breaking capacity) to protect a power circuit, including disassembly, installation, and fixing using a small circuit breaker – drawing the	Using fuses of various types (wired, hose, high breaking capacity) to protect a power circuit, including disassembly, installation, and fixing using a small circuit	A practical application of my connectionMarried Joint and T with welding	Assessing the quality of joints and welds(Married Joint and T)

		breaker's thermal curve	breaker – drawing the breaker's thermal curve		
Fifth	2	Thermally and magnetically protected starters (line–type starters) use starters with different operating voltages to start the motor, including internal starter rewiring and current rating adjustment.	Thermally and magnetically protected starters (line–type starters) use starters with different operating voltages to start the motor, including internal starter rewiring and current rating adjustment.	Practical application for implementing a connectionStraight and T–shaped CTS wires with solder	Inspecting straight joints andT with welding
Sixth	2	The key to a switch and how to use it to control an electrical circuit – and how to protect the user from the dangers of sparks	The key to a switch and how to use it to control an electrical circuit – and how to protect the user from the dangers of sparks	Practical training in connecting and soldering aluminum and paper cables	Evaluating aluminum conductivity and welding
Seventh	2	Multiple keys – using their different types – using specific keys to end the movement	Multiple keys – using their different types – using specific keys to end the movement	A practical application of assembling a simple lighting circuit (switch + lamp) using a systemCleat	Circuit assembly test (switch + lamp)
Eighth	2	Measuring the resistance of the ground pole using a grounding device – Measuring the	Measuring the resistance of the ground pole using a grounding	Practical implementation and application of a circuit for installing two lamps	Evaluating the structure of a parallel circuit

		grounding network for the laboratory, grounding circuit breakers for ground leakage, and selecting the tripping current.	device – Measuring the grounding network for the laboratory, grounding circuit breakers for ground leakage, and selecting the tripping current.	in parallel using a systemCleat	
Ninth	2	1– Use voltage regulators for leakage current. 2– Create an automatic tank filling circuit using a float switch.	1– Use voltage regulators for leakage current. 2– Create an automatic tank filling circuit using a float switch.	Practical training for installing a lighting circuit, fan, and socket with separate control.	Evaluation of the installation of lighting circuits, fan, and sockets
tenth	2	Use the specified keys 1– In elevators, a circuit is created to demonstrate and implement the theory of elevator operation. 2– Using the specified switches on the crane, create a circuit illustrating the crane's operation in both lifting and hoisting states, and implement the circuit.	Use the specified keys 1– In elevators, a circuit is created to demonstrate and implement the theory of elevator operation. 2– Using the specified switches on the crane, create a circuit illustrating the crane's operation in both lifting and hoisting states, and implement the circuit.	Training on installing a two–position lamp control circuit (staircase system)	Staircase circuit assembly test

eleventh	2	Stopping the engines (braking) by way of 1– Direct currentDC Brake 2– Reverse currentCounter current braking	Stopping the engines (braking) by way of 1– Direct currentDC Brake 2– Reverse currentCounter current braking	A practical application of installing a 3–location control circuit usingTwo–pole relay	Evaluate the installation of the control circuit from 3 locations
twelfth	2	3D electrical energy meters – disassembly and assembly Connection and operation – How to adjust the meter to measure the power factor using an ammeter and using the magnetic loop to measure current and voltage	3D electrical energy meters – disassembly and assembly Connection and operation – How to adjust the meter to measure the power factor using an ammeter and using the magnetic loop to measure current and voltage	Practical training for assembling a control circuit for multiple lamps usingTwo–way switch.	Evaluation of the installation of multi–lamp circuits
thirteenth	2	How to create a control circuit to operate a three–phase induction motor using pickups?	How to create a control circuit to operate a three–phase induction motor using pickups?	A practical application for installing and operating a fluorescent lamp withThermal Relay	Testing and checking the operation of a fluorescent lamp
fourteenth	2	Three–phase induction motor start switch (/)Y) Mapping (connection and disconnection diagram for different switch states) Study of possible faults. Rotary switches and their use in operating a three–phase induction	Three–phase induction motor start switch (/)Y) Mapping (connection and disconnection diagram for different switch states) Study of possible faults. Rotary switches and their use in operating a three–phase	Practical implementation and application of installing two fluorescent lamps in series withChook.	Evaluating the installation of two fluorescent lamps in series

		motor – for reversing direction – for operating a motor from two sources – for operating two motors alternately	**induction motor – for reversing direction – for operating a motor from two sources – for operating two motors alternately**		
fifteenth	**2**	**Installation of metal pipes (cutting pipes – threading them – connecting them using connection bushings – bending the pipe using a bending machine)**	**Installation of metal pipes (cutting pipes – threading them – connecting them using connection bushings – bending the pipe using a bending machine)**	**Practical training for assembling a mercury lamp and a sodium lamp**	**Testing the composition of mercury and sodium lamps**

11) Curriculum Development Plan	
Continuously developing educational content to keep pace with the demands of the times, such as: 1- Including specialized fields that align with digital transformation 2- Organizing discussion sessions with leaders in the industrial sector 3- Keeping up with global technological developments in the electrical field 4- Holding applied exhibitions to showcase modern innovations 5- Developing field training programs in leading companies	
12) Infrastructure	
classrooms, laboratories, a workshops	**Well–equipped and prepared halls and laboratories are available to provide a suitable environment for teaching and learning.**
5– Required textbooks	**Home and industrial electrical installations** **•Fundamentals of electricity and electrical circuits** **•International Electrical Code (IEC) – Latest Versio**
6– Main references (sources)	**"Electrical Engineering: Principles and Applications"** **"Electrical Engineering: An Introduction"** **"Fundamentals of Electrical Engineering"** **"Electricity and Electronics for HVAC"**

ج) **Recommended books and references** (**scientific journals**, **reports**, **etc**.)	"**Electrical Systems Design**" **Electric Power Systems**: **A Conceptual Introduction** "**Electrical Engineering**: **Know It All**"
ح) **Electronic references**, **websites**,.....	**https**://**www**.**qrcodechimp**.**com**/**page**/**srcyif3uvk4a4**

1. Course Name
Electrical Networks 2
2. Course code
ELTP212
3. Available forms of attendance
My presence
4. Semester/Year
Decisions
5. Total study hours / Number of units
4*15=60 / 4 units
6. Date this description was prepared
19-6-2025
7. Name of course coordinator
Name: Alaa Yass Ahmed e-mail: alaaalyass85@ntu.edu.iq
1.Course objectives (general course objectives)
1- Thorough knowledge of hydroelectric, thermal and gas power plants, and an understanding of some other types of power plants such as diesel. A-2 Use of overhead lines - Mechanical calculations, including- Calculate tension and relaxation when the distances from the ground are equal. - Calculate the weight of snow

accumulated on the wire. - Calculate the magnitude of the wind pressure force acting on the wire.

