Republic of Iraq

Ministry of Higher Education

and Scientific Research

Scientific supervision and

evaluation device

Academic program and course

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
College/Institute: Al- Hawija Technical Institute
Scientific Department: Electrical Technology Department
Academic or Professional Program Name: Technical Diploma in Electrical Technology
Final Certificate Name: Technical Diploma in Electrical Technology
Study System: Courses
Description Preparation Date: 25 /6/2025
File Filling Date: 25 /6/2025

Signature:

Department Head:

Parween Raheem Kareem

25 /6/2025

Signature:

Scientific Assistant Dean

Dr. Mohammed Jiad Ligy

25 /6/2025

Check the file before

Quality Assurance and University Performance Division:

Hamza Omar siddeeq

Signature: Ahmed Abed Khalaf

Dean's approval

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 Mission**
-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. 1. **Other external influences**
nothing

6. .**Program structure for the first and second levels**

Program Structure	Number of courses	Study unit	Percentage	Notes *
University Requirements	11	22	26.8%	9 Basic, 2 Optional
Institute Requirements	4	9	9.8%	3 Basic, 1 Optional
Department Requirements	26	72	63.4%	88 Basic, 4 Optional
Summer Training	Completed	-------	----------	
Other	nothing			

*Notes may include whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			Theoretical	Practical
2024-2025 First	NTU100	Human Rights and Democracy	2	0
	NTU101	English Language	2	0
	NTU102	Computer principles1	1	2
	NTU103	Computer principles2	1	2
	NTU104	Arabic Language	2	0
	NTU105	Sport	1	1
	NTU106	Franch Language	2	0
	TIHA100	Mathematic 1	2	0
	TIHA101	Mathematic 2	2	0
	TIHA102	Mechanical Workshop	0	3
	TIHA103	Vocational Safety	2	0
	ELTP100	Electrical Cicuit1	2	2
	ELTP101	Electrical Cicuit2	2	2
	ELTP102	Electronic 1	2	2
	ELTP103	Electronic 2	2	2
	ELTP104	Electrical Installation	2	2
	ELTP105	Digital Electronic	2	2
	ELTP106	Engineering Drawing	0	3
	ELTP107	Electrical Workshop	0	3
	ELTP108	Renewable Energy	2	0
	ELTP109	Electric Circuits Simulation	1	2
2024-2025	NTU200	English Language	2	0

Second	**NTU201**	**Professional Ethics**	**2**	**0**
	ELTP204	**D.C Machines**	**2**	**3**
	ELTP205	**Electrical networks 1**	**2**	**2**
	ELTP206	**Power electronics 1**	**2**	**3**
	ELTP207	**Maintenance Workshop 1**	**0**	**3**
	ELTP208	**Industrial Installation1**	**2**	**2**
	ELTP209	**Electrical Drawing**	**0**	**3**
	ELTP210	**Project1**	**0**	**2**
	ELTP211	**A.C Machines**	**2**	**3**
	ELTP212	**Electrical networks 2**	**2**	**2**
	ELTP213	**Power electronics 2**	**2**	**3**
	ELTP214	**Maintenance Workshop 2**	**0**	**3**
	ELTP215	**Electrical Installation 2**	**2**	**2**
	ELTP216	**Programmable Logic Controller (PLC)**	**1**	**2**
	ETP217	**Project 2**	**0**	**2**
	ETP218	**Protection 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 methods
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	
	Year	Special			permanent	lecturer
Assistant Professor	Electrical Engineering	Electric Power			permanent	
Assistant Lecturer	Electrical Engineering	Power & Machinery			permanent	
Assistant Lecturer	Electrical Engineering	Power & Machinery			permanent	
Assistant Lecturer	Civil Engineering	Roads & Transport			permanent	

12. Acceptance Criteria
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

Evaluation methods
Daily, semester and final tests, weekly reports
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

Program Skills Outline														
Year/Level	Course Code	Course Name	Mandatory or Elective	Required Learning Outcomes of The Program										
				Knowledge				Skills				Values		
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
2024-2025 First	NTU100	Human Rights and Democracy	University mandatory					✓			✓				✓
	NTU101	English Language								✓					
	NTU102	Computer principles1							✓						
	NTU103	Computer principles2							✓						
	NTU104	Arabic Language								✓					
	NTU105	Sport	University Elective							✓					
	NTU106	Language Franch								✓					
	TIHA100	Mathematic 1	Institute mandatory			✓									
	TIHA101	Mathematic 2				✓									
	TIHA102	Mechanical Workshop		✓	✓	✓	✓	✓				✓	✓	✓	
	TIHA103	Safety Vocational	Institute Elective	✓	✓		✓	✓			✓		✓	✓	
	ELTP100	Electrical Cicuit1	Department mandatory	✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP101	Electrical Cicuit2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP102	Electronic 1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP103	Electronic 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP104	Electrical Installation		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP105	Digital Electronic		✓	✓			✓	✓			✓	✓	✓	
	ELTP106	Engineering Drawing		✓		✓			✓			✓	✓	✓	
	ELTP107	Electrical Workshop		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP108	Renewable Energy	Department Elective	✓	✓		✓	✓				✓	✓	✓	
	ELTP109	Electric Circuits Simulation		✓	✓				✓			✓	✓	✓	
2024-2025 Second	NTU200	English Language	University mandatory					✓		✓					
	NTU201	Professional Ethics									✓				✓
	ELTP204	D.C Machines	Department mandatory					✓							✓
	ELTP205	Electrical networks 1						✓		✓					
	ELTP206	Power electronics 1							✓						
	ELTP207	Maintenance Workshop 1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP208	Industrial Installation1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP209	Electrical Drawing		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP210	Project1		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP211	A.C Machines		✓	✓	✓	✓	✓				✓	✓	✓	

	ELTP212	Electrical networks 2		✓	✓				✓			✓	✓	✓	
	ELTP213	Power electronics 2		✓	✓	✓	✓	✓			✓	✓	✓	✓	
	ELTP214	Maintenance Workshop 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP215	Electrical Installation 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ELTP216	Programmable Logic Controller (PLC)		✓	✓	✓	✓	✓				✓	✓	✓	
	ETP217	Project 2		✓	✓	✓	✓	✓				✓	✓	✓	
	ETP218	Protection system	Department Elective	✓	✓	✓	✓	✓				✓	✓	✓	
	ETP219	Microcontroller	5 units	✓	✓				✓			✓	✓	✓	

Course description form

1- Educational institution
Ministry of Higher Education and Scientific Research / Northern Technical University
2- Scientific Department
Department of Electrical Technologies
3- Course name/code
Electrical Circuits 1 / ELTP100
4- Available forms of attendance
• Weekly lesson schedule (theoretical + practical). • Scientific discussions, seminars and other extracurricular activities
5- Semester/year
The first / first
6- Number of study hours (total)
60
7- Date this description was prepared
2025/6/10
8- Course objectives (general objectives of the course)
• Introduce students to DC circuits and their components. • Understand the various calculations in DC circuits and familiarize themselves with various theories. • Learn about various measuring devices. • Solve basic technical problems in electrical circuits. • Improve personal productivity.
9- Course outcomes, teaching, learning and assessment methods

Outcomes	Teaching and learning methods	Evaluation methods

A- Knowledge A1- The ability to design circuits and analyze data. A2 - The ability to identify, formulate, and solve problems. A3 - Proficiency in the necessary mathematical and engineering sciences. A4 - The ability to use the technologies required in the work.	(Theoretical lectures / discussion groups / debates between students)	(Traditional tests, assignments, formative assessment)
B – Skills B1 - Learn to work collaboratively with colleagues to complete group projects. B2 - Be able to respond to technical challenges with initiative and independence. B3 - Be able to use all types of measuring devices. B4 - Have the ability to simplify complex electrical circuits.	(Presentation, explanation, questions and answers, discussion)	(Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams)
C- Values C1- Identify all types of electrical components and the properties of each component in an electrical circuit. C2- Understand how to select the appropriate components for an electrical circuit and how to calculate these components both practically and theoretically.	(Reports on scientific developments in the field of specialization, asking analytical and deductive questions)	(Self-assessment and peer assessment, participation and contribution)

C3- Understand how to perform calculations for electrical circuits using multiple methods and choose the easiest calculation method. C4- Handle electrical devices and circuits safely and correctly.		

10- Course structure

(Theoretical Vocabulary)

Week	Hours	Required learning outcomes	Unit name/subject	Teaching method	Evaluation method
First	2	Understands the units used and how to convert between them.	The system of units used in electricity and units of measurement for each substance (its parts and multiples). Mathematical applications for converting values using units.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Second	2	Identify the factors affecting resistance value.	Factors affecting resistance value 1-Specific resistance 2-Temperature coefficient	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Third	2	Learn to connect	DC circuits include:	Theoretical lectures,	Daily written tests, daily

		resistors in series in DC circuits.	Connecting resistors in series with examples	educational videos and discussions.	posts, midterm and final exams, homework.
Fourth	2	Learn how to connect resistors in parallel in DC circuits.	Connecting resistors in parallel with examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Fifth	2	Learn to connect the resistors in DC circuits.	Mixed connection of resistors with examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Sixth	2	Performs the required calculations when linking the stellar and triangular	Applications on series, parallel, mixed, star and triangular circuits	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Seventh	2	Analysis of electrical circuits according to Kirchhoff's theory of current and voltage in DC circuits.	Kirchhoff's Laws - Kirchhoff's Laws Definition of Current and Voltage with solved examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Eighth	2	Analysis of electrical circuits according to Maxwell's theory in DC circuits.	Maxwell's theory with solved examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Ninth	2	Analysis of electrical	Thevenin’s Theorem -	Theoretical lectures,	Daily written tests, daily

		circuits according to Thevenin's theorem in DC circuits.	Definition of the Theorem - How to Apply It in DC Circuits	educational videos and discussions.	posts, midterm and final exams, homework.
tenth	2	Analysis of electrical circuits according to Norton's theory in DC circuits.	Norton's Theorem - Definition of the Theorem - How to Apply It in DC Circuits	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
eleventh	2	Optimal solution based on Thevenin and Norton theorem.	Applications of Thevenin and Norton's Theorem	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
twelfth	2	Define the theory and derive its relationships.	Maximum power transfer theory.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
thirteenth	2	Analysis of electrical circuits with two or more sources according to the superposition theory.	Superposition Theorem - Definition of the Theorem - How to Apply It in DC Circuits.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
fourteenth	2	Optimal solution based on superposition theory.	Applications of Superposition Theory with Solutions and Examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.

fifteenth	2	Definition of current source and voltage source (DC power supply) and how to convert from one to the other.	Congruence Theorem - Definition of the Theorem - Steps for applying it to solve DC circuits that contain more than one source - Solving examples	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
(Practical Vocabulary)					
Week	Hours	Required learning outcomes	Unit name/subject	Teaching method	Evaluation method
First	2	Learn about laboratory equipment and how to write reports.	Training on laboratory work methods, reporting methods, and equipment use.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Second	2	Calculates resistor values by colors and how to use an ohmmeter.	Calculating resistances by color - the resistance measuring device (ohmmeter) in measuring resistances by color - and calculating the error percentage.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Third	2	Use of laboratory voltage	Use of DC voltage	Practical lectures, educational	Daily practical tests, daily posts, midterm

		measuring devices	measuring devices.	videos and discussions.	and final exams, weekly reports
Fourth	2	Use of laboratory voltage and power meter	Use of DC measuring devices (such as ohmmeters) – Use of DC power supplies.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Fifth	2	Measure the electromotive force and internal resistance of the battery.	Measurement of electromotive force and internal resistance of a battery - Study of the thermal coefficient of resistance.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Sixth	2	Learn to check the resistance of conductors available in the laboratory.	Determine the specific resistance of some conductors.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Seventh	2	Understanding Ohm's Law in the Lab	Check Ohm's law in practice.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Eighth	2	Learn how to connect resistors in series, parallel and compound in a practical way.	Connecting resistors in series - parallel - mixed (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports

Ninth	2	Converting star to triangular and vice versa in DC circuits.	Equation of star and triangular DC circuits (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
tenth	2	Connecting electrical circuits and verifying Kirchhoff's first and second theories in the laboratory.	- Practical verification of Kirchhoff's first law - Practical verification of Kirchhoff's second law	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
eleventh	2	Connect electrical circuits and verify Thevenin's theorem in the laboratory.	Verification of Thevenin's theorem	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
twelfth	2	Connect electrical circuits and verify Norton's theory in the laboratory.	Verification of Norton's theorem	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
thirteenth	2	Definition of current source and voltage source (DC power supply) and how to convert from one to the other in the laboratory.	Verification of the correspondence theory	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports

fourteenth	2	To practically implement the theory of exchange between different sources.	Verification of exchange theory	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
fifteenth	2	Verifying the theory with its three possibilities	Power distributor - the theory of maximum possible power transfer in direct current	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports

11- Curriculum development plan

Include a lecture titled "Solar Energy and Smart Batteries," which will include the following topics:

1- Introduction to Solar Energy

- Definition of solar energy as a renewable resource.
- Comparison between solar energy and conventional energy sources.
- Types of solar cells: monocrystalline, polycrystalline, thin-film

2- Solar Cell Operating Principle

- Photoelectric Effect
- Connection in Electrical Circuits Using Solar Panels
- Voltage and Current Curve (IV Curve)

3- Smart Batteries

- Definition and Function
- Types (Lithium-ion, Lead-acid, etc(.
- The Relationship Between Smart Batteries and Solar System Efficiency

4- Integrating systems into practical applications

- Assembling a miniature solar power circuit using a small solar panel and battery
- Measuring voltage and current differences as lighting changes
- Practical experiment calculating the power output of a solar panel

12- Infrastructure

Classrooms, laboratories and workshops	Available
1- Required textbooks	Available
2- Main references (sources)	Electrical Technology (Theraja A.K. Theraja).
a) Recommended books and references (scientific journals, reports, etc.)	1- Electrical Technology (Edward Hughes). 2- Basic Circuits (A-M-F Brooks) pregame press 3- Introduction to Electric circuits (M Romanize) John Willy.
b) Electronic references, websites, etc.	https://www.youtube.com/@user-ld6bv4po3e

1- Educational institution
Ministry of Higher Education and Scientific Research / Northern Technical University
2- Scientific Department
Department of Electrical Technologies
3- Course name/code
Electrical Circuits 2 / ELTP101
4- Available forms of attendance
• Weekly lesson schedule (theoretical + practical). • Scientific discussions, seminars and other extracurricular activities
5- Semester/year
The Second / first
6- Number of study hours (total)
60
7- Date this description was prepared
2025/6/10
8- Course objectives (general objectives of the course)

- Introduce students to AC circuits and their components.
- Understand the various calculations in AC circuits and familiarize themselves with various theories.
- Learn about various measuring devices.
- Solve basic technical problems in electrical circuits.
- Improve personal productivity.