A-3 Calculations of the basic elements of overhead lines - electrical calculations, including- Calculating resistance - Calculating the internal and external inductance of a single wire - Calculating the inductance of a three-wire system consisting of three wires spaced equally, unequally, or alternately in position

A-4 Calculating the capacity of a single-wire, three-wire system consisting of three wires that are either equally spaced or unequally spaced and alternate in location

2.Course outcomes, teaching and learning methods, and assessment

Course Outcomes

A- Cognitive objectives

5. Operation and maintenance of electrical units for power generation plants.

Introducing the student to the types of power stations, explaining the operating mechanism of each type of station, and the efficiency of each type of power station.

6. Operation and maintenance of electrical equipment for the transmission and distribution of electrical power.
7. Maintenance of protection and control devices for the electrical power system.
8. Laying and maintenance of underground and overhead cables.

Fundamentals of Engineering Design Knowledge of basic engineering design principles such as the analysis and design of electrical and mechanical systems.

Outputs	Teaching and learning methods	Evaluation methods
ج- Knowledge **1- The student learns about methods of generating electrical energy** **2. Distinguish between each type of energy source** **3. Explains the mechanism of electrical energy production.**	**3.Theoretical lectures** **4.Group discussions** **5.Case studies**	**13. Theory tests** **14. Performance evaluation** **15. Class participation** **16. Research reports**
b) Skills **1- The student learns about methods of generating electrical energy**	**10. Interactive lectures**	**13. Short and final tests**

2. Distinguish between each type of energy source **3. Explains the mechanism of electrical energy production.**	**11. Real-life case studies** 12. **Field visits to facilities**	**14. Performance evaluation during practical training** **15. Applied projects** 16. **Field visit reports**
C- Values **Student participation in classroom activities and submission of assignments on time.** **Adherence to occupational safety rules while working in laboratories.** **Attention control and attention testing (selective attention)**	**10. Interaction and application** **11. Modern technologies** 12. **collaborative learning**	**13. Continuous assessment** **14. Performance evaluation during practical training** **15. Final assessment** **16. Field visit reports**

Details of the curriculum for Electrical Networks 2 (Theoretical Curriculum): Two hours per week

6.Course structureA- (Theoretical vocabulary)					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	**2**	Understanding the subject of unity	**Distribution networks and DC power distribution systems that feed from one end – those that feed from two ends. AC power distributors that feed from one end**	**Interactive lectures supported by presentationsPowerPoint presentations, documentary videos, and a concept map of the flow of energy in an electrical system.**	**A short quiz + research assignment on the stages of energy systems development**

the second	**2**	Understanding the subject of unity	**All types of ring diffusers – a comparison between different types**	**Explanatory video, comparative study, classroom discussion.**	**Analytical report + short descriptive quiz.**
the third	**2**	Understanding the subject of unity	**Solve various examples from the first and second weeks**	**Real–life case studies + application research**	**Oral presentation within a group + individual written assessment**
Fourth	**2**	Understanding the subject of unity	**Conditions for stable operation of synchronous generators with the grid – load power curve; how synchronous generators operate in parallel with each other and with the grid.**	**Analysis of engineering plans, interactive discussion, practical examples.**	**Practical test + homework**
Fifth	**2**	Understanding the subject of unity	**Methods for improving the power factor are divided into: Static capacitors – Synchronous motors – Phase–advance devices**	**Video lecture + comparison exercises**	**Essay question + homework exercise**
Sixth	**2**	Understanding the subject of unity	**Types of errors in electrical networks and their classification:**	**Solving applied problems + numerical simulation(via programs**	**Test in class**

			– Symmetrical faults and calculation of fault current in an electrical circuit **– Asymmetrical faults and calculation of fault current in an electrical circuit** **– Calculating basic units (PU)**	**such as MATLAB**).	
Seventh	**2**	Understanding the subject of unity	**Principles of protection, their definition, various systems, and uses of protection and disconnection relays and circuit breakers in electrical power systems and measuring devices, including: Voltage measuring transformers – Current measuring transformers**	**Practical training + detailed explanations**	**analytical test**
Eighth	**2**	Understanding the subject of unity	**Follow–ups, classified according to their operating principle: inductive**	**Solving exercises, group discussion**	**Achievement test**

			follow–ups (**against overcurrent**), (**against reverse power**), **electronic follow–ups**		
Ninth	**2**	Understanding the subject of unity	**How to protect overhead transmission lines – Distance protection** (**line impedance measurement protection**) **– Rail protection** (**BB**)	**Review session**, **classroom exercises**	**Short achievement test**
tenth	**2**	Understanding the subject of unity	**How to protect power transformers using** (**Differential Protection**	**Drawing electrical circuits + applications**	**Drawing circles + geometric problems**
eleventh	**2**	Understanding the subject of unity	**How to protect synchronous generators using**: **–Differential Protection –Digital Protection –Reverse Power Protection**	**Video presentations + examples of insulation**	**Practical report + test**
twelfth	**2**	Understanding the subject of unity	**Protecting the stator from overcurrent and protecting the rotor**.	**Using models or diagrams**	**Research report**

thirteenth	**2**	Understanding the subject of unity	**Relative reactancePercentage Reactance**	**Workshop, problem solving**	**Technical Achievement Test**
fourteenth	**2**	Understanding the subject of unity	**Power circuit diagram at the receiving end**	**Case studies of breakdowns + discussion of causes and prevention.**	**Final comprehensive test**
fifteenth	**2**	Understanding the subject of unity	**Economic operation of power generation plants, load factor, load capacity, calculation of cost per kilowatt-hour**		**Practical report + test**

Details of the curriculum for Electrical Networks 2 (Practical Curriculum): Two hours per week

13-Course structureb) Practical vocabulary					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	**2**	The student learns about the operation of a constant-time relay as a means of protection against overcurrent.	Constant time overcurrent follower	Practical explanation of the device + demonstration on a security panel	Performance Notes + Brief Report
The second and the third	**2**	The student understands the principle of the inverse function against increasing current and applies it to an actual device.	Inverse function against overcurrent	Theoretical explanation + device connection and testing demonstration	Technical report + analytical questions
Fourth	**2**	The student applies the directional prevention experiment against ground fault and analyzes the results.	Directional protection	A diagram of the connection process + practical	Connection diagram +

			against ground fault	demonstration of the experiment	written conclusions
Fifth	**2**	The student is able to measure the useless power in an electrical circuit.	Measuring useless power	Practical linking of devices + reading and discussion of results	Accurate reading + interpretation of results in a report
Sixth	**2**	The student learns about the different types of cables and their components.	Identifying the components of different types of cables	View real samples + compare features	Field observations + worksheet
Seventh	**2**	During the visit, the student observes the components of the gas station and their function.	Visit to a gas station	Field visit + Q&A session with the accompanying engineer	Descriptive report of the visit + analytical question
Eighth and ninth	**2**	The student learns about the parts of a steam power plant and the mechanism of power generation within it.	Visit to a steam power plant	Field visit + practical explanation of the components	Detailed report + comparison with a gas station
tenth	**2**	The student follows the work stages in a hydroelectric power station and analyzes the energy production from it.	Visit to a hydroelectric power station	Field visit + asking questions of technicians	Technical report + oral summary
eleventh	**2**	The student performs a breakdown voltage test on transformer oil.	Breakdown voltage test of a transformer oil sample	Explanation of test steps + practical application	Reading values + recording a practical report
twelfth	**2**	He learns about the types of high and low voltage circuit breakers and their operating principle.	Identifying high and low voltage circuit breakers	Real-life device demonstration + user experience	Descriptive report + diagram

Thirteenth and fourteenth	**2**	The principle of automatic restoration of transmission lines is understood and its condition is simulated.	Automatic restoration of transmission lines	Theoretical explanation + demonstration using a security panel	Performance report + application questions
fifteenth	**2**	It carries out an experiment to protect transmission lines against overload and short-circuit current.	Protection of transmission lines against overload and short circuit current	Fault simulation + monitoring of protection device performance	Results analysis + practical test

7.Curriculum Development Plan

Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee) such as

4- Updating the curriculum to keep pace with developments in the field of electrical networks.
5- Holding scientific seminars with specialists in the field.
6- Monitoring scientific developments in electrical grid systems and power generation

8.Infrastructure

classrooms, **laboratories**, **and workshops**	**Classrooms are available that are equipped to accommodate students and designed to provide a suitable learning environment**.
7- Required textbooks	**Electrical Networks Lecture Notes 2** **Electrical Machines and Power Systems**: **A Study and Analysis**
8- Main references (**sources**)	"**Power System Analysis**" **John J**. **Grainger & William D**. **Stevenson**
خ) **Recommended books and references** (**scientific journals**, **reports**, **etc**.)	"**Electric power transmission and distribution**" **publisherDar Al Fajr Publishing and Distribution House – Cairo**
د) **Electronic references**, **websites**,.....	**https**://**www**.**qrcodechimp**.**com**/**page**/**srcyif3uvk4a4**

1) Course Name
Maintenance Workshop 2
2) Course code
ELTP214
3) Available forms of attendance
My presence
4) Semester/Year
Decisions
5) Total study hours / Number of units
3*15=45 / 3 units
6) Date this description was prepared
19-6-2025
7) Name of course coordinator
8) Course objectives (general course objectives)
The student will also be able to: 1. Uses the various devices, tools, and components used in workshops. 2. Acquires technical skills and experience in various electrical maintenance works. 3. Gains self-confidence to perform electrical technical work, including troubleshooting a repairing faults.
9) Course outcomes, teaching and learning methods, and assessment **Course Outcomes** A-1Introducing the student to equipment maintenance workElectric. A-2Student definitionOn electrical engineering work, in tracing faults in electrical devices and identifying how to repair them.A-3Student definitionOn the various electrical and electronic components and how to use them in building electrical circuits. A-4Introducing the student to how to disassemble and assemble the parts of electrical machines..A-5Introducing the

student to how to inspect electrical machines after winding them.		
Outputs	Teaching and learning methods	Evaluation methods
Knowledge A-1 Introducing the student to the maintenance work of electrical equipment. A-2 Introducing the student to electrical engineering work in troubleshooting electrical devices and learning how to repair them. A-3 Introducing the student to the various electrical and electronic components and how to use them in building electrical circuits. A-4 Introducing the student to how to disassemble and assemble the parts of electrical machines	**10) Theoretical lectures** **11) Group discussions** **12) Case studies**	**17. Theory tests** **18. Performance evaluation** **19. Class participation** **20. Research reports**
b) Skills for1 - Acquiring the skill of installing DC motors, methods of rewinding DC motors. for2 - Acquiring the skill of designing and studying three-phase electrical transformers. for3 - Acquiring the skill of rewinding the stator windings of a three-phase induction motor and squirrel cage. for-4 Acquiring the skill of assembling the motor and testing the motor under its designated load. for-5 Acquiring the skill of performing periodic maintenance on a split-phase motor, conducting the necessary tests on it, identifying faults and methods of treating them.	**13. Interactive lectures** **14. Real-life case studies** 15. **Field visits to facilities**	**17. Short and final tests** **18. Performance evaluation during practical training** **19. Applied projects** 20. **Field visit reports**
C- Values C-1 Practical skills that enable the student to research, identify, and fix faults in electrical devices. C-2 Practical skills that enable the student to cooperate in work with others. C-3 Maintaining the safety of the equipment and furniture in the workshop, as it is public property. C-4 The student's ability to think systematically and therefore to make decisions	**13. Interaction and application** **14. Modern technologies** 15. **collaborative learning**	**17. Continuous assessment** **18. Performance evaluation during practical training** **19. Final assessment** **20. Field visit reports**

Details of the curriculum for Maintenance Workshop 2 (practical curriculum only): three hours per week