9- Course outcomes, teaching, learning and assessment methods

Outcomes	Teaching and learning methods	Evaluation methods
A- Knowledge A1- The ability to design circuits and analyze data. A2 - The ability to identify, formulate, and solve problems. A3 - Proficiency in the necessary mathematical and engineering sciences. A4 - The ability to use the technologies required in the work.	(Theoretical lectures / discussion groups / debates between students)	(Traditional tests, assignments, formative assessment)
B – Skills B1 - Learn to work collaboratively with colleagues to complete group projects. B2 - Be able to respond to technical challenges with initiative and independence. B3 - Be able to use all types of measuring devices. B4 - Have the ability to simplify complex electrical circuits.	(Presentation, explanation, questions and answers, discussion)	(Oral exams / Written exams / Weekly reports / Daily attendance / Participation and interaction in lectures / Midterm and final exams)
C- Values C1- Identify all types of electrical components and the properties of each component in an electrical circuit. C2- Understand how to select the appropriate components for an electrical circuit and how to calculate	(Reports on scientific developments in the field of specialization, asking analytical and	(Self-assessment and peer assessment, participation and contribution)

these components both practically and theoretically. C3- Understand how to perform calculations for electrical circuits using multiple methods and choose the easiest calculation method. C4- Handle electrical devices and circuits safely and correctly.	deductive questions)	

10- Course structure

(Theoretical Vocabulary)

Week	Hours	Required learning outcomes	Unit name/subject	Teaching method	Evaluation method
First	2	Learn about alternating current, its properties and waveform.	Alternating quantities, including their definition, characteristics of alternating current, how alternating current is generated, its waveform, and its special relationships.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Second	2	Identify the direction of alternating current and its phase angle.	Alternating vector quantities - definition - phase and direction representation - phase angle and how to find it.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.

Third	2	Learn how to find the phase angle between voltage and current for each circuit with examples.	Study the effect of alternating current on a circuit containing only resistance, a circuit containing only pure inductance, and a circuit containing only pure capacitance.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Fourth	2	Finding the relationship between current and voltage in the three cases - phase angle - total impedance of the circuit with applied examples.	Effect of alternating current on a circuit containing a resistance and an inductance in series - A circuit containing a resistance and a capacitor in series.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Fifth	2	Analysis of circuits containing resistance, inductance, and capacitance in parallel	Effect of alternating current on a circuit containing a resistance and an inductance in parallel - A circuit containing a resistance and	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.

			a capacitor in parallel.		
Sixth	2	Find the total impedance, total permittivity, current, voltage and phase angle for series and parallel impedance circuits with examples.	Use description 1-7 (J-Operator) or compound operator	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Seventh	2	Find the bandwidth, find the quality factor, and draw the relationship between inductive and capacitive reactance with frequency.	Resonant circuits, including: series resonant circuit, definition of resonance and how to reach it, calculation of current, voltage, impedance and frequency angle at resonance.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
Eighth	2	Find bandwidth - plot graphs with frequency - find quality factor and solve examples.	Parallel resonant circuit - definition - calculation of current, voltage, impedance, impedance angle, phase angle and resonant frequency.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.

Ninth	2	Analysis of electrical circuits according to Norton and Thevenin's theorems in AC circuits.	Applying theories such as Norton's theorem, Thevenin's theorem, and matching to AC circuits with solving examples.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
tenth	2	Definition of active power and how to calculate it - Reactive power and how to calculate it. Theoretically.	Power in AC circuits, including power calculations in: circuits containing only resistance, circuits containing only inductance, and circuits containing only capacitors.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
eleventh	2	Definition and effect on AC circuits - How to improve power factor - with practical examples.	Total apparent power (definition) - How to draw the power triangle - Power factor.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
twelfth	2	Derivation of its relations - with practical examples.	Maximum power transfer theory in current circuits.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.

thirteenth	2	Using the ohmmeter in series and parallel - the ammeter and voltmeter method - the compensation method - using the Wheatstone bridge.	Practical methods for measuring high, medium and small value resistors.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
fourteenth	2	Calculating line and phase current and voltage, total power, line power - phase power - advantages of each connection when used in balanced and unbalanced loads.	Three-phase AC circuits - single phase - two phases - three phases.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
fifteenth	2	How to find the total power in this way and in the case of star and triangular connections - using two watt meters - using three watt meters.	Methods for measuring power for three-phase loads - Wattmeter and how to connect it to the circuit to measure active power.	Theoretical lectures, educational videos and discussions.	Daily written tests, daily posts, midterm and final exams, homework.
(Practical Vocabulary)					
Week	Hours	Required learning outcomes	Unit name/subject	Teaching method	Evaluation method

First	2	How to connect inductive and capacitive resistance in an electrical circuit.	(RL) series, (RC) series, (RL) parallel, (RC) parallel.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Second	2	Practical application of measuring the phase angle of a series circuit and extracting the results in the laboratory.	Phase Angle Measurement – (RLC) Series (Multiple Exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Third	2	Practical application of measuring the phase angle of a parallel circuit.	Phase Angle Measurement – (RLC) Parallelism (Multiple Exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Fourth	2	Apply the resonant circuit in series and parallel and extract the results in the laboratory	- Series resonance - Parallel resonance	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Fifth	2	Connecting an electrical circuit, analyzing it, and extracting results according to Thevenin and Norton's theories of	-Verification of Thevenin’s theorem for alternating current - Verification of Norton's theorem for	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports

		alternating current.	alternating current		
Sixth	2	Measurement with different types of regular and electronic voltmeters and comparison between them according to the extracted results.	Comparison between conventional and electronic voltmeters in measuring DC and AC voltages.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Seventh	2	Be able to measure power using multiple voltmeters and multimeters.	Measuring power using three voltmeters and three ammeters (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Eighth	2	Using a wattmeter to measure power and a power laboratory practically	Measuring power and power factor using a wattmeter (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
Ninth	2	Professionalism in power factor improvement processes and measuring them with high accuracy in the laboratory.	Power Factor Improvement (Multiple Exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
tenth	2	Performing calculations and extracting practical results for three-phase current circuits	Voltage and current in three-phase current circuits, star	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams,

		connected in star and triangular configurations	and triangle connections.		weekly reports
eleventh	2	Learn about the Wheatstone bridge, how it works, and how the bridge is balanced.	Resistance using a Wheatstone bridge (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
twelfth	2	Use the voltage divider method in the load and no-load states.	Loaded voltage divider – Unloaded voltage divider.	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
thirteenth	2	Professionalism in measuring different types of voltages and different values using a voltmeter.	Measuring resistance using an ammeter and voltmeter (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
fourteenth	2	Methods of using operational amplifiers when connecting them to an electrical circuit.	Using a magnifier to measure high value resistors (insulators) (multiple exercises).	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams, weekly reports
fifteenth	2	Absolute control of the ammeter, increasing its effectiveness and calibrating it to adjust the	-Increase the measuring range of the ammeter - Calibrate the ammeter using	Practical lectures, educational videos and discussions.	Daily practical tests, daily posts, midterm and final exams,

		reading of laboratory results.	another device.		weekly reports

11- Curriculum development plan

Include a lecture entitled "Inverter" that includes the following topics:

1- Introduction to Inverters:

- Definition of inverters.
- Simplified inverter circuit diagram.
- Types of inverters.

2- Inverter Operating Principle

- DC input from a battery or solar panels
- Switching stage to convert current into MOSFETs
- Filtering stage
- Output

3- Basic Inverter Components

- Battery: The DC power source
- Electronic switches for switching current, such as MOSFET or IGBT
- Protection circuit: To protect against overload or overheating

4- Integrating systems into practical applications

- Solar energy systems
- Powering home appliances from batteries
- Practical experiment in calculating the energy output of a solar panel

12- Infrastructure

Classrooms, laboratories and workshops	Available
1- Required textbooks	Available
2- Main references (sources)	Electrical Technology (Theraja A.K. Theraja).
a) Recommended books and references (scientific journals, reports, etc.)	1- Electrical Technology (Edward Hughes). 2- Basic Circuits (A-M-F Brooks) pregame press

	3- Introduction to Electric circuits (M Romanize) John Willy.
b) Electronic references, websites, etc.	https://www.youtube.com/@user-ld6bv4po3e

1. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
2. Section scientific
Department of Electrical Technology
3. Course Name/Code
Electrical installations ELTP104
4. Available attendance forms
in presence
5. semester/year
Decisions
6. Number of study hours(kidney)
4*15=60
7. Date this description was prepared
19-6-2025
8. Course objectives (general objectives of the course)
1- Training the student on electrical installation methods and comparing different types installatio **2 - Understand the main concepts and know the rules and laws used in calculating electri loads and cable si** **The capacity of the circuit breaker to be connect** **3- Introducing the student to the types of cables and the load capacity of each cable. To t maximum A current that can pass throug** **4 -Preparing the student to study the various calculations required in electrical installatio and to become familiar with the various theories for studying those calculation**
9. Outputs The decision Teaching, learning and assessment methods **Course outcomes** **1. Understanding the basics of electricity(voltage, current, resistance).** **2. Installation of foundations(Lighting, control circuits, motors).** **3. Use of protective devices (breakers, fuses, grounding).** **4. Reading electrical diagrams And implement it practically.** **5. Implementing safety procedures And risk prevention.** **6. Breakdown maintenance(Detect and repair common faults).**

identification It is a theoretical-practical course that aims to teach students the basics of designing, installing, and maintaining electrical systems in facilities (such as homes, laboratories, and workshops), which the course seeks to achieve for students.

Its importance:

1- Providing safe electricity For homes and factories.

2- Prevent fires and electric shocks.

3- Operate machinery and equipment efficiently.

4- Meet the requirements of regulations and standard specifications.

5- Facilitate maintenance and reduce breakdowns

How is it determined?:

1. **Study of labor market needs**
2. **Review of professional standards**
3. **Evaluate students' capabilities and the workshop**
4. **Formulate clear and measurable goals**
5. **Linking with other courses**
6. **Periodic update according to developments**

Outputs	Teaching and learning methods	Evaluation methods
A-knowledge **A1-During the academic year, the student learns the basics of electrical installations.** **A2-The student learns about electrical installations, how to read them, and the factors affecting them..** **A3-The student learns the types of connections used in home installations..** **A4-knowledgeSafety standards and the risk of electric shock**	**1- Theoretical lectures using presentations.** **2- Real-life case studies of foundation failures.** **3- Short research on modern distribution systems**	**1- Written tests (essay and objective questions).** **2- Analytical reports on protection systems.** **1-Theoretical tests** **2- Practical tests** **3- Reports**
B - Skills **B1-Ability to design and conduct experiments, analyze and interpret data.**	**1- Practical experiments (workshops on electrical installations).**	**1- Practical performance tests (such as installing a lighting circuit).**

B2-Ability to identify, formulate and solve problems. **B3 -Mastery of the necessary mathematical, basic and engineering sciences.** **B4-Ability to use the techniques and skills required in the work.**	**2- Simulation using programs such as: AutoCAD Electrical.** **3- Field visits to electrical construction sites**	**2- Project evaluation (design and implementation of a control circuit)**
C- Values **A1-Commitment**with safety standards at work **A2-to bear Professional responsibility In implementing the foundations** **A3-the job With a team To implement electrical projects** **A4-respectStandards and regulations(such as delivery terms)**	**1- Group discussions on professional ethics.** **2- Role playing For situations that require ethical decisions.** **3- Observe and imitate models of distinguished professionals.**	**1- Peer evaluation For team performance.** **2- Observing behavior during practical training (commitment to safety).** **3- Self-reports on practical experiences**

10. Course structure A- (Theoretical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	**1-Explaining the curriculum vocabulary to the student** **2- Learn about the classification of materials (conductive, semiconductor, and insulator) and the properties of each type.**	**Overview of the curriculum vocabulary for the subject and classification of the subjects into:** • **electrical conductors** • **semiconductors** • **Insulators**	**An introductory lecture about the method + classification of materials (conductor, semiconductor, insulator)**	**Short test (theoretical) on material classification**
the second	**2**	**1-The student's understanding of the basics of electricity, including potential difference, current intensity, resistance, and the influencing factors.** **2-Identify the components of electrical circuits** **3-Knowing electrical switches and lamps, their types and uses**	**Basics of Electrical Principles** **Factors affecting the intensity of electric current, resistance.** **Factors affecting resistance.** **Components of an electrical circuit**	**Theoretical explanation of the principles of electricity (potential difference, current, resistance) + presentation of the components of an electrical circuit**	**Electrical circuit components identification test.**
the third	**2**	**1-Introducing the student to electrical conductive materials** **2-Understanding the characteristics and uses of materials in the electrical field**	**electrical conductors** **Their advantages and uses in the field of electricity**	**Study of the properties of copper and aluminum (electrical, mechanical) + their applications**	**Practical Evaluation (Comparison between Copper and Aluminum)**