10-Course structure					
Week	Hours	**Required learning outcomes**	**name Unity / or the topic**	**Teaching method**	**Evaluation Method**
the first	3	acquisitionTechnical skill and experience inUnit topic	Motor assembly and testing under its designated load – Study of the starting phase of three-phase motors – Direct method – Self-starting method	to implement exercises	evaluation continuous
the second	3	acquisitionskill and experienceThe art inUnit topic	Induction motor protection devices and the use of timers	to implement exercises	evaluation continuous
the third	3	acquisitionskill and experienceThe art inUnit topic	Changing the final motor terminal connection from star to delta The engine is originally workingY -Δ Note the differences in current and torque in both cases.	to implement exercises	evaluation continuous
thefour	3	Acquiring skills and experience Artistic in topicUnity	Single-phase induction motor: A practical study of different types of single-phase induction motors – motor construction – capacitor motor – split-phase motor	to implement exercises	evaluation continuous
Fifth	3	Acquiring skills and experience Artistic in topicUnity	Winding a split-phase motor, performing necessary tests on it, and methods of periodic maintenance – faults and methods of repair – reversing the direction of rotation of the motor	to implement exercises	evaluation continuous
Sixth	3	acquisitionTechnical skill and experience inUnit topic	Drawing files for a split-phase motor - multiple examples	to implement exercises	evaluation continuous
Seventh + Eighth	3	acquisitionTechnical skill and experience inUnit topic	Winding a shaded pole motor of various types	to implement exercises	evaluation continuous
Ninth	3	Acquiring skills and experience Artistic in topicUnity	Continuity test – Polarity test – Ground contact test – Short circuit test	to implement exercises	evaluation continuous
tenth	3	Acquiring skills and experience Artistic in	Electrical and mechanical faults and methods of repairing them	to implement exercises	evaluation continuous

		topicUnity			
eleventh	3	Acquiring skills and experience Artistic in topicUnity	Winding the capacitor-type motor involves performing the necessary tests – polarity continuity test – grounding test – short circuit between windings	to implement exercises	evaluation continuous
twelfth	3	acquisitionTechnical skill and experience inUnit topic	Winding the ceiling and table fan motors and performing the necessary tests	to implement exercises	evaluation continuous
thirteenth	3	acquisitionTechnical skill and experience inUnit topic	Home appliance repair – Home refrigerator – Mechanical and electrical faults and how to fix them	to implement exercises	evaluation continuous
thefourteen	3	acquisitionskill and experienceThe art inUnit topic	Home appliance repair – Home freezers – Home air conditioners – Mechanical and electrical faults and their solutions – Routine maintenance	to implement exercises	evaluation continuous
fifteenth	3	acquisitionskill and experienceThe art inUnit topic	Home appliance repair – washing machine – electrical faults and their solutions – routine maintenance	to implement exercises	evaluation continuous

11–Structure Infrastructure:

The booklet laboratory private In the workshop	**1-Required textbooks**
1 –He wrapped electric motors, d. moon 2- Reference in transformers Electric, Franklin Sticant, SA	**2-Main References(Sources)**
1-Identifying faults and maintaining electrical machinery.World Bank preparation of technical illustrations.	**aRecommended books and references(Magazines)ScientificReports**
1- locationTechnical Institute/Al-Rumaytha 2- Global company websites	**for - the reviewer Electronic,** **Sites The Internet** ....

12- Curriculum Development Plan:

1-Participating inThe various courses related to the subject matter are designed to provide workshop instructors with greater experience..

2- View on last what I arrived for him Technology Modern in This is amazing Material.

1_ Course Name
electrical drawing
2_ Course Code
ELTP106
3_ Available forms of attendance
My presence
4_ Chapter / Year
Decisions
5_ Total number of study hours, number of units
3*30=90 / 6 units
6_ Date this description was prepared
22-6-2025
7_ Name of the course coordinator
the name:Alaa Ahmed Yass e-mail:alaaalyass85@ntu.edu.iq
8_ Course Objectives (General Objectives of the Course)
– 1 Understanding the basic rules of electrical drawing using a computer. **–2 Drawing basic models using this program**. **–3 Design and draw the proposed models**.

9_ Course outcomes, teaching and learning methods, and assessment

Course Outcomes

identification: An electrical diagram is a graphical representation of electrical components and circuits using standard symbols. This diagram aims to simplify understanding how electrical devices and materials are connected within a system. It is used to illustrate how electric current flows in a circuit and is employed in the design and maintenance of electrical systems such as lighting, heating, cooling, and power systems..

Its importance: Electrical drawings are of great importance in the design, operation, and maintenance of electrical systems. Here are some aspects that highlight the importance of this type of drawing.:

1. **Explanation of electrical circuit design**
2. **Facilitating the maintenance and repair process**
3. **precise system control**
4. **Ensuring safety and security**

How is it determined?: It is determined based on the type of electrical system, the components used, the required connections, and the safety and efficiency requirements. By accurately defining these factors, an effective electrical diagram can be created to aid in the design, operation, and maintenance of a safe and efficient electrical system..

Outputs	Teaching and learning methods	Evaluation methods
ح- Knowledge A1 - Knowledge and understanding of the basics of electrical drawing using AutoCAD software A2 – Knowledge of drawing basic electrical diagrams using a computer A3 – Knowledge and understanding of program commands	•**Hands-on practical training**:Using AutoCAD software in practical lessons with the application of real-life examples in engineering drawing. •**Interactive learning**:Combining short theoretical explanations with practical application, and encouraging students to solve progressively challenging exercises (from simple to complex).	1- Monitoring students' performance step by step during practical lessons, with immediate feedback to improve performance. 2- Use short exercises after each unit to measure understanding of basic concepts and commands.

A4 – Knowledge of writing and dimensioning electrical shapes 5-Knowledge of the symbols specific to the electrical circuit 6- How to draw an integrated electrical circuit	•**Cooperation and offers**:Implement small projects within teams to promote teamwork and present the results for discussion.	
B - Skills B1 - Drawing symbols not found in the program B2 – Drawing an integrated electrical circuit B3 – Executing the orders to obtain the electrical drawing B4 - Setting the dimensions of the drawing and writing on the drawing	1.**Hands-on practical training**: •Using AutoCAD software in computer labs with progressively increasing exercises from simple to complex. 2.**Project-based education**: •Implementing small projects (such as creating electrical diagrams) to link theory with practice. 3.**Cooperation and offers**: •Working in teams to produce integrated drawings and presenting the results for group discussion	1- A brief practical assessment: •Quick tests during lessons to measure mastery of basic commands 2- Applied projects: •Evaluate a final project (such as creating a complete engineering drawing) with a focus on accuracy and adherence to standards.. 3- Peer assessment: •Students participate in evaluating each other's work under the teacher's supervision to promote self-assessment.

C- Values A1 - Instilling a spirit of creativity in students and encouraging them to find innovative solutions to various problems Q2 - Developing students' ability to work collaboratively as effective teams that produce outstanding results Q3 - Developing a sense of responsibility among students and preparing them psychologically to bear the burdens placed upon them Q4 - Developing the values of diligence and perseverance in completing work to achieve satisfactory results	Stimulating students' creativity by presenting various scientific problems and asking them to find appropriate scientific solutions using different methods; developing a spirit of cooperation among students by forming work teams and motivating them to exert all necessary efforts to work in different conditions and with multiple people.	Direct assessment: This assessment is conducted directly by the instructor through observing the student's interaction during the lecture and recording the relevant observations. Practical projects: The student's ability to achieve, innovate, work within teams, and produce results and solutions to various scientific problems are assessed.

2. Course structure(**Theoretical and practical vocabulary**)

Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	3 hours	Introducing student to interfaces program AutoCAD How to use it	The importance of electrical drawing. Identifying interface AutoCAD program	The presentation abo roadPowerPoint With the app	Through participation and exams

the second	3 hours	How to use Orders for purpose The drawing	Offer orders Drawing boundaries units	The presentation abou roadPowerPoint With the app	Through participation and exams
the third	3 hours	Student education How to Using commands For a more accu drawing	Drawing accuracy commands GRID POLAR, OSNAP	The presentation abou roadPowerPoint With the app	Through participation and exams
Fourth	3 hours	How to use Ready orders	drawing orders elementsRectangle Circle, Polygon, Arc	The presentation abou roadPowerPoint With the app	Through participation and exams
Fifth	3 hours	Student education Use Orders To edit and m easier The drawing	Modification commandsErase Copy, Move, Mirror	The presentation abou roadPowerPoint With the app	Participation
Sixth	3 hours	Student education On the dimension the drawing precisely	dimensiondifferent on Drawing elements and controlling it Using a square Dimensional patt dialogue	The presentation abou roadPowerPoint With the app	Through participation and exams
Seventh	3 hours	How to control By font type and c	Specifications control Drawing types of lines Colors of the element Its characteristics	The presentation abou roadPowerPoint With the app	Through participation and exams
Eighth	3 hours	How to use Orders to facilitate The drawing	Commands for draw elements Ellipse, Donut, Wipeout, Revision Cloud	The presentation abou roadPowerPoint With the app	Through participation and exams

Ninth	3 hours	Student education Use Orders To edit and m easier The drawing	Modification commar The otherOffset, Scale, Stretch, Rotat	The presentation abou roadPowerPoint With the app	Through participation and exams
tenth	3 hours	Knowing how Add text and line control and color, etc.	Adding text Its methods and contr With its specifications	The presentation abou roadPowerPoint With the app	Through participation and exams
eleventh	3 hours	To find outaccoun spaces Sizes and lengths	Handling orders tape Parametric	The presentation abou roadPowerPoint With the app	Through participation and exams
twelfth	3 hours	How toUse Tools for drawing required circuit	drawing circles electrical existing symbols or drawing non-symb It is available in program	The presentation abou roadPowerPoint With the app	Through participation and exams

Through participation and exams	ıe presentation about roadPowerPoint With the app	Circuit diagram l a control circuit for the motor	Student education How the mechanism rawing and operation	3 hours	thirteenth
Through participation and exams	ıe presentation about roadPowerPoint With the app	Drawing models of cable trays	Student education	3 hours	fourteenth
Through participation and exams	ıe presentation about roadPowerPoint With the app	Printing	Student education Printing on The program	3 hours	fifteenth

3. Curriculum Development Plan
Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee) such as 7- Updating the curriculum to keep pace with developments in the field of electrical drawing. 8- Keeping up with scientific developments in the continuous updating of the AutoCAD program.

4. Infrastructure	
classrooms, laboratories, and workshops	Well-equipped laboratories are available to accommodate students are prepared To provide a suitable learning environment
9- Required textbooks	Electrical Drawing Lecture Notes
10- Main references (sources)	https://faculty.uobasrah.edu.iq/uploads/teaching/1711798938.pdf
ذ) Recommended books and references (scientific journals, reports, etc.)	https://www.smartdraw.com/cad/engineering-drawing-software.htm?srsltid=AfmBOoqDqQ2hjW1riiDu_ZmtTLd6-itW7EDrm7zUii1JMSEtmWi8ii2i
ر) Electronic references, websites,.....	https://www.qrcodechimp.com/page/srcyif3uvk4a4

1. Course Name
Power electronics
2. Course code
ELTP206
3. Available forms of attendance
My presence
4. Semester/Year
Decisions
5. Total study hours / Number of units
5*15=75/5 units
6. Date this description was prepared
19-6-2025
7. Name of course coordinator
Name: Taha Abdel Salam Taha Email: Taha.a.taha@ntu.edu.iq
8. Course objectives (general course objectives)
Introducing the student to the basic and electronic components of power systems such as transformers, thyristors, and control circuits. Enabling the student to analyze and design power electronics circuits to achieve the required high performance and efficiency. To enhance the student's understanding of protection techniques in power systems, such as overcurrent protection and electrical stress protection. Linking theoretical knowledge with practical and industrial applications in fields such as smart grids and industrial electronics.
9. Course outcomes, teaching and learning methods, and assessment
Course Outcomes • Understanding the components and types of power electronics circuits. • Analysis and diagnosis of the performance of power electronic circuits. • Design of electronic energy control systems. • Application of protection technologies in electronic power systems. • Using simulation tools to analyze circuits(Such as MATLAB/Simulink). • Teamwork and effective problem-solving in engineering.

identificationA course that studies how to use electronic devices and circuits to control and distribute electrical power efficiently, with an emphasis on analysis, design, and protection in electrical power systems.