		3-Knowing the properties that make materials good conductors of electricity			
Fourth	2	1-Introducing students to insulating materials 2-Understanding and studying the properties of insulating materials and their temperature tolerance 3-Introducing students to solid insulating materials	Insulating materials Examples of insulating materials Properties of insulating materials in relation to their temperature tolerance solid insulating materials	Explanation of insulating materials (air, oil, solids) + permittivity laws	Short test on the properties of insulators
Fifth	2	1-Study of the properties of magnetic materials 2-Knowing the types of magnetic materials and their associated terms 3-Study of the laws related to magnetism	Magnetic properties of materials Solved examples	Lecture on Magnetism (Force, Magnetic Materials, Laws)	Students are assessed individually by giving them the opportunity to participate in the class by answering questions.
Sixth	2	1-Understanding Magnetic Circuits 2-Study and application of laws and solved examples of magnetism	magnetic circuits Apply Kirchhoff's laws to it. Solved examples on magnetism	Application of Kirchhoff's laws to magnetic circuits	Short tests andEvaluate participation in discussions
Seventh	2	1-Introducing the student to the mechanical properties of electrical materials 2-Study and apply laws and solve examples on the topic	Mechanical properties of electrical materials - Tension, stress, elongation, elasticity, other - Solved exam	Study of mechanical properties (tensile, stress, elasticity)	Theoretical test on mechanical properties
The eighth	2	1-Study the stages of electrical energy 2-Knowing how electrical energy is generated, transmitted and distributed	The stages of electrical energy Generation, transmission and distribution	Explanation of the stages of energy transmission (generation, transmission, distribution) + distribution panels	Power transmission diagram + distribution panels explanation
Ninth	2	1-Knowing how to supply the consumer with electricity from a secondary station 2-Introducing students to home and industrial distribution panels 3-Teaching a student how to supply electricity to a building In addition To know the capacity of the electrical transformers used	Basic principles on how to prepare a consumer from a secondary station, the materials required for this, and the type of consumer	Theoretical explanation of generation, transmission and distribution systems. +Visual presentation of building power supply diagrams + practical examples. +Workshop on installing distribution panels	Short test on types of stations and transformer capacities

tenth	**2**	**1-Knowing and studying electrical switches and their types 2-Teaching students to draw electrical circuits and diagrams**	**Types of switches used in electrical installations and their importance**	**Explanation of electrical switch types + drawing of application circuits**	**Circle drawing test using keys.**
eleventh	**2**	**1-Introducing the student to the protection devices used inFoundationselectrical 2-Learn about fuses, their types, advantages and disadvantages 3-Teaching the student how to select a fuse and coordinate the fuses in the same electrical circuit.**	**Protection devices used in installations Electrical (Fuses)**	**Study of fuses (types, specifications, how to choose them)**	**Evaluating the selection of suitable fuses for different circuits**
twelfth	**2**	**1-Study of circuit breakers, their types, composition and working principle 2-Knowing how to distribute loads inside the building and calculating the circuit breaker capacity**	**Circuit Breakers**	**Electrical breakers explained(MCCB, MCB, ELCB) + Installation**	**Short tests andEvaluate participation in discussions**
thirteenth	**2**	**1-Study of electrical wiring systems 2-Knowing how to number wires and cables at work and taking into account the colors of the wires when installing them**	**Electrical wiring systems Electrical Wiring Systems**	**View wiring systems(BB, TRS, PVC) + Wire numbering**	**Wiring systems knowledge assessment.**
fourteenth	**2**	**1-Teaching students about the types of home electrical installations 2-Knowing the advantages and disadvantages of each type, safety requirements, the general form of the foundation, and the tools used in it.**	**Home electrical installations**	**Home Foundation Study (Safety Requirements, Tools, Cost)**	**Evaluate participation in discussions**
fifteenth	**2**	**1-Study grounding and know its components and connection and connection equipment 2-Know the different methods of reducing grounding resistance and the**	**Grounding**	**Lecture on grounding (components, measurement methods, importance)**	**Short tests andEvaluate participation in discussions**

		devices and equipment that must be grounded. **3-Teaching the student the importance of good grounding, the difference between grounded and ungrounded systems, and measurement methods.**			

10- Course structure B-(Practical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	**1-Implementing safety procedures in workshops and factories.** **2-First aid for electric shock.** **3-Take fire prevention measures.**	**Warnings and precautions to be taken while working in workshops and factories, as well as training on how to provide first aid for electric shock and how to warn of fires.**	**Lecture and practical application of safety and first aid**	**Short theoretical test + practical application for first aid and safety**
the second	**2**	**Recognizing symbols for electrical tools and components.**	**Knowing the symbols for devices, tools, and all necessary pendants used in electrical installations**	**Display electrical symbols and classify tools**	**Symbol and Tool Classification Test**
the third	**2**	**to implement Twist and T-connector for VIR wire**	**Make a connection of type (Twist) and also a link of type (T Wire of type (VIR)**	**Practical training on Wasalti work Twist and T**	**Practical evaluation Implementation of Twist and T joints**
Fourth	**2**	**Implement a link Married Joint and T-joint with welding.**	**Marriage bond Married Joint) Type connector (T) Then do the welding for it.**	**Practical application of my connection Married Joint and T with Weld**	**Evaluation of the quality of joints and welding(Married Joint and T)**
Fifth	**2**	**to implement connection Straight And a link T For wire CTS With welding.**	**Make a straight connection (Straight) and also a link of type (T) Wire type (CTS) Then weld the joint.**	**Practical application of to implement connection Straight and T for CTS wires with solder**	**Check straight connections and T with welding**
Sixth	**2**	**Connecting German conductors and paper-insulated cables with soldering**	**Connecting aluminum conductors and paper insulated**	**Practical training for Connecting and welding aluminum and paper cables**	**Aluminum joint and welding evaluation**

			cables and then how to do their welding		
Seventh	2	1- Installation of a lighting circuit with a switch and one lamp (Cleat). 2- Installing a circuit of two lamps in series with a switch. (Cleat)	Making a circuit containing a switch and one lamp with a wiring system of type (Cleat) Making a circuit containing two lamps in series with a switch with a wiring system of type (Cleat)	Practical application of Installing a simple lighting circuit (switch + lamp) with a system Cleat	Circuit installation test (switch + lamp)
The eighth	2	Installing a circuit of two lamps in parallel with a switch(Cleat)	Make a simple circuit on two lamps in parallel with a switch (Cleat)	Implementation and practical application of Installing two lamps in parallel in a system Cleat	Parallel Circuit Installation Evaluation
Ninth	2	Installing a light point, fan, and socket with separate control(Cleat)	Wiring a lighting point, a ceiling fan point, and a socket, with separate control for each point, using a wiring system of the type (Cleat)	Practical training for Installation of lighting circuit, fan and socket with separate control	Evaluation of lighting, fan and socket circuit installation
tenth	2	Two-way lamp control circuit installation (ladder system).	Wiring to control one lamp from two places (wiring used in ladder)	Training on Two-way lamp control circuit installation (ladder system)	Ladder circuit installation test
eleventh	2	Installing a 3-way lamp control circuit using Two Pole Relay or Intermediate Switch.	Make a circuit to control a lamp from three places using a two-pole relay (Two Pole Relay) and also by using the middle key (Intermediate Switch)	Practical application of Installing a 3-way control circuit using Two Pole Relay	3-Place Control Circuit Installation Evaluation
twelfth	2	Installing a control circuit for multiple lamps using Two-way switch.	Establish a circuit to control multiple lamps using a two-way switch (Two-way switch)	Practical training for Installing a control circuit for multiple lamps using Two-way switch.	Multi-lamp circuit installation evaluation
thirteenth	2	Installation and operation of a fluorescent lamp with Thermal Relay	Testing and setting up an AC fluorescent lamp using a thermal starter (Thermal Relay) with his examination	Practical application of Installation and operation of a fluorescent lamp with Thermal Relay	Test and Fluorescent lamp operation check

fourteenth	**2**	**Installing two fluorescent lamps in series with Chook 40W and check it.**	**Set up two 20W fluorescent lamps in series with (Chook) Its capacity is 40 watts, then check it.**	**Implementation and practical application of Installing two fluorescent lamps in series with Chook.**	**Evaluation of installing two fluorescent lamps in series**
fifteenth	**2**	**Installation of a high-pressure mercury lamp and a sodium lamp**	**Establishment of the mercury lamp (High pressure mercury vapor lamp) And also a lamp of the type (Sodiuin vapor lamp)**	**Practical training for Installation of a mercury lamp and a sodium lamp**	**Mercury and sodium lamp installation test**

11. Curriculum Development Plan

Continuously developing educational content to keep pace with modern requirements, such as:

1-IncludeQualitative specializations in line with digital transformation

2-OrganizationDiscussion sessions with industry leaders

3- Follow-upGlobal technical developments in the electrical field

4- ResidenceApplied exhibitions to showcase modern innovations

5-DevelopmentField training programs in leading companies

12. infrastructure

Classrooms, laboratories a workshops	**Well-equipped and equipped halls and laboratories are available to provide a suitable environment for teaching and learning.**
1- Required textbooks	**Home and industrial electrical installations** **•Basics of Electricity and Electrical Circuits** **•International Electrical Code (IEC) - Latest Editi**
2- Main References (Sources)	**"Electrical Engineering: Principles and Applications"** **"Electrical Engineering: An Introduction"** **"Fundamentals of Electrical Engineering"** **"Electricity and Electronics for HVAC"**
A)Recommended books and references (scientific journals, reports, etc.)	**Electrical Systems Design** **Electric Power Systems: A Conceptual Introduction** **"Electrical Engineering: Know It All"**

B)Electronic references, websites,.....	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

13. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
14. Sectionscientific
Department of Electrical Technology
15. Course Name/Code
Occupational safetyTIHA103
16. Available attendance forms
in presence
17. semester/year
Decisions
18. Number of study hours(kidney)
2*15= 30
19. Date this description was prepared
19-6-2025
20. Course objectives (general objectives of the course)
1. Educating the student about the dangers of electric current: Understand ingReasons Which leads to Injuries Electrical and types Injuries **Different, which enhances their ability to prevent and deal with them properly.** **2. Teaching proceduresFirst aid PrimaryAcquiring skillsnecessaryTo presentReliefImmediate assistance to those injured by electric current,** **Including breathing appartificialAnd treat burns effectively.** **3. Understanding systemsWarningFrom Fire: Learn How Systems WorkWarningVarious fire extinguishers, including detectors** **Fire, smoke and heat detectors, learn how to install and maintain them.** **4. Applying occupational health and safety guidelines: Understanding and following general safety guidelines in work environments, and the ability to** **Reducing unhealthy behaviors and practicesSafe.**

5. Familiarity with Personal Protective Equipment: Knowing how to use personal protective equipment correctly, including:

This is a means of protecting eyesight and hearing.and clothesProtective, to ensure safetyindividualsDuring work.

6. Risk assessment and application of prevention strategies: The ability to identify risks in the work environment and apply prevention strategies.

Effective prevention and risk reduction to ensure a safe and healthy working environment.

21. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

1- Understanding the causes and effects of electrical injuries.
2- The ability to provide first aid to the injured.
3- Knowledge of fire alarm systems and how to deal with them.
4- Applying occupational health and safety guidelines in work environments.
5- Use personal protective equipment correctly.

Identification The Occupational Safety course is a core course that aims to provide students with the concepts and skills necessary to deal with occupational hazards, particularly those related to electrical current and fire-fighting systems, as well as personal protective measures. The course focuses on the theoretical aspect by examining the causes of electrical injuries, first aid methods, fire alarm systems, and the use of personal protective equipment.

Its importance:

1. **Protecting lives– Prevention of injuries and deaths resulting from electric shock, fires, and occupational hazards.**
2. **Legal Compliance- Applying global safety standards and avoiding penalties.**
3. **Promoting preventive awareness- Training employees on dealing with emergencies and first aid.**
4. **Improve productivity– Reducing accidents ensures a safe and efficient work environment.**

How is it determined?:

1. **Compliance with laws and application of safety standards**
2. **Accident preventionAvoid work-related injuries and deaths**
3. **Cost savingsReducing accident losses and compensation**
4. **Qualifying cadresFilling the labor market's need for safety experts**

5. Reputation protectionAvoid legal and media problems		
Outputs	Teaching and learning methods	Evaluation methods
A- knowledge **A1 - Understanding occupational hazards and prevention methods** **A2 - Knowledge of international safety standards** **A3 - Understanding Emergency Procedures** **A4- Identify personal protective equipment**	**1. Theoretical lectures** **2. Group discussions** **3. Case studies**	**1. Theoretical tests** **2. My work performance evaluation** **3. Safiya's participation** **4. Research reports**
B - Skills **B1- Ability to implement safety procedures in the work environment** **B2 - Skill in using personal protective equipment correctly** **B3 - Ability to analyze and evaluate risks** **B4- Basic first aid skill**	**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 **A1- Commitment to a culture of safety as a priority in the work environment** **A2- Take individual and collective responsibility for implementing safety standards.** **A3- Respect the regulations and preventive instructions without compromise** **A4- Promoting the spirit of initiative in spreading awareness of occupational safety**	**1. Interaction and application** **2. modern technologies** **3. group learning**	**1. Continuous assessment** **2. Performance evaluation during practical training** **3. Final evaluation** **4. Field visit reports**

22. Course structure **(Theoretical Vocabulary)**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2	**1- Understanding the main causes of electric shock 2- Identifying the conditions and factors causing electrical accidents.**	**Causes of electric shock**	**1.Show videos of electrical accidents with analysis of the causes. 2.Discussing real-life cases of common errors that cause electrical injuries.**	**Short test (objective questions) on the main causes of injury**
the second	2	**1- Classification of types of electrical injuries (burns, electrocution, organic effects) 2- Analysis of the severity of injuries according to the circumstances of the accident.**	**Types of electrical injur**	**1.Explaining the types of injuries (burns, electrocution, organ damage) through pictures and medical explanation. 2.Workshop on identifying injuries based on current intensity**	**Practical evaluation of classification of fictitious injuries by type**
the third	2	**1- Applying the steps to rescue the injured personBy electric current 2- Practice safety procedures during the rescue operation.**	**Relief The injured By current electrician - clearance The injured**	**1.Practical training on isolating the injured person from the electrical source using isolation tools.. 2.Simulate rescue scenarios with safety rules in place.**	**Evaluate students' performance during the simulation (application accuracy + response time).**

Fourth	2	**1- Mastering basic artificial respiration techniques 2Treating different types of burns according to their degree**	**Artificial respiration - burn treatment**	**Workshops, simulations**	**evaluation , Tests Skills**
Fifth	2	**Assessing the cumulative understanding of previous concepts**	**exam monthly**	**Written test, performance assessment**	**a test written, evaluation comprehensive For skills The student**
Sixth	2	**1- Analysis of the effects of electrical leakage to the groun 2- Understanding t risks of ground volta**	**Effects of electric current passing through the ground**	**Lecture, case study**	**hidEditorial, case study analysis**
Sevent	2	**1- Explanation of the components of a fire alarm system 2 - Understanding how the central control unit works**	**Fire Alarm Systems - Control Unit**	**Presentations, workshops**	**Test, performance evaluation**
The eighth	2	**1- Distinguishing between types of fire detectors (heat, smoke, flame) 2- Determine the optimal use of each type of reagent.**	**Fire Detectors - Heat Detectors - Smoke Detectors**	**Training, interactive lectures**	**evaluation, a test Editorial**
Ninth	2	**1 - Classification of buildings according to alarm system requirements 2- Applying equipment standards for alarm systems.**	**buildings that He should Provide it System warning from fire**	**Case studies, lectures**	**Written test, case analysis**

tenth	2	**Assessing understanding of fire protection concepts**	**monthly exam**	**Written test, performance assessment**	**Written test, comprehensive assessment of student skills**
eleventh	2	**1- Comparison of different audible alarm methods 2- Choosing the appropriate system according to the work environment**	**Alarm meansaudibleAnd bells and trumpets**	**Lectures, training**	**Test, performance evaluation**
twelfth	2	**1- Application of occupational health and safety guidelines 2 - Analysis of the impact of the work environment on safety**	**Occupational Health and Safety Guidelines**	**Interactive lectures, discussions**	**Written test, discussion questions**
thirteenth	2	**1 - Identify common unsafe practices 2- Proposing solutions to reduce risky behaviors**	**limit from Actions and practices Other Amana**	**Case studies, workshops**	**a test Editorial, analysis studies the condition**
fourteenth	2	**1- Selection and use of personal protective equipment 2- Applying vision and hearing protection standards**	**Personal Protective Equipment - Eye Protection - Hearing Protection**	**Training, presentations**	**Test, performance evaluation**
fifteen	2	**1- Evaluation of th effectiveness of different protective clothing 2- Applying criteri for selecting protecti clothing according t risks.**	**Personal protective clothing**	**Lectures, training**	**evaluation, a test Editorial**

23. Curriculum Development Plan

Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as: **1- Updating the curriculum to keep pace with developments in the field of occupational safety.** **2- Holding scientific seminars with specialists in the field.** 3- **Keeping up with scientific developments in electrical safety systems.**	
24. infrastructure	
Classrooms, laboratories and workshops	**There are classrooms equipped to accommodate students and prepared to provide a suitable learning environment.**
3- Required textbooks	**Occupational Safety Lectures Booklet** **"Principles of Occupational Safety and Health" by Philip J. Landrigan and William J. Rosenstock**
4- Main References (Sources)	**"Fundamentals of Occupational Safety and Health" by Mark A. Friend and James P. Kohn** **"Introduction to Safety Management" by David L. Goetsch**
A-Recommended books and references (scientific journals, reports, etc.)	**"Safety and Health at Work: A Practical Guide" by Michael R. McGarry "Occupational Health and Safety Management: A Practical Approach" by Charles D. Reese**
B- **Electronic references, websites,.....**	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

25. Educational institution
Ministry of Higher Education and Scientific Research / Northern Techni University / Al-Hawija Technical Instit
26. Sectionscientific
Department of Electrical Technology
27. Course Name/Code
Electronics1
28. Available attendance forms
My presence
29. semester/year
Decisions
30. Number of study hours(kidney)
21 theoretical and 2 practical lessons every week 2*15=60
31. Date this description was prepared
19-6-2025
32. Course objectives (general objectives of the course)
1- Introducing the student to the different electronic components. **2 -** The student will be able to understand: electronic components made from different types of semiconductors. -Its composition-Its properties-Its uses in electronic circuits-Its Applications-Analysis of electronic circuits using optoelectronic components and their applications.
33. OutputsThe decisionTeaching, learning and assessment methods **Course outcomes** **By the end of the course, the student will be able to:** **7. a descriptionBasic principles of operation of electronic components (e.g., diodes, transistors, amplifiers)** **8. to explainProperties of analog and digital electronic circuits and their theoretical analysis** **9. Understand the role of electronic components in the design of modern systems (e.g., power supplies, digital logic).** **identificationThis course description provides a concise summary of the main course features and the learning outcomes expected of the student,**

demonstrating whether the student has made the most of the available learning opportunities. It must be linked to the program description.

Its importance:

1- **Ensure that the skills acquiredKeep up with industry needs (e.g., circuit design, use of measuring instruments)**
2- **All modern devices rely on electronics, from smartphones to artificial intelligence systems and robots.**
3- **Students can develop innovative electronic projects (e.g., alarm systems, home automation, small medical devices).**
4- **Contributes to the knowledge economy by manufacturing local electronic products instead of relying on imports.**

How is it determined?

7. **Study of labor market needs**
8. **Review of professional standards**
9. **Evaluate students' capabilities and the workshop**
10. **Formulate clear and measurable goals**
11. **Linking with other courses**
12. **Periodic update according to developments**

Evaluation methods	Teaching and learning methods	Outputs
1- Written tests (essay and objective questions). **2- Analytical reports on protection systems.** **1-Theoretical tests** **2- Practical tests** **3- Reports**	**1- Theoretical lectures using presentations.** **2- Real-life case studies of foundation failures.** **3- Short research on modern distribution systems**	أ- **knowledge** **Describe the basic principles of operation of electronic components (e.g., diodes, transistors, amplifiers).** **Explain and analyze the properties of analog and digital electronic circuits theoretically.** **Understand the role of electronic components in the design of modern systems (e.g., power supplies, digital logic)**

1- Practical performance tests. 2- Project evaluation (design and implementation of a control circuit)	1- Practical experiments. 2- Simulation using programs such as: AutoCAD Electrical. 3- Field visits to electrical construction sites	**B - Skills** Analyze the behavior of electronic circuits using laws and theories (e.g., Ohm's Law, current and voltage analysis). Comparison of types of electronic circuits (analogvs.digital) and identify its practical applications. Evaluating the performance of electronic circuits based on criteria of energy efficiency, cost, and stability
1- Peer evaluationFor team performance. 2- Observing behavior during practical training (commitment to safety). 3- Self-reports on practical experiences	1- Group discussions on professional ethics. 2- Role playingFor situations that require ethical decisions. 3- Observe and imitate models of distinguished professionals.	**C- Values** **Commitment**with safety standards at work **to bearProfessional responsibilityIn implementing the foundations** **the jobWith a teamTo implement electrical projects** **respectStandards and regulations**

34. Course structure A- (Theoretical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	2	3-Explaining the curriculum vocabulary to the student 4- Learn about the classification of materials (conductive, semiconductor, and insulator) and the properties of each type.	Semiconductor theory - Atomic structure - Energy levels - Crystals - Conduction in crystals - Gap current - How gaps move	An introductory lecture about the method + classification of materials (conductor, semiconductor, insulator)	Short test (theoretical) on the classification of materials
the second	2	4-Student understanding of the basicselectronics 5-Identify components Mosul sub-continent disaster	Doping - positive crystal type (PNegative crystal of type (NElectron current and hole current - total resistance	Theoretical explanation of the principles of theTronic	Component identification testCrystal of the Mosul sub-continent.
the thirdAnd the fourth	4	4-Introducing the student to electrical materialssemiconductor 5-Understanding the features and uses of	Semiconductor diodes - junction (PN) Formation of the evacuation zone - barrier potential - energy hill - thermal effects - biased diode -	Study of the properties ofSilicon and germanium (Electrical, Mechanical) + their applications	Practical evaluation (comparisontheSilicon and germanium)

		materials in the field ofElectronic	forward bias - reverse bias - characteristic curves in the forward and reverse directions - evanescent crossing current - minority carrier current - surface leakage current - breakdown potential - breakdown potentialPIV) Maximum forward current - Maximum reverse voltage - (PIVmax) – Equivalent circuit of a diode		
Fifth	2	4-Study of a binary current integrator 5-Understanding its types and applications	Diode as a rectifier – H wave rectifier – DC curr value and its calculatio Effective value – Out frequency	a lectureDiodes as a current integrator	Students are assessed individually by giving them the opportunity to participate in the class by answering questions.
Sixth	2	3-Understand the topicFull wave unification 4-Calculating effective current values 5-Understanding the difference between a half-wave and full-wave rectifier	Full-wave rectifier – using a center-phase transformer – bridge rectifier – calculating continuous and effective current values – extracting the output frequency – comparison between half-wave rectifier and full-wave rectifier – comparison between full-wave rectifiers	Extract output frequency	Short tests andEvaluate participation in discussions
SeventhThe eighth	2	3-Introducing the student toFilters and their types	Filters - Capac filtration - Filter (filter (RC) – DC rip output volt	studyFilters, their types and comparison between them	Theoretical test aboutFilters
Ninth and tenth	2	3-Explaining the feeding circuits and their types 4-Knowing the difference between negative, positive and compound pruning	Ripple Factor Voltage Multiplier Trimmer Circuits - Positive Trimmer - Negative Trimmer - Compound Trimmer	Explanation of the mechanism of pruning circuits	Surprise test for evaluation departments
eleventh and twelfth	4	4-Introducing the student to the Zener diode 5-Knowing the difference between a	Zener diode - structure - symbol - properties - breakdown refraction Zener refraction -	Theoretical explanation of Zener diode and refraction + refraction potential	Short test aboutZener diode

		Zener diode and a normal diode 6-Explaining the types of refraction	breakdown voltage - power tolerance - Zener impedance - temperature effects - Zener approximation Continuous voltage regulation		
13th and 14th	4	4-Introducing the student totransistor 5-Explanation of its composition and types 6-Explaining the areas of the zener	bipolar junction transistor-Its composition-Its regions-Its symbol-bias efforts-(αDC)-(βDCThe relationship between (αDC)-(βDCTypes of bias-Approximate connection formulas in transistor and equivalent circuit	studytransistor(Types, specifications, how to choose them)	Selection EvaluationtransistorsSuitable for different circles
Fifthten	2	3-studyTransistor characteristics curves 4-Explanation of work areas	Transistor characteristics curves-Work areas definition (ICBO) and (ICEO)-Current gain curve-The relationship between (IC) and (ICEO)	Explain the properties of the transistor, its working areas, and clarify the gain curve.	Knowledge assessmentWork areas

11- Course structure B-(Practical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first		-Familiarization with laboratory equipment - yourReport cardFor Afires.	Training on how to use laboratory equipment, prepare reports, and occupational safety	- Demo - Group practical application	Short theoretical test + practical application for first aid and safety
the second		- Drawing a voltage-current curve - Comparison between silicon and germanium	Forward bias diode properties and plotting of the diode characteristics of silicon and germanium	- Individual laboratory experiments - Analysis of results	Symbol and Tool Classification Test
the third		- Draw a reverse bias curve. Breakdown voltage measurement	Properties of diode in reverse bias and plotting of the	- Group work - Discuss the results	Practical evaluation

			characteristics curve of silicon and germanium type		
Fourth		- Installation of the calendar circuit - Measure the output voltage	half-wave rectifier	- Practical application - Using the oscilloscope	Lab Report + Performance Test
Fifth		- Comparison of evaluation efficiency - Output signal analysis	Full wave rectifier (bridge)	- Comparative experiments - Data analysis	Practical assessment + short test
Sixth		Circuit design using transformer - Measure the ripple ratio	Full wave rectifier using center-phase transformer	- Teamwork - Discussion of results	Technical report + presentation of results
Seventh		- Filter effect analysis - Time constant calculation	Half wave rectifier with filter (RC) and candidate (RL)	- Laboratory experiments - Signal analysis	Practical test + report
The eighth		- Comparison of filter performance - Improve output quality	Full wave rectifier with filter (RC) and candidate (RL)	- Compare results - Edit circles	Performance Evaluation + Theory Test
Ninth		- Apply trimming types - Modify waveforms	Trimming circuits (positive, negative, and compound)	- Practical experiments - drawing waveforms	Lab Report + Classification Test
tenth		- Building a multiplier circuit - Measure the output voltage	DC voltage multiplier circuits (triple to quadruple)	- Practical application - Performance measurement	Practical assessment + math test
eleventh		- Output signal analysis - Understanding voltage stabilization	Obligor (positive, negative and compound)	- Laboratory experiments - Data analysis	Technical Report + Short Test
twelfth		- Breakdown voltage measurement - Characteristics analysis	Properties of Zener diode in forward bias and reverse bias	- Group work - Discuss the results	Practical assessment + theoretical test
thirteenth		- Design of an organizing circle - Voltage stability measurement	Properties of Zener Diode in Voltage Regulation with a Fixed Resistive Load	- Practical application - modifying values	Lab Report + Performance Test
fourteenth		- Circuit response analysis - Adjusting load values	Properties of Zener Diode in	- Stepwise experiments - Analysis of results	Practical assessment + analytical test

			Voltage Regulation with Variable Resistive Load		
fifteenth		-Measuring transistor coefficients -Understanding the properties of conduction	Common base transistor properties	- Laboratory experiments - Drawing curves	Technical Report + Classification Test

35. Curriculum Development Plan

Continuously developing educational content to keep pace with modern requirements, such as:

1-IncludeQualitative specializations in line with digital transformation

2-OrganizationDiscussion sessions with industry leaders

3- Follow-upGlobal technical developments in the fieldElectronics

4- ResidenceApplied exhibitions to showcase modern innovations

5-DevelopmentField training programs in leading companies

36. infrastructure

Well-equipped and equipped halls and laboratories are available to provide a suitable environment for teaching and learning.	Classrooms, laboratories a worksho
1. Principles of Electronics 1984 - Written by Malvi Translated by Badr Muhammad Ali Al-Watar - Dr. Ri Kam 2. Industrial Electronics 1985 - Written by: Di Mahdi Faris, Nabil Younis Abdullah, Helmy Am	5- Required textbooks
3. An Introduction to semiconductors (KI Gross & Rwoo	6- Main References (Sources)
4. Power Electronics / Diaa Mahdi Faris, Youss Ibrahim Taha, Mosul University Press 19	1)Recommended books and references (scientific journals, reports, etc.)
https://youtu.be/yEHKsiIyF8s?si=CbGnmTHRUx2tBg2N	2)Electronic references, websites,

37. Educational institution
Ministry of Higher Education and Scientific Research / Northern Techni University / Al-Hawija Technical Instit
38. Sectionscientific
Department of Electrical Technology
39. Course Name/Code
Electronics2
40. Available attendance forms
My presence
41. semester/year
Decisions
42. Number of study hours(kidney)
21 theoretical and 2 practical lessons every week 2*15=60
43. Date this description was prepared
19-6-2025
44. Course objectives (general objectives of the course)
1- Introducing the student to the different electronic components. **2 -** The student will be able to understand: electronic components made from different types of semiconductors. -Its composition-Its properties-Its uses in electronic circuits-Its Applications-Analysis of electronic circuits using optoelectronic components and their applications.
45. OutputsThe decisionTeaching, learning and assessment methods **Course outcomes** **By the end of the course, the student will be able to:** **10. a descriptionBasic principles of operation of electronic components (e.g., diodes, transistors, amplifiers)** **11. to explainProperties of analog and digital electronic circuits and their theoretical analysis** **12. Understand the role of electronic components in the design of modern systems (e.g., power supplies, digital logic).** **identificationThis course description provides a concise summary of the main course features and the learning outcomes expected of the student,**

demonstrating whether the student has made the most of the available learning opportunities. It must be linked to the program description.

Its importance:

5- **Ensure that the skills acquiredKeep up with industry needs (e.g., circuit design, use of measuring instruments)**
6- **All modern devices rely on electronics, from smartphones to artificial intelligence systems and robots.**
7- **Students can develop innovative electronic projects (e.g., alarm systems, home automation, small medical devices).**
8- **Contributes to the knowledge economy by manufacturing local electronic products instead of relying on imports.**

How is it determined?

13. **Study of labor market needs**
14. **Review of professional standards**
15. **Evaluate students' capabilities and the workshop**
16. **Formulate clear and measurable goals**
17. **Linking with other courses**
18. **Periodic update according to developments**

Evaluation methods	Teaching and learning methods	Outputs
1- Written tests (essay and objective questions). **2- Analytical reports on protection systems.** **1-Theoretical tests** **2- Practical tests** **3- Reports**	**1- Theoretical lectures using presentations.** **2- Real-life case studies of foundation failures.** **3- Short research on modern distribution systems**	**ب- knowledge** **Describe the basic principles of operation of electronic components (e.g., diodes, transistors, amplifiers).** **Explain and analyze the properties of analog and digital electronic circuits theoretically.** **Understand the role of electronic components in the design of modern systems (e.g., power supplies, digital logic)**

1- Practical performance tests. **2- Project evaluation (design and implementation of a control circuit)**	**1- Practical experiments.** **2- Simulation using programs such as: AutoCAD Electrical.** **3- Field visits to electrical construction sites**	**B - Skills** **Analyze the behavior of electronic circuits using laws and theories (e.g., Ohm's Law, current and voltage analysis).** **Comparison of types of electronic circuits (analogvs.digital) and identify its practical applications.** **Evaluating the performance of electronic circuits based on criteria of energy efficiency, cost, and stability**
1- Peer evaluationFor team performance. **2- Observing behavior during practical training (commitment to safety).** **3- Self-reports on practical experiences**	**1- Group discussions on professional ethics.** **2- Role playingFor situations that require ethical decisions.** **3- Observe and imitate models of distinguished professionals.**	**C- Values** **Commitment**with safety standards at work **to bearProfessional responsibilityIn implementing the foundations** **the jobWith a teamTo implement electrical projects** **respectStandards and regulations**

10.Course structure A- (Theoretical vocabulary) electronic 2					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
First and Scond	**4**	**5-studyTransistor characteristics curves** **6-Explanation of work areas**	**Transistor characteristics curves-Work areas definition (ICBO) and (ICEO)-Current gain curve-The relationship between (IC) and (ICEO)**	**Explain the properties of the transistor, its working areas, and clarify the gain curve.**	**Knowledge assessmentWork areas**

Third and Fourth	**4**	**3-Teaching the student the typesTransistor bias circuits 4-Comparison between them**	**Transistor bias circuits-Al-Qaeda bias-emitter bias**	**studyBias circuits and explaining the difference between base and emitter bias**	**Evaluate participation in discussions**
Fifth and Sixth	**4**	**4-Explaining the application of the transistor in small signal amplification 5-Study of voltage gain, current gain and power**	**Transistor in small signal amplification-AC equivalent circuit-perfect approximation-Hybrid Constants-Equivalent circuit using coefficients (h)-Effort Gain-Gain the current-Gaining Power-Input and output resistors-small signal amplifiers-Al-Qaeda Market**	**Lecture onEquivalent circuit (Its components, measurement methods, importance)**	**Short tests andEvaluate participation in discussions**
Seventh And Eighth	**4**	**1- Explaining the use of transistors in voltage regulation.**	**Using transistors in voltage regulation - series regulator - parallel regulator DC voltage source circuit**	**A theoretical explanation of voltage regulation and the difference between series and parallel types**	**Evaluate participation in discussions**
Ninth and Tenth	**4**	**1-FThey are a compositionJFET and its characteristics - Characteristic curves analysis**	**Junction field effect transistor (JEFT) – Its structure – Its symbol – Theory of action – Characteristic curves – Interchangeable conductivity curve – Definition of the narrowing potential (VP),(IDSS),(VGSOff) – Property curves (MOSFET) – (D-MOSFET) – (E-MOSFET)**	**1-theoretical lecture 2-Visual presentation 3-Group discussion**	**Short test + analytical assignment**
Eleventh and Twelfth	**4**	**1-Determine the action point 2-Bias circuit analysis**	**Bias circles (FET) – Constant current source bias – Self-biased working point – Equivalent circuit of (FETUseFET) In magnifying the small sign**	**1-Solve numerical examples 2-Software simulation**	**Written assessment + problem solving**
Thirteenth	**2**	**1-Understanding Zoom Applications 2-Amplifier circuit analysis**	**Comparison between the types of (FET) (FET, MOSFET) and between (BJT**	**1-Case studies 2-Circuit analysis**	**Theoretical test + circuit analysis**
Fourteenth	**2**	**1-Comparison of properties**	**Light-dependent resistor (LDR) – Light Emitting Diode**	**1-Comparison table 2-Group discussion**	**Comparative report + conceptual test**

		2-TIron suitable applications	**– Photodiode Seven-Segment Board Its Structure and Applications**		
Fifteenth	**2**	**1-Understanding the work of optical elements 2-Application Analysis**	**Phototransistor - Structure - Operation - Applications - Process**	**1-Showcase experiences 2-Data analysis**	**Short test + homework**

10.Course structure B-(Practical vocabulary) electronic 2					
week	watch	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first		**- Current and voltage gain analysis -Drawing characteristic curves**	**Common emitter transistor properties**	**- Teamwork - Data Analysis**	**Practical assessment + theoretical test**
the second		**- Calculate voltage and current gain Frequency response analysis**	**Common Base Amplifier (Finding Voltage Gain and Current Gain)**	**- Advanced experiments - Using a signal generator**	**Lab report + analytical test**
the third		**- Hybrid Transaction Measurement - Circuit Analysis**	**Common emitter amplifier (find voltage gain and current gain) and plot frequency response curve**	**- Practical application - Model analysis**	**Performance Evaluation + Short Test**
Fourth		**- Voltage regulator design - Performance analysis**	**Common collector amplifier (finding voltage gain and current gain) and plotting the frequency response curve**	**- Practical project - Stability test**	**Project Report + Presentation**
Fifth		**- Determine hybrid coefficients (h) - Analysis of common emitter circuits**	**Hybrid transaction measurement (h-paramet.) for the common emitter formula**	**- Laboratory experiments - Use of measuring devices**	**Lab Report + Arithmetic Test**
Sixth		**- Comparison of hybrid transactions - Analysis of differences**	**Hybrid transaction measurement (h-paramet.) for the**	**- Making comparisons - Drawing curves**	**Practical assessment + theoretical test**

			common base formula		
Seventh		- Application of coefficients in design - Power gain calculation	Hybrid transaction measurement (h-paramet.) for the common denominator formula	- Circuit design - Performance measurement	Technical Report + Design Test
The eighth		- Voltage regulator design - Stability testing	Use of transistor in voltage regulation circuits (series regulator)	- Practical project - Modify parameters	Performance Evaluation + Presentation
Ninth		- FET characteristics analysis - VI curves drawing	Properties of field effect transistor (FET)	- Laboratory experiments - Comparison with BJT	Practical test + report
tenth		- Voltage gain calculation - Impedance analysis	common source amplifier	- Practical application - Using the oscilloscope	Performance Evaluation + Short Test
eleventh		- Current gain analysis - Matching circuit design	Joint Bank Amplifier	- Group work - Edit circuits	Lab report + analytical test
twelfth		- Optical response measurement - Efficiency calculation	Photodiode properties	- Experiments under variable lighting - Data recording	Practical assessment + theoretical test
thirteenth		- Alarm circuit design - Sensitivity test	Application circuit for using a photodiode	- Mini-project - Testing the waters	Practical presentation + technical report
fourteenth		- Optical properties analysis - Plotting response curves	Properties of phototransistor	- Advanced experiments - Using light sources	Lab Report + Performance Test
fifteenth		- Building an optical control system - Measuring response time	Application circuit for using phototransistor	- Final Project - Functional Test	Comprehensive Evaluation + Final Presentation

12.Curriculum Development Plan

Continuously developing educational content to keep pace with modern requirements, such as:

1-IncludeQualitative specializations in line with digital transformation

2-OrganizationDiscussion sessions with industry leaders

3- Follow-upGlobal technical developments in the fieldElectronics

4- ResidenceApplied exhibitions to showcase modern innovations

5-DevelopmentField training programs in leading companies	
13.infrastructure	
Well-equipped and equipped halls and laboratories are available to provide a suitable environment for teaching and learning.	Classrooms, laboratories a worksho
1. Principles of Electronics 1984 - Written by Malvi Translated by Badr Muhammad Ali Al-Watar - Dr. Ri Kam 2. Industrial Electronics 1985 - Written by: Di Mahdi Faris, Nabil Younis Abdullah, Helmy Am	7- Required textbooks
3. An Introduction to semiconductors (KI Gross & Rwoo	8- Main References (Sources)
4. Power Electronics / Diaa Mahdi Faris, Youss Ibrahim Taha, Mosul University Press 19	1)Recommended books and references (scientific journals, reports, etc.)
https://youtu.be/yEHKsiIyF8s?si=CbGnmTHRUx2tBg2N	2)Electronic references, websites,

.46 Educational institution
nistry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
.47 Scientific Department
Department of Electrical Technology
.48 Course Name/Code
DC machines
.49 Available attendance forms
In-person
.50 semester/year
Modular Courses
.51 (Number of study hours (total
75 = 15 *5
.52 Date this description was prepared

19-6-2025

53. (Course objectives (general objectives of the course

1. **the basic theoretical principles of DC machines, including understand similarity between magnetic and electric circuits, and the concepts of electromotive force and magnetism.**
2. **Distinguish between different types of DC machines in terms of their power supply method (parallel, series, compound, self-contained, separate), and understand their main components and functions.**
3. **alyze the electrical and mechanical performance of DC generators and otors by studying efficiency and losses, and knowing how to calculate power, torque, and voltage equations.**
4. **Understand various operating effects such as product reaction, voltage d speed regulation, parallel operation conditions of generators, as well as starting, stopping and reversing applications in motors.**
5. **Master performance-related calculations such as efficiency, ectromotive force, resistance and critical speed, and speed and torque regulation under different loading conditions.**
6. **Learn about solar pumping systems linked to DC motors, understand their configuration, advantages, and applications in industrial and agricultural fields .**

54. Course outcomes , teaching, learning and assessment methods

Course outcomes

13. **Gain basic theoretical knowledge related to DC machines, their components and operating methods.**
14. **Develop the computational and technical skills necessary to analyze the performance of generators and motors.**
15. **Develop the ability to apply concepts in practical fields, especially solar pumping systems.**
16. **Promoting professional values and awareness of the importance of electrical energy and its sustainable uses.**

My theory - This course covers the study of It is decided : identification DC machines in terms of their composition, internal structure, and basic ,operating principles, with a focus on the types of generators and motors their operating characteristics, and analyzing their performance under various operating conditions. The course also covers calculations of electromotive force, efficiency, torque, and speed regulation, in addition to the applications of these machines in solar pumping systems. The course aims to prepare students to understand the theoretical and

practical aspects of these machines and their use in various energy fields .