Its importance:

- **Enabling precise control of electrical power systems**.
- **Improving the efficiency of electrical power conversion and distribution**.
- **Developing skills in designing and maintaining electronic energy devices**.
- **Supporting modern industrial applications such as smart grids and electric motors**.

Enhancing understanding of protection and safety in power systems.

How is it determined?:

Study of current industrial and engineering market requirements.

- **Review of relevant curricula and academic standards**.
- **Analyzing students' needs in the specialization and their prior knowledge level**.
- **Identifying the practical and theoretical skills needed for the labor market**.
- **Keeping up with technological developments in the field of power electronics**.

Outputs	Teaching and learning methods	Evaluation methods
Knowledge	- Theoretical lectures	Written tests
1- Understanding the components of power circuits	Reading references and books	Short questions
2-Understanding the concepts of control and energy	- Presentations	- Periodic assessments
3- Identifying protection technologies	- Case studies	Written reports
4-Knowledge of the basics of simulation software	- Simulation using MATLAB/Simulink	- Online tests
Skills	- Practical training in the laboratory	- Evaluating practical projects
1. Analysis of electrical circuits	Circuit design projects	Project reports
2. Design of electronic systems	Teamwork	- Evaluating presentations
3. Applying protection technologies	- Classroom discussions	- Evaluating classroom participation
4. Using simulation tools	Solving applied problems	- Evaluating practical performance
Evaluation	- Comprehensive review of the content	Final exams

1-Measuring theoretical understanding	Periodic tests	Written tests
2- Assessing practical skills	- Applied projects	- Evaluating practical performance
-3 Measuring collaboration and teamwork skills	- Group activities	- Evaluating teamwork
4- Continuous improvement and innovation	- Presenting proposals and research	Research reports and articles

Chapter One of the Scientific Content							
Chapter Title	the time						
Time distribution	Theory	practical	Main Title	Subtitle	Teaching method	Technologies	Measurement methods
Week 1	2 hours	3 hours	Power Electronic	Introduction of power electronic	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 2	2 hours	3 o'clock	Power Electronic	Classification of Power Electronic Converters	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 3	2 hours	3 hours	Power Electronic	Single Phase Half Wave Uncontrolled Rectifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 4	2 hours	3 hours	Power Electronic	Single Phase full Wave Uncontrolled Rectifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Chapter Two							
Chapter Title	the time						
Time distribution	Theory	practical	Main Title	Subtitle	Teaching method	Technologies	Measurement methods
Week 5	2 hours	3 hours	**Three Phase Rectifier (uncontrolled)**	Three phase half bridge uncontrolled rectifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 6	2 hours	3 hours	Three Phase Rectifier (uncontrolled)	Three phase full bridge uncontrolled rectifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 7	2 hours	3 hours	Three Phase Rectifier (uncontrolled)	Compeer between single phase and three phase	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

AFor the third chapter							
Chapter Title	the time						
Time distribution	theoretical	practical	Subtitle		Teaching method	Technologies	Measurement methods
Week 8	2 hours	3 hours	Transistor as Switch	Introduction and Operating Modes of Transistors	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 9	2 hours	3 hours	Transistor as Switch	BJT switching time	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student

							inquiries, attendance
Week 10	2 hours	3 hours	Transistor as Switch	Improving BJT Switching Time	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Chapter Four (of the scientific content)							
Chapter Title	the time						
Time distribution	theoretical	practical	Main Headlines	Subheadings	Teaching method	Technologies	Measurement methods
Week Eleven	2 hours	3 hours	Field Effect Transistor	MOSFET	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week Twelve	2 hours	3 hours	Field Effect Transistor	Working Principle of MOSFET	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 13	2 hours	3 hours	Field Effect Transistor	Unijunction Transistor (UJT)	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 14 and Week 15	2 hours	3 hours	Field Effect Transistor	UJT Characteristics	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

10. Curriculum Development Plan	
Continuously developing educational content to keep pace with the demands of the times, such as: • Integrating the latest technologies and digital tools into the curriculum. • Regularly update scientific and applied information. • Including real-world case studies and modern industrial applications. • Encouraging interactive learning and practical projects. • Reviewing and adapting the content based on student feedback and labor market needs.	
11. Infrastructure	
classrooms, laboratories, and workshops	• Providing classrooms equipped with modern display technologies (projector, smart board). • Laboratories equipped with power electronics circuit measurement and simulation devices. • Practical workshops for conducting experiments and designing circuits.
Required textbooks	Basic books covering the principles of power electronics, such as: • *Power Electronics*– Muhammad H. Rashid • *Power Electronics: Converters, Applications and Design*– Ned Mohan
Main references (sources) Recommended books and references (scientific journals, reports, etc.)	• Peer-reviewed scientific journals such as: IEEE Transactions on Power Electronics Technical reports from electronics and energy companies • Books specializing in control and power systems

1) Course Name
Power electronics
2) Course code
ELTP213
3) Available forms of attendance
My presence
4) Semester/Year
Decisions
5) Total study hours / Number of units
5*15=75 / 5 units
6) Date this description was prepared
19-6-2025
7) Name of course coordinator
Name: Taha Abdel Salam Taha Email:Taha.a.taha@ntu.edu.iq
8) Course objectives (general course objectives)
Introducing the student to the basic and electronic components of power systems such as transformers, thyristors, and control circuits. **Enabling the student to analyze and design power electronics circuits to achieve the required high performance and efficiency.** **To enhance the student's understanding of protection techniques in power systems, such as overcurrent protection and electrical stress protection.** **Linking theoretical knowledge with practical and industrial applications in fields such as smart grids and industrial electronics.**
9) Course outcomes, teaching and learning methods, and assessment
Course Outcomes 1. Understanding the components and types of power electronics circuits. 2. Analysis and diagnosis of the performance of power electronic circuits. 3. Design of electronic energy control systems. 4. Application of protection technologies in electronic power systems. 5. Using simulation tools to analyze circuits(Such as MATLAB/Simulink). 6. Teamwork and effective problem-solving in engineering.

identificationThis course examines how to use electronic devices and circuits to efficiently control and distribute electrical power, with a focus on analysis, design, and protection in electrical power systems.