: Its importance

-1 ,Understand the basics of electrical machine operation especially DC generators and motors, which enhances a deep understanding of the structure of electrical .power systems

-2 Enhance 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, linking .the theoretical and practical aspects

-4 ,Preparing students for renewable energy applications especially in systems such as solar pumping that rely .primarily on DC motors

-5 Qualifying students to work in the maintenance and operation of machines in industrial facilities, power .plants, and the field of solar energy

-6 ,Enhance understanding of the concepts of losses efficiency, and speed regulation, which are essential in .any efficient power system

? How is it determined

.19 Study of labor market needs
.20 Review of professional standards
.21 Evaluate students' capabilities and the workshop
.22 Formulate clear and measurable goals
.23 Linking with other courses
.24 Periodic update according to developments

Evaluation methods	Teaching and learning methods	Outputs
Written tests (essay and -1 . (objective questions Analytical reports on protection -2 . systems Theoretical tests-1 Practical tests -2	**-1 Theoretical lectures: to provide basic concepts and .detailed explanation Presentations and visual -2 media: to explain the**	**ت- knowledge Knowledge of the structure and -A1 parts of DC machines such as generators and motors and their basic .components**

Reports -3	machine installation and .operating stages Class discussions: to -3 enhance critical and .analytical understanding Solving classroom -4 problems and exercises: to apply mathematical and .technical concepts Field visits or virtual -5 laboratories: to enhance understanding by linking it .to real-life application Homework and short -6 research: to expand self-knowledge and develop .analytical skills	Understand the working principle -A2 of DC generator and motor and the ,types of power supply (separate .(parallel, series, combined Distinguish between types of losses -A3 and efficiency and how to calculate .them theoretically ,Analysis of load characteristics -A4 voltage and speed regulation of DC .machines Identifying the methods of starting -A5 engines, speed control and braking .(stopping) Understand the relationship -A6 between voltage, current and torque in .different operating conditions Knowledge of DC machines -A7 applications in industrial fields, and renewable energy systems such as solar .pumping systems
Detailed laboratory reports for -1 .each experiment Tests The process inside The -2 . laboratory Observation Direct from before -3 Professor during to implement . Experience Evaluation performance -4 Students in solution problems And . connect Circles Show verbal or writing For the-5 . project practical basic	For direct laboratory -1 .experiments Training practical The -2 wave from before The teacher) Education Cooperative -3 work within difference small Projects Miniature To solve . problems Applied	B - Skills Operation and testing of DC - B1 .machines in a laboratory environment Measuring the electrical properties -B2 of generators and motors (such as .(voltage, current, efficiency Draw and analyze experimental -B3 curves such as magnetization curves .and load curves Diagnose minor faults and -B4 determine the causes of abnormal .performance Implementation and connection of -B4 practical circuits for starting and speed .control systems Preparing technical reports based -B5 on practical experiences and measured .data
Direct classroom and laboratory -1 observation: To assess behavior and discipline in the classroom and .laboratory : evaluation the job Collective -2 from during quality cooperation . inside The group Calendar Self or calendar Peer -3 ,evaluation : to measure interaction . trust, and accountability Commitment In time And -4 . delivery Reports in Its dates Share The student in -5 Discussions Safiya and interaction Positive	Group discussions and .1 classroom activities: to encourage cooperation and .respect for opinions Participation in the job -2 Laboratory Collective : for development spirit team And bear Responsibility Observation Direct inside -3 Laboratory : for planting Commitment And discipline . instructions teacher -4 Continuous : to plant values like Trust Scientific And . respect Laws Storm mental and -5 positions Dramatic or	C- Values Adherence to occupational safety -A1 rules inside the laboratory when .handling machines Teamwork and cooperation with -A2 colleagues in implementing .experiments and solving problems Assume responsibility and -A3 discipline in performing duties and .practical activities Developing the spirit of initiative -A4 and innovation in finding practical .solutions to technical problems Respect and maintain laboratory -A5 .tools and equipment Enhancing self-confidence when -A6 conducting experiments and submitting .reports

	simulation Real : To plant values Ethics and respect Professional	**Commitment to scientific ethics in -A7 preparing reports and documenting .results**

(Course structure A- **(Theoretical vocabulary** .55					
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	watches	week
Short test (theoretical)	**An introductory lecture about the method + definitions of terms in magnetic + circuits computational examples**	**- Magnetic circuits Calculating - magnetomotive force Similarities between magnetic circuits and . electric circuits**	**Explaining the-5 curriculum vocabulary to the student Learn about-6 magnetic circuits and their similarities to .electrical circuits**	**2**	**the first**
Theoretical test	**theoretical explanation For the basic principles of DC + machines presentation of the parts of a DC machine**	**Basic principles of DC machines - Main parts of machines - Magnetic poles - Product .The external structure -**	**Student-6 understanding of the working principle of .DC machine Student's mouth for-7 the parts of a DC .machine**	**2**	**the second**
Theoretical test	**Presentation on the types of DC machines calculation examples + to calculate the induced electromotive force generated in each type of machine and to calculate the losses and efficiency of the machine**	**:Types of DC machines - separate power supply self-power supply - parallel - series) (compound Efficiency of DC - machines - Losses Types of losses - fixed) (losses and variable losses Power distribution stages in DC machines - Giving computational examples on how to calculate efficiency and losses**	**Introducing the-6 student to the types of DC machines and classifying them according to the type of power supply and the method of connecting .the field coils The student learns-7 how to calculate the efficiency of the .machine The student learns-8 how to measure the various losses in the .machine The student learns-9 the stages of power distribution in DC .machines**	**2**	**the third**
Theoretical test	**+ Presentation Calculation Examples**	**Electromotive force Factors affecting strength ctromotive force - giving hematical examples of how to calculate force**	**The student should -1 define the concept of electromotive force and distinguish it from .electric potential**	**2**	**Fourth**

		ctromotive force for all types .Generators	The student should -2 explain the factors that affect the amount of .electromotive force The student should -3 apply the appropriate physical laws to calculate the .electromotive force The student will -4 solve numerical problems related to calculating the electromotive force of different types of .generators The student should -5 be able to distinguish between types of generators (DC, AC) in terms of the method of generating driving .force The student should -6 use the technical data of the generators to the EMF calculate .generated by them The student should -7 link physical variables such as the number of ,turns, magnetic flux and speed with the .EMF value resulting		
Practical test in -1 the laboratory: to assess the student's ability to draw and analyze the magnetization curve and determine the resistance and critical velocity .from the data Analytical -2 :laboratory reports The student is required to document the readings, analyze the results, and calculate critical values with a physical .interpretation	A theoretical -1 presentation supported by illustrations of the magnetization curve a data through and aprojector discussion of the curve's behavior when the field and current .change Direct laboratory -2 experiment using a DC machine to measure the no-load voltage at different speeds, and draw the .magnetization curve Analytical activities -3 and group discussions to solve real-life	dy of magnetization curve (curve) load (and how to find (resistance ritical and critical speed on gnetization curve examples of how Driving force calculation ctrical and critical resistance itical speed of DC machines	The student -1 explains the behavior of the magnetization curve of a DC machine in the no-load condition and deduces the relationship between voltage and magnetic field. The student -2 calculates the critical resistance and critical speed theoretically and practically using experimental equations and diagrams and deduces their effect on the self-excitation process in .the generator	2	Fifth

Short written test -3 (Quiz)	numerical examples including calculating critical ,EMF resistance, and critical .speed		-3 The student applies the steps of analyzing and calculating the electromotive force in different operating conditions with a practical explanation of the magnetization .prevention		
A detailed -1 analytical laboratory report Short written test -2 :(Quiz) Theoretical and numerical questions that measure the student's understanding of voltage regulation concepts and load .characteristics Practical -3 evaluation inside the laboratory	Theoretical explanation supported by interactive graphic displays: Presenting performance curves for each type of DC machine with practical examples from industrial realities, showing how voltage or torque changes with load .changes Integrated practical application :laboratory Conduct experiments DC machines on ,mounted, series) compound) to record ,values of voltage current, speed and .torque Voltage regulation analysis is performed practically by comparing the voltage under no load and .under full load	Study the load characteristics of all types of DC machines, draw their curves, and study the voltage regulation of different types of .generators	The student explains -1 the behavior of DC machines under the influence of loads of all types (motors and ,generators: shunt series, compound), and analyzes their operational characteristics based .on performance curves The student -2 accurately calculates the voltage regulation ,of DC generator types compares their performance under different load conditions, and is able to deduce the physical effects behind each .behavior The student applies -3 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 .machines	2	Sixth
Laboratory -1 report Drawing -2 performance curves Calculate -3 voltage regulation and product .reaction effect Analyze the -4 method of reducing the effect by using an alternating pole	A detailed -1 theoretical explanation supported by graphs and diagrams: explaining the load characteristics and the effect of the load on ,voltage and torque with comparative curves between .generator types	duct reaction and its effect pregnancy and explaining s to reduce the effect of oduct reaction hematical examples	The student explains -1 the operating characteristics of DC motors under load with the ability to analyze the change in performance through voltage-current, speed-torque, and efficiency-.load curves The student explains -2 the phenomenon of product reaction and	2	Seventh

or brush .distribution Short written test -5 (Quiz) Mathematical -6 examples on voltage regulation and voltage calculation under load	Show a video or -2 practical simulation of the product's reaction using An explanatory video, then a detailed discussion of ways to .reduce it		its effect on the magnetic field and voltage regulation, and compares methods for reducing it, such as ,distributing the turns using an alternating or opposite pole, and the inclination of the .brushes The student applies -3 analytical steps to calculate voltage regulation and the effect of product reaction through realistic numerical .examples		
A written test -1 that includes interpretive questions and drawing diagrams illustrating the standardization process, in addition study to case analysis questions about the effects of poor .standardization Report My -2 laboratory or simulation : Analytical Required In it from The student analysis Data performance whenDC machine there are standardization issues and provide a technical report that includes .realistic solutions Display My -3 presentation verbal or project small	A detailed -1 theoretical presentation supported by illustrations and time diagrams of currents ,during consolidation with emphasis on the change in current within the coils as they pass under the .brushes simulation visible -2 or an experience / Laboratory Virtual Real Explain The spark The resulting on ill Monotheism, And compare performance when Use Poles Interchangeability or Without it discussions -3 Analytical and activities Safiya	DCin Communication machines	The student defines -1 the rectification process ,in DC machines explains its steps and the mechanism of its operation inside the commutator, and differentiates between ideal and non-ideal .rectification Analyzes The -2 student impact factors Different like Pregnancy rose an act Product And speed rotation on quality Monotheism, It is suggested means practical To improve it like Poles ,Interchangeability tendency Brushes, And . distribution The rolls	2	The eighth
Written test -1 :(short or monthly) Questions about -2 the basic conditions for parallel connection	A detailed -1 theoretical explanation supported by diagrams to illustrate the steps of ,parallel connection and the effect of	Operating DC generators in parallel Reasons for operating • DC generators in parallel Conditions for • operating DC generators in parallel	The student explains -1 the need to operate DC generators in parallel in industrial electrical systems and power plants, and explains the operational and	2	Ninth

Numerical -3 problems to calculate load distribution and currents using the internal resistance .of each generator a report My -4 laboratory or paper : activity practical The student -5 connects two generators in .parallel / discussion Oral -6 Presentation My presentation	internal resistance and voltage curve on current distribution .between generators activity practical or -2 hypothetical inside laboratory solution Issues -3 Numerical Applied	Load distribution on • generators connected in parallel and giving mathematical examples	technical advantages of ,this (backup maintenance, voltage .(stability He specifies The -2 student Terms and Conditions necessary To deliver generators or more on parallelism ,like match effort Polarity, And agree curves to organize effort, And understands what It follows on breach With this Terms and . Conditions solves The student -3 Issues Numerical To distribute Pregnancy between Generators ,Tied on parallelism And it is calculated The current that Pull it all generator building on His resistance Interior And a curve to organize Effort		
Written test -1 including interpretive questions and numerical examples : Practical report -2 from the laboratory Classroom -3 analysis activity or : oral discussion	A detailed -1 theoretical explanation supported by animations and videos that illustrate the principle of torque generation, how counter-motive force is generated during rotation, and its effect .on current and speed Discussions Safiya-2 and analysis comparative It is required In it	DC motors Motor Operation Theory Reverse Electromotive - Force Backward Electromotive - Force Equation Comparison of DC Motors and Generators	The student explains -1 the theory of DC motor operation and analyzes how torque is generated as a result of the effect of the magnetic field on the .current conductors Explains The -2 student concept power The driver electrical Back EMF , and its It derived equation is explains its role in regulating the engine speed and protecting it from high current .during start-up Compare The -3 student between Generators and engines in terms ofDC function, power flow direction, operating characteristics, and internal parts	2	tenth

			composition, and deduces the similarities and differences practically and .theoretically		
. Written test -1 -2 Practical/laboratory report Class discussion - 3 or individual/group : presentation	A theoretical - 1 explanation supported by schematic drawings and illustrative curves showing the relationship between torque, current, and speed, clarifying the concepts of the resulting torque within the product and the torque delivered to the drive .shaft simulation or -2 activity My laboratory practical To register) Data Operation voltage, The current Speed) and its use To account determination and ability in Cases different, including In it the condition (Dangerous (Greatest .(Ability Activities -3 Analytical and issues Numerical	Torque - Torque on the product - Torque on the (Shaft) drive shaft Power distribution in DC motors - Maximum electromagnetic power condition in DC motors	The student explains -1 the difference between the electromagnetic and the(T_e) torque net mechanical torque on the drive shaft with the ability ,(T□) to calculate each of them, and analyze the losses resulting from friction and mechanical . losses The student -2 analyzes the power distribution in a DC motor, starting with the electrical power input, then the internally generated power (electromagnetic and ,power) ending with the mechanical power . output The student -3 deduces the maximum power in condition ,motors understands its operational significance, and applies the equations .associated with it	2	eleventh
) Written test -1 :(Quiz/Short Exam	A theoretical -1 explanation with drawings of speed and torque curves for each	ıeral properties of speed d torque of motors (parallel) Complex sequence	The student explains -1 the relationship between speed and (Speed-Torque torque	2	twelfth

Mathematical -2 problems that explain how torque and speed change .with load Analyze the -3 relationship ,between current load, speed, and .torque Display My -4 presentation or : discussion Oral The student is asked to provide a comparison between the three .types	,type of motor explaining how these values change with changes in load and current, supported by real-life examples of applications for each .type discussion Safiya -2 comparison And collective analytical, It is required In it from students comparison between Types different, And present Examples from life Industrial on all type Why? It is used in . that The application		forCharacteristics) .each type of DC motor The student applies -2 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		
A written test -1 that includes direct arithmetic problems to calculate speed regulation and analyze the effect of load on .performance discussion Oral -2 or an offer My : application Requests In it from The student clarification any type from Engines is suitable for aDC particular industrial application and why, supported by .calculations	A theoretical -1 presentation supported by realistic numerical examples to calculate speed regulation in each type of DC motors with a technical interpretation of the .results activity -2 comparative My analysis inside the line ,or Using simulation Includes Tables Explain the difference in performance industrial between engine The shint In succession, The ship	- Speed regulation rate calculation examples Comparison of DC motors in various industrial applications	It is calculated The -1 student an average to organize speed For engines The current .Continuous Its significance is explained in evaluating .engine performance compare The -2 student between Types Engines The current continuous from where ,to organize speed behavior Determination, And the response under Loads different, And connects that By use industrial . optimum per Type	2	thirteenth
A written test containing applied numerical problems: such as calculating the resulting speed when the voltage is reduced, or determining the braking resistance required to stop a motor dynamically within a certain .time	Theoretical explanation supported by drawing control circuits and presenting numerical examples to calculate the speed when changing voltage or current in the field coils, with practical comparison of the .results	- DC motor speed control Speed regulation by voltage - Speed regulation by field Mathematical examples Reversing the direction of - rotation of the machine Methods of stopping engines - Dynamic stopping - Calculating examples	The student explains -1 the methods of controlling the speed of DC motors using armature voltage and magneticcontrol and ,field control solves mathematical problems that demonstrate the effect of each method on .speed Analyzes The -2 student mechanism	2	fourteenth

			reverse direction ,DC rotation engine and explains the different methods of ,stopping it (natural ,(dynamic, reversible with the application of computational examples that illustrate the behavior of torque and current during .these processes		
A written test or -1) short questions :that includes (quiz **Choosing the - appropriate type of (DC orAC) system for a specific .application** **Analyzing a - realistic situation that requires pumping water according to .specific solar hours** **Display My -2 presentation or a report My : application** **In which the student explains his comparison between the two .systems** **It presents a preliminary concept for the design of a complete solar ,pumping system identifying potential advantages and .limitations**	**Theoretical explanation supported by system installation diagrams and real-life photos of solar water ,pumping projects with a functional analysis of each .system component** **◈ an exercise applied Clear or project Mini Project : In this the student ,project designs a solar pumping system suitable for an agricultural or home application, choosing the appropriate components according to the type of current .and consumption**	**Solar water pumping systems** **Pumping SystemsSolar " -1** **ic components of .2** **solar pumping systems** **es of solar .3** **pumping systems** **ssification of water .1** **mping systems according to** **e type of operating current** **DC pumps .1** **AC pumps .2** **antages of solar .4** **pumping systems** **dvantages of .5** **r pumping systems Solar** **mping**	**The student explains -1 the working principle of** solar pumping systems, and distinguishes between their basic components ,such as: solar cells ,control unit, pump water tank, mounting ,structureetc. The student classifies -2 solar pumping systems according to the type of current(DC/AC) , compares them in terms of efficiency, system cost, complexity, and suitability for rural applications, and analyzes the advantages and disadvantages of each type.	**2**	**fifteenth**

(Course structure B-(**Practical vocabulary** -12					
Evaluation method	Teaching method	Unit name/topic	Required learning outcomes	watches	week
Field evaluation -1) during work Observation	**Direct instructional -1 explanation at the beginning of the experiment, supported**	**Study of -1 general safety methods - how to**	**The student -1 identifies the basic occupational safety**	**3**	**the first**

which ,(Checklist includes the student's commitment to safety procedures and the accuracy of implementing the .delivery steps Report practical -2 Evaluated from ,where organization ,inclusion Data ,health Connections and analysis Results, with comparison between The two methods practically	by explanatory panels or an educational video on safety .and connection method activity practical applied -2 inside laboratory, It is done In it to divide students to Groups To apply The two methods practically And . registration Notes	- write a report introduction to distribution panels on devices in the laboratory and a general idea about the different types of DC machines assembled by Lamp method -1 Method of-2 measuring resistance	procedures in the electrical machinery laboratory, and follows them accurately during .practical experiments It is considered The -2 student Report practically organized It contains on Elements ,Basic (Introduction ,steps the job, Data ,Results, Discussion .(Conclusion Get to know The -3 student on ingredients paintings distribution in laboratory, And a job all device linked By running machinery The current Continuous He specifies The -4 student Types Different For machines The ,current continuous And explains the difference between Engine The birth And the principle a job all . From it -5 Implemented The student practical installation DC machine using the lamp and resistance measurement methods, and the two methods are compared in terms of accuracy and .safety		
Direct practical -1 evaluation of performance within ,the laboratory including measurement accuracy, safety compliance, and	A practical laboratory experiment to record open voltage values versus excitation current, using a separate, self-powered, two- .speed generator acting Results Graphically inside the line and discussion	Determine the magnetic properties of a separate-fed DC generator at normal speed and then half-normal speed. Determine	The student draws -1 the magnetic E vs) properties curve of a separately (If powered generator at ,two different speeds and explains the relationship between	3	the second

accurate curve .drawing a report My -2 laboratory Includes comparison curves ,between Both cases and analysis technical To influence speed And type excitement on . effort The result	**impact magnetism The remaining, And inclination The curve Differently type . The birth And his speed**	**the magnetic properties of a parallel self-fed DC generator at normal speed and then half-normal .speed**	**excitation and the .resulting voltage Analyzes The -2 student impact speed in a self-OCC on curve feeding generator parallel), comparing) performance at rated .speed and half speed**		
Direct -1 practical evaluation in the : laboratory accuracy in ,taking readings determining the point of contact the between andOCC curve the resistance . line Laboratory -2 report including drawing and analysis of the curve, with a technical explanation of the nature of the critical resistance and its effect on voltage build-up	**A practical -1 laboratory experiment in which the voltage is measured at different speeds** with the excitation current constant, then the relationship between the voltage and speed is . drawn **Analytical activity to** -2 **andOCC curve plot the intersect it with lines representing different resistance values** to determine the critical . resistance	**Speed-voltage relationship for a separately powered alternator and determination of the critical resistance**	**The student -1 analyzes the relationship between rotational speed and open-circuit output voltage** , and concludes the effect of speed on the magnetic properties . curve **The student** -2 **determines the critical resistance of the** , **generator practically** explains its importance in the process of ,building self-voltage and draws a straight-line . resistance curve	**3**	**the third**
Practical -1 evaluation of students during the experiment in terms of accuracy ,of measurement speed control, and extracting correct data to draw the . curve Laboratory -2 report including drawings and	**Direct laboratory -1 experiment by measuring the output voltage at different excitation currents, and the OCC curve drawing of the generator at the .two speeds discussion Safiya** -2 **Interactive To analyze The curve And inclination line**	**Determine the critical resistance of a parallel self-powered DC generator at normal speed and half .normal speed**	**The student -1 determines the critical resistance of a self-powered generator by drawing the magnetic) properties curve and (OCC intersecting it with .the load lines**	**3**	**Fourth**

technical analysis to determine the critical resistance and comment on the differences between the two . cases	resistance Passing by At a point origin, And specify value resistance . Critical Graphically		Analyze The -2 student impact speed on resistance Critical And he concludes the difference between Its value when speed regular And a half Speed		
Direct -1 practical evaluation during the experiment in terms of the accuracy of ,measurements connecting circuits, and extracting the data needed to .draw curves Report My -2 laboratory It contains on Fees Bayani And the interpretation Technical For differences between The birth separate ,The birth Self And explain Reasons Decrease in Effort	Carry out an actual -1 or simulated laboratory experiment to measure the internal and external voltage when the load current changes for each .of the two types Drawing My-2 statement Interactive inside the line or in The report practical To represent curve Properties and analysis Differences Operational .	A- Load characteristics of a separately powered DC generator and determine the internal and external characteristics .curve B- Load characteristics of a self-powered DC generator and determination of the curve Internal and external .properties	The student -1 draws the curve of internal properties and (E vs IL) external properties for two (V vs IL) :generators separate and self-powered, and compares the behavior of each of .them Analyze The -2 student impact stream Pregnancy on effort Internal and external And it is explained role) Losses Interior lost voltage inside .(The product	3	Fifth
A practical -1 test or laboratory report in which the results of the experiment are analyzed and the electrical behavior is .compared	A theoretical lecture -1 supported by illustrative drawings of voltage versus current curves for each type of .generator A practical -2 experiment in the laboratory during which both types (cumulative	Load characteristics of a DC generator accumulative-) .(differential	Distinguish the -1 load characteristics of the accumulator and differential DC generator in terms of performance and voltage behavior with load .change Analyze the -2 curves of the	3	Sixth

Short written -2 or oral questions that measure the student's understanding of the differences between the two types and the behavior of each under different .loads	and differential) are operated and the load properties are .measured		relationship between voltage and current and explain the effect of cumulative or differential conduction on .stability		
A practical -1 laboratory report containing ,results, tables graphs, and .analysis An analytical -2 question in the ,theoretical test :such as Observing -3 the student's performance during the experiment connection) ,accuracy measurement ,accuracy practical .(understanding	A theoretical -1 explanation supported by graphs of the internal and external characteristics curves of .the series generator Practical activity -2 :inside the laboratory Connecting a series * .generator circuit Generator and load * .gradually Measure the required * .(V, I, E) values Draw curves based on * .practical values Group discussion -3 about generator ,behavior, when to use it and why it is not used much in modern .applications	Load characteristics of a DC generator (self- (powered series and finding the internal and external characteristics .curves	Understanding -1 the behavior of voltage and current in a self-powered series DC generator under the influence of .different loads Draw and -2 analyze the (E vs I) internal V vs) and external characteristics (I curves of the generator and explain the difference between .them	3	Seventh
Direct -1 observation of the student's performance during the experiment ,connection) ,operation .(monitoring Oral or -2 written	A brief theoretical -1 explanation before the experiment about the principles and conditions of parallel .operation Practical -2 implementation of the experiment inside the laboratory using two self-generators and	Parallel operation of a self-powered .DC generator	The student -1 should be able to distinguish the conditions required to operate two self-generators in .parallel The student -2 should be able to practically implement the	3	The eighth

questions after the experiment to measure understanding .of the concepts A practical -3 report that includes an explanation of the experiment ,steps, readings analysis of results, and .conclusions	current and voltage .measuring devices Group discussion -3 during and after the experiment to interpret the readings and analyze .the results		parallel operation experiment and analyze the behavior of generators during .operation		
Observing -1 the student's practical performance in implementing the electrical circuit safely .and accurately Ask -2 analytical questions about the effect of changing the field current or source voltage on speed and .torque A practical -3 report containing a description of ,the experiment readings, graphs observations , .and conclusions	A short theoretical -1 presentation explaining the principle of each method with speed and .torque curves Practical -2 implementation of a speed control experiment inside the laboratory, observing .changes in performance Post-experiment -3 discussion to link theoretical results to practical results and .analyze the differences	How to control the speed of a parallel DC motor by A-Field current B-Source voltage	The student -1 should be able to distinguish between the two main methods of controlling the speed of a parallel DC motor (via field current and .(via source voltage The student -2 should practically carry out an experiment to change the motor speed using both methods, and record the relationship between the ,variables (speed .(current, voltage	3	Ninth
Direct -1 observation of the student's skills in ,connecting operating and safely measuring	A brief theoretical -1 explanation of the behavior of a series motor under load, with an explanation of the mathematical relationships and an	Load characteristics of a series DC motor and find the relationship between current-torque-	The student can -1 deduce the relationship between the load ,current, torque speed and efficiency of a series DC motor	3	tenth

during the .experiment Applied or -2 analytical questions to link theoretical concepts to .practical data A detailed -3 practical report :containing Readings table * ,.Graphs (e.g * .current vs .torque, speed vs ,current .efficiency vs (load Analysis of * the relationship with mechanical (BHP) power	**approximate graph for .each relationship Practical -2 implementation of the motor experiment with gradual measurements of current, speed and torque, with calculation .BHP of efficiency and Analyze group data -3 after the experiment is completed to interpret the results and compare them with theoretical .values**	**efficiency-speed .BHP with**	**during operation under different .loads The student -2 should link the) mechanical power with the (BHP rest of the variables to explain the engine's performance .practically**		
Direct -1 practical evaluation of the student's skill in operating the engine and taking accurate .measurements Analytical or -2 oral questions to test theoretical understanding of the relationships between .variables A practical -3 report that :includes Table of * readings for ,current, speed ,torque, power .and efficiency Relationship * :graphs	**A brief theoretical -1 introduction explaining the difference between the accumulator compound engine and other engines, and the effect of the series engine .on performance curves Practical -2 implementation of the experiment by measuring the load ,current, motor speed torque, mechanical power, and efficiency at .different loads Analyze and compare -3 the results with parallel and series motors to understand the behavior .of the compound motor**	**Load characteristics of a series compound current motor and finding the relationship between current-torque-efficiency-speed .BHP with**	The student will -1 be able to practically analyze the load characteristics of a series-compound DC motor, and understand the effect of the additional field component on . performance To deduce the -2 relationship between ,load current, torque ,efficiency, speed and mechanical (BHP) power through . experimental data	**3**	**eleventh**