Its importance:

- Enabling precise control of electrical power systems.
- Improving the efficiency of electrical power conversion and distribution.
- Developing skills in designing and maintaining electronic energy devices.
- **to support**Modern industrial applications such as smart grids and electric motors.
- Enhancing understanding of protection and safety in power systems.

How is it determined?:

- Study of current industrial and engineering market requirements.
- Review of relevant curricula and academic standards.
- Analyzing students' needs in the specialization and their prior knowledge level.
- Identifying the practical and theoretical skills needed for the labor market.
- Keeping up with technological developments in the field of power electronics.

Outputs	Teaching and learning methods	Evaluation methods
Knowledge	- Theoretical lectures	Written tests
1. Understanding the components of power circuits	Reading references and books	Short questions
2. Understanding control and energy concepts	- Presentations	- Periodic assessments
3. Identifying protection technologies	- Case studies	Written reports
4. Knowledge of the basics of simulation software	- Simulation using MATLAB/Simulink	- Online tests
Skills	- Practical training in the laboratory	- Evaluating practical projects
1. Analysis of electrical circuits	Circuit design projects	Project reports
2. Design of electronic systems	Teamwork	- Evaluating presentations
3. Applying protection technologies	- Classroom discussions	- Evaluating classroom participation
4. Using simulation tools	Solving applied problems	- Evaluating practical performance

Evaluation	- Comprehensive review of the content	Final exams
1. Measuring theoretical understanding	Periodic tests	Written tests
2. Assessing practical skills	- Applied projects	- Evaluating practical performance
3. Assessing collaboration and teamwork skills	- Group activities	- Evaluating teamwork
4. Continuous improvement and innovation	- Presenting proposals and research	Research reports and articles

Chapter One of the Scientific Content							
Chapter Title	the time						
Time distribution	Theory	practical	Main Title	Subtitle	Teaching method	Technologies	Measurement methods
Week 1	2 hours	3 hours	**Amplifiers**	Operational Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 2	2 hours	3 o'clock	**Amplifiers**	Inverting Voltage Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 3	2 hours	3 hours	**Amplifiers**	Non-Inverting Voltage Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 4	2 hours	3 hours	**Amplifiers**	Applications of Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Chapter One of the Scientific Content							
Chapter Title	the time						
Time distribution	Theory	practical	Main Title	Subtitle	Teaching method	Technologies	Measurement methods
Week 1	2 hours	3 hours	**Amplifiers**	Operational Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 2	2 hours	3 o'clock	**Amplifiers**	Inverting Voltage Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 3	2 hours	3 hours	**Amplifiers**	Non-Inverting Voltage Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 4	2 hours	3 hours	**Amplifiers**	Applications of Amplifier	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Chapter Three							
Chapter Title	the time						
Time distribution	theoretical	practical	Main Title	Subtitle	Teaching method	Technologies	Measurement methods
Week 8	2 hours	3 hours	**Thyristor Construction, Characteristics and Family**	Thyristor definition and characteristics	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Week 9	2 hours	3 hours	**Thyristor Construction, Characteristics and Family**	Thyristor Family	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 10	2 hours	3 hours	**Thyristor Construction, Characteristics and Family**	Test	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

Chapter Four (of the scientific content)							
Chapter Title	the time						
Time distribution	theoretical	practical	Main Headlines	Subheadings	Teaching method	Technologies	Measurement methods
Week Eleven	2 hours	3 hours	**AC to DC converter**	What is an AC/DC Converter	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week Twelve	2 hours	3 hours	**AC to DC converter**	Applications	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 13	2 hours	3 hours	**AC to DC converter**	Half Wave single Phase Controlled AC/DC converter	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance
Week 14 and Week 15	2 hours	3 hours	**AC to DC converter**	Full wave AC/DC converter (resistive load)	Theoretical explanation and practical application	Using a data projector: presentation, explanation, Q&A, discussion	Daily quiz, daily assignments, student inquiries, attendance

10. Curriculum Development Plan	
Continuously developing educational content to keep pace with the demands of the times, such as: • Integrating the latest technologies and digital tools into the curriculum. • Regularly update scientific and applied information. • Including real-world case studies and modern industrial applications. • Encouraging interactive learning and practical projects. • Reviewing and adapting the content based on student feedback and labor market needs.	
11. Infrastructure	
classrooms, laboratories, and workshops	• Providing classrooms equipped with modern display technologies (projector, smart board). • Laboratories equipped with power electronics circuit measurement and simulation devices. • Practical workshops for conducting experiments and designing circuits.
Required textbooks	Basic books covering the principles of power electronics, such as: • *Power Electronics*- Muhammad H. Rashid • *Power Electronics: Converters, Applications and Design*- Ned Mohan
Main references (sources) **Recommended books and references (scientific journals, reports, etc.)**	• Peer-reviewed scientific journals such as: IEEE Transactions on Power Electronics Technical reports from electronics and energy companies • Books specializing in control and power systems

1- Course Name
Professional ethics
2- Course code
NTU201
3- Available forms of attendance
My presence
4- Semester/Year
Decisions
5- Total study hours / Number of units
2*15=30Two units
6- Date this description was prepared
-6-202524
7- Name of course coordinator
the name: Ahmed Zaki Habib e-mail:ahmed.zaki.habib@gmail.com
8- Course objectives (general course objectives)
1-Understanding moral values in general **2-Identifying ethical institutional values in particular.** **3-Identifying the laws that govern institutional values.** **4-Working in accordance with ethical values within the organization by understanding rights and duties.** **5-Adherence to the rights and duties stipulated by law is evidence of commitment to professional ethics.** **6-Avoid all violations stipulated by law**
9- Course outcomes, teaching and learning methods, and assessment **Course Outcomes** **1-Knowledge and understanding of the basic concepts of professional ethics and their role in the work environment.** **2- Distinguishing the ethical principles associated with professional practices in different disciplines.**

3– Analyzing ethical situations related to work contexts and making responsible professional decisions.
4– Commitment to social responsibility and respect for corporate values in the work environment.
5– Developing ethical communication skills within the team and assessing the impact of unethical behavior on individuals and organizations.

identificationThis is a course of study that examines the ethical principles and values that govern individual conduct in professional practice, guiding them towards making responsible decisions based on agreed–upon ethical rules and behavioral standards within the profession. It aims to instill a commitment to professional responsibility and integrity, and to promote respect for laws and regulatory standards.

Its importance:

1. **Promoting integrity and professional responsibility among students before they enter the job market.**
2. **Developing professional competencies capable of making ethical decisions in the face of real–world challenges.**
3. **Building a work environment based on trust and mutual respect within organizations.**
4. **Achieving sustainable development by linking professional conduct to higher human values..**

How is it determined?:

1. **Compliance with laws, regulations, instructions, and especially rules of conduct.**
2. **Refer to international ethical charters.**
3. **Analyzing the nature of the profession and its ethical requirements.**
4. **Identifying the values associated with the profession.**
5. **Reputation protectionAvoid legal and media problems**

Outputs	Teaching and learning methods	Evaluation methods
ج- Knowledge **A1 – Explanation of the basic concepts of professional ethics** **A2 – Identifying the core ethical values that govern professional practices, such as honesty and integrity** **A3 – Familiarity with local and international professional regulations, instructions, and laws** **A4– Recognizing the importance of professional commitment in order to enhance trust**	**5. Theoretical lectures** **6. Group discussions** **7. Case studies**	**21. Theory tests** **22. Performance evaluation** **23. Class participation** **24. Research reports**
B – Skills **B1 –Knowledge, understanding, and explanation of the basic concepts related to professional ethics** **B2 – Getting acquainted with ethical charters and professional conduct.** **B3 – Explaining the importance of adhering to ethical values** **B4– Analyzing realistic professional situations with an ethical dimension and proposing appropriate solutions.**	**16. Interactive lectures** **17. Real–life case studies** 18. Case studies	**21. Short and final tests** **22. Performance evaluation during theoretical training** **23. Projects or case studies that reflect the practical and theoretical application of ethical values**
C– Values **A1–CommitmentWith a culture of professional ethics** **Part 2–to bearIndividual and collective responsibility in applying rules of conduct** **Q3–respectRegulations and instructions without compromise** **C4– Promoting a spirit of initiative in spreading awareness of professional ethics**	**16. Interaction and application** **17. Practicing professional communication skills** 18. **Collaborative learning within a team and taking ethical responsibility**	**21. Continuous assessment** **22. Performance evaluation during theoretical training** **23. Final assessment**

10- Course structure(**Theoretical vocabulary**)					
Week	Hours	Required learning outcomes	Unit/Topic Name	Teaching method	Evaluation Method
the first	2	**Understanding the concepts and definitions of professional ethics**	**What is professional ethics?**	**1.Professional Ethics Film Screening. 2.Discussion of real-life cases and key questions about how individuals in society can adhere to ethical principles.**	**A short quiz (objective questions) on topics related to professional ethics, assessed through the evaluation of answers.**
the second	2	**Understanding the importance of professional ethics and their impact on social relationships**	**The importance professional ethics**	**Asking questions and writing answers**	**The same method as above**
the third	2	**Understanding the concept of professional conduct rules, its principles, and its elements**	**Ethical thought and professional conduct**	**The same method as above**	**Evaluating student performance during the simulation (application accuracy + response time).**
Fourth	2	**Clarifying social responsibility and its most**	**Moral dependency and social responsibility**	**Theoretical workshops, simulations**	**Assessment, skills tests**

		important principles			
Fifth	2	**Important discussions about topics such as duty, job, work ethics, profession and its importance, and the work environment.**	**Important terms abo professional ethics**	**Written test, performance evaluation**	**Written test, comprehensive assessment of student skills**
Sixth	2	**Understanding th types of organizations and the impact of ethi in the work environment**	**Organizations and Professional Ethics**	**Lecture, case study**	**Written test, case study analysis**
Seventh	2	**Work on the topics studied in the past weeks.**	**worksheet**	**Presentations, workshops**	**Testing, performance evaluation**
Eighth	2	**Understanding the nature of public service and its components, and recognizing the public employee and their role in upholding professional ethics.**	**Job and professional ethics**	**Training, interactive lectures**	**Assessment, written test**
Ninth	2	**Identifying the most important rights and duties of a public employee,**	**Employee rights and duties**	**Case studies, lectures**	**Written test, case analysis**

		which the employee must adhere to.			
tenth	2	**Understanding administrative law through studying the employee's relationship to professional ethics**	**Administrative law a professional ethics**	**Written test**, **performance evaluation**	**Written test**, **comprehensive assessment of student skills**
eleventh	2	**Understanding the different types of education**, **whether primary or higher**, **and the nature of its ethics**.	**Ethics of Education**	**Lectures**, **training**	**Testing**, **performance evaluation**
twelfth	2	**Learn about the codes of conduct for various professions**, **which focus on the ethics of each profession**.	**Different ethics**	**Interactive lectures**, **discussions**	**Written test**, **discussion questions**
thirteenth	2	**Understanding the topic of integrity and all related topics**, **and its relationship to professional ethics**.	**Integrity and professional ethics**	**The same methods as above**	**Written test**, **case study analysis**
fourteenth	2	**Understanding the ethics of political action**	**Political ethics**	**The same methods as above**	**Testing**, **performance evaluation**

		in ancient history and their responsibility towards society			
fifteenth	2	**Worksheets for topics studied in previous weeks ar lectures**	**worksheet**	**The student presented the paper and it was discussed by the professor and the student**.	**Assessment**, **written test**

11- Curriculum Development Plan

Continuously updating the curriculum to keep pace with labor market developments (Curriculum Update Committee, Scientific Committee) such as

9- Updating the curriculum to keep pace with developments in the field of professional ethics.

10-Holding scientific seminars with specialists in the field.

11-Monitoring social developments related to professional conduct rules.

12- Infrastructure

classrooms	**Classrooms are available that are equipped to accommodate students and designed to provide a suitable learning environment**.
11- Required textbooks	**Professional Ethics Lecture Notes** **Professional Ethics / Dr. Salem Mohammed**
12- Main references (sources)	**Organization Theory / Dr. Mohamed Hassan Al-Shammaa**
ز) **Recommended books and references (scientific journals, reports, etc.)**	**Administrative Law / Dr. Mazen Lilo Radi**
	Principles of professional ethics