.Current vs) Torque, Speed ,vs. Current .Efficiency vs .vsBHP ,Load (Current Explain the * behavior of a compound engine compared to other types of .engines					
Monitoring the -1 student's practical performance in terms of accuracy in ,connecting ,operating devices .and reading values Written or oral -2 questions to measure theoretical understanding and practical steps for calculating .proficiency A practical -3 report for each test :that includes Objectives of the - experiment Size chart - Solution steps and - calculations Comparison - between the two methods	A theoretical presentation -1 illustrating both the Solenoid and Hopkinson tests with basic equations and .illustrative diagrams :Practical implementation -2 Sollenbohn test on a DC * .motor without load Hopkinson test by * connecting two machines in parallel while monitoring the .input and output power Group discussion after -3 each experiment to analyze the differences between the .two methods	A- Determine the efficiency of a DC machine without load using the Sollenbohn .method b- Determine the efficiency of a parallel-fed DC machine (motor generator) using the Hopkinson .method	The student should -1 explain the principle of the Sollenbohn test and how to use it to estimate the efficiency of the machine without .loading it The student should -2 practically perform the Hopkinson test on two similar machines and accurately calculate the efficiency under .operating conditions The student should -3 compare the two methods in terms of ,accuracy, type of load and operating .requirements	3	twelfth
Direct -1 observation of the student's performance while implementing the experiment steps and connecting the .devices accurately Short evaluation -2 questions to explain the concepts of losses and their calculation .equations	A preliminary theoretical -1 explanation that clarifies the types of losses in a DC machine and the source of .each type Practical experience in -2 separating losses using :techniques such as No-load operation (to * estimate iron and mechanical (losses Measure current, voltage * and resistance to determine .copper losses	Isolating losses from a DC .machine	The student should -1 distinguish between the ,types of losses (copper iron, mechanical) in a .DC machine The student should -2 apply practical methods to separate and estimate each type of loss in the engine or .generator To conclude the -3 effect of each type of losses on the performance and	3	thirteenth

A practical -3 report that :includes Reading table for * each part of the .experiment :Loss calculation * I2RI2R = Copper Iron and mechanical = from .no-load operation Approximate * graph of loss .distribution Conclusions -4 about the losses that most affect .efficiency	Analytical discussion of the * experimental results to understand how to improve .efficiency and reduce losses		efficiency of the .machine		
Observing -1 'students performance during the process of ,connecting operating, and dealing with the .system components Oral or written -2 questions about the functions of each component and how .it works A practical -3 :report containing .System diagram * Explain the * system components .and their functions .Connecting steps * Observations on -4 system performance under different .conditions	A theoretical and practical -1 explanation of the working principle of the solar pumping system and the use .of DC motors in it Field study inside the -2 laboratory or at a pilot site of the system components and .their practical connection Group discussion to -3 clarify the effect of changing radiation on the electrical and mechanical performance .of the system	Practical study of the components of a solar pumping system	The student should -1 be familiar with the basic components of the solar pumping :system Solar panels, charge) controller, voltage ,converter, DC motor ,water pump, sensors .(electrical protection The student -2 understands how to connect components practically and operate the system effectively .and efficiently To link the -3 characteristics of DC motors to the behavior of the solar system during changes in solar .radiation	3	fourteenth
Practical -1 assessment of the student's ability to connect the system and measure readings accurately .and safely Analytical -2 questions about the system performance under different conditions (such as changing radiation .(or load	A simplified theoretical -1 presentation of the equations of power, lift and water flow in solar pumping systems .DC motors using Practical implementation -2 of an experiment to operate a water pump connected to a solar panel (or a simulated source) with changing the .radiation level or voltage Collecting and analyzing -3 :data in terms of Voltage and current * entering the motor	Performance analysis of a DC motor-driven water pump in a solar pumping system	The student will be -1 able to analyze the relationship between solar radiation, output ,voltage, load current and motor speed in a .solar pumping system The student should -2 measure the performance of the water pump in terms of flow rate, hydraulic lift, and motor power under different .radiation conditions	3	fifteenth

A comprehensive -3 practical report :that includes Measurement * ,table (voltage ,current, speed, flow .(lift Graphs (such as * the relationship between voltage and flux, or current and .(efficiency Analyze results * and compare theoretical and .actual performance -4 Recommendations to improve system .efficiency	Rotational speed * Water pumping rate * Hydraulic and electrical * efficiency		The student should -3 evaluate the efficiency of the system as a whole (from the panel to the pump) and deduce the factors .affecting it		

.56 Curriculum Development Plan	
Continuously developing educational content to keep pace with modern requirements, such as: **1- Including qualitative specializations that are in line with the digital transformation.** **2- Organizing discussion sessions with industrial sector leaders.** **3- Following up on global technical developments in the electrical field.** **4- Holding applied exhibitions to display modern innovations.** **5- Developing field training programs in leading companies.**	
.57 infrastructure	
Well-equipped and equipped halls and laboratories are available to provide a suitable environment for teaching and learning.	**assrooms, laboratories and workshops**
Electrical Machines (Dr. Muhammad Zaki Muhammad (Khader / University of Mosul	**Required textbooks -9**
Text book of electrical technology by BL Theraja	**(Main References (Sources -10**
• IEEE Transactions on Industrial Applications **• International Journal of Electrical Power &**	**(أ Recommended books and ,references (scientific journals (.reports, etc**

Energy Systems	
• MIT OpenCourseWare – Massachusetts Institute of Technology • **Electronics Tutorials**	**ب) Electronic references, websites.....**

58. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technica University / Al-Hawija Technical Institute
59. Scientific Department
Department of Electrical Technology
60. Course Name/Code
1 Electrical networks
61. Available attendance forms
In presence
62. semester/year
Decisions
63. (Number of study hours (total
60 =15*4
64. Date this description was prepared
19-6-2025
65. (Course objectives (general objectives of the course
1- Complete knowledge of hydroelectric, thermal and gas generating stations and an idea about some other stations such as diesel. 2-A: - Calculating Using overhead lines - Mechanical calculations including tension and slack when the distances from the ground are equal- Calculating the weight of snow accumulated on the wire- Calculating the amount of wind pressure force acting on the wire 3-A Calculations of the basic elements of overhead lines - Electrical calculations ,including: - Calculating the resistance- Calculating the internal and external inductance of a single wire- Calculating the inductance of a three- way system consisting of three wires separated by equal distances from each other, Or at different distances or exchanged in location

Calculate the capacitance of the single - phase system A triode consisting of 4-A three wires spaced equally apart, or At different distances and exchange locations

66. Course outcomes , teaching, learning and assessment methods

Course outcomes

A- Cognitive objectives

1. Operation and maintenance of electrical units of power plants.

Introducing the student to the types of power stations and introducing the student to the operating mechanism of each type of station and the degree of efficiency of each type of power station

2. Operation and maintenance of electrical equipment for the transmission and distribution of electrical energy.
3. Maintenance of protection and control devices for the electrical power system.
4. Extension and maintenance of underground and overhead cables.

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

Evaluation methods	Teaching and learning methods	Outputs
5. Theoretical tests **6. My work performance evaluation** **7. Safiya's participation** **8. Research reports**	**4. Theoretical lectures** **5. Group discussions** **6. Case studies**	**ث- knowledge** The student gets to know Methods of -1 generating electrical energy Distinguish between each type of .2 .energy source Explain the mechanism of electrical .3 . energy production
5. Short and final tests **6. Performance evaluation during practical training** **7. Applied projects**	**4. Interactive lectures** **5. Real-life case studies** 6. **Field visits to facilities**	**B- Skills** The student gets to know Methods of -1 generating electrical energy Distinguish between each type of .2 .energy source Explain the mechanism of electrical .3 . energy production

8. **Field visit reports**		
5. Continuous assessment **6. Performance evaluation during practical training** **7. Final evaluation** **8. Field visit reports**	**4. Interaction and application** **5. modern technologies** 6. **group learning**	**C-Values** Student participation in classroom activities and submitting .assignments on time Adherence to occupational safety .rules while working in laboratories Attention control and attention test **(** selective attention)

Number of units	Weekly hours			Second academic year	Name of the materia
	M	A	N		1 Electrical networks
4	4	2	2		

theoretical(1 Details of the curriculum for Electrical Networks curriculum) two hours per week

67. **(**Course structure A- **(Theoretical vocabulary**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
and First second	**2**	**The student learns how electrical energy is generated, the development**	**How to generate electrical ,energy energy ,development**	**Interactive lectures supported by PowerPoint presentations , documentary videos, and a**	**A + short test research assignment on the stages of development of energy systems**

		of energy uses, and the components of the electrical power system from generation to ,consumption in addition to the standard .voltages used	electrical power system from generation to ,consumption standard voltages	conceptual map of energy flow in the electrical system.	
the third	2	The student understands the working principle of hydroelectric and thermal ,power plants and compares them in terms ,of uses efficiency, and .environment	Hydroelectric and thermal power plants	,Explanatory video ,comparative study class discussion.	+ Analytical report short descriptive test.
Fourth	2	Identify gas and diesel stations, and distinguish between their characteristics and applications.	Gas generating stations and an idea about some other stations such as diesel	Real case presentation + application study	Oral presentation + in a group individual written assessment
Fifth	2	Explains the components of a bus bar system, and analyzes the layouts of transformer stations inside and outside buildings.	) Bus Bar SystemBE and layouts transformer stati inside and outs buildings	Analysis of engineering ,drawings interactive ,discussion practical examples.	a test My work + my duty my house
Sixth	2	Classifies air lines and analyzes their use and types ,short) (medium, long	Air lines, their uses, the division of lines i short, medium, and l .lines	+ Video lecture comparison exercises	a question My article + exercise my house
Seventh	2	Performs ,tension, sag ,snow weight and wind	Overhead - lines mechanical	Solving applied + problems numerical	a test in the chapter

		pressure calculations on overhead lines.	calculations :including Calculating - tension and relaxation when the distances from the ground surface are equal Calculate - the weight of snow accumulated .on the wire Calculating - the amount of wind pressure acting on the wire	simulation(via programs such as MATLAB).	
The eighth	2	Calculates the internal and external resistance and inductance of single and .triple wires	Calculations of the basic elements of - overhead lines electrical ,calculations :including Resistance - calculation Calculate the - internal and external inductance of a single wire Calculating the - inductance of a three-wire system consisting of three wires separated by a distance of At equal distances fr each other, o different distances .exchange locati	training Practical + Explanations Detailed	a test My analysis
Ninth	2	Calculates capacitance in single- and triple-phase systems and analyzes the effect of	Calculating the- capacitance of a ,single-phase system a three-phase system consisting of three wires separated by At equal or different distances from each	solution exercises , discussion Collective	a test Academic

		distances and .site switching	other, and they .exchange locations		
tenth	2	review Solution Issues from Weeks previous	Solve various problems for the seventh and eighth weeks	session Review , exercises Safiya	a test short Academic
eleventh	2	Analyzes short and medium lines and represents them with electrical circuits(T ,π) and , calculates their efficiency	,Solving short lines including representing them as an electrical circuit and calculating their .efficiency The solution of the intermediate lines is :divided into T- shaped electrical .circuit Represent it as an electrical circuit in the shape of the letterri.	fee circles Electrical + Applications	+ Drawing circles geometry problems
twelfth	2	Learn about the types of air transport insulators, the phenomenon ,of discharge its causes and methods of .treatment	Overhead transmission line insulators, their ,types, shapes ,installation discharge phenomenon, its causes, and methods .used to get rid of it	View videos + view models of insulators	a report Practical + Test
thirteenth	2	knowledge ingredients Midwives floor And its types	- Ground cal - compone classification - range cables	Use Models or Fees Graphic	a report My research
fourteenth	2	procedure Accounts Capacity And the conversation For midwives	Calculating capacitance and inductance for single-pole and three-pole grounding cables	workshop work , solve Issues	a test technical Academic
fifteenth	2	to understand Gradient effort And lost Insulation in Midwives	Voltage gradient in cables, loss calculation and ,angle in insulators cable breakdown	Case studies of + collapse discussion of causes and prevention.	a test comprehensive ultimate

practical(1 of the curriculum for Electrical Networks Details
curriculum) two hours per week

13-(Course structure B-(**Practical vocabulary**					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	recognize The student on ingredients laboratory Electrical , Appliances basic , mechanism Its operation and procedures Safety inside The laboratory .	Learn about laboratory equipment	session Introductory inside Lab + Presentation My explanation Practical + Discussion around Use Tools .	note performance The student inside Lab + Questions directly on ingredients Devices + Evaluation behavior Safety
Second and third	**2**	can The student from delivery Transformers Y way and download it With loads balanced And other balanced , analytical impact that on an effort tie	Loading distribution transformers with balanced and unbalanced resistive and inductive loads in theY shape, Δ and the effect of that on the neutral voltage	to implement experiments Process for connecting transformers With loads Various + Discussion Results within Groups .	a report practical detailed on all Experience + Evaluation performance during Delivery + Questions Analytical in end Experience .
Fourth	**2**	can The student from to implement practical synchronization between Converter synchronicity Trilogy The stage and the network Foreign Ministry and analysis Her steps	Synchronization between the three-phase synchronous transformer and the external network	to explain theoretical For synchronization + execution practical For the experience with tracking Signs Synchronization .	evaluation success practical Synchronization + Report Detailed + Discussion around Mistakes potential
Fifth	**2**	He paints The student curve Pregnancy Based on to Data Taken from experience And explains behavior order under Loads Different	Draw a load curve	to gather Data from experiments Previous + Training on The drawing The graph And analysis .	delivery fee My statement Explanatory + Questions Analytical on behavior Pregnancy
Sixth	**2**	Explains The student Ways to improve Factors ability , and applies practically Use Capacitors To improve it .	Improving the power factor of networks	to explain theoretical around concept Factors Ability + Execution an experience Using Capacitors .	a report It contains on the accounts Improvements + Testing practical To measure bezel Improvement
Seventh	**2**	It is concluded The student Elements line Transfer (	Study the transmission line	procedure Tests practical Using	a report detailed With results +

		resistance , impedance , inductance) from Tests The palace And pregnancy .	model and calculate the basic elements by load and short circuit .test	Models Lines Transport + Analysis Readings .	questions Oral on accuracy Measurements And its interpretation .
eighth and ninth	**2**	compare The student between features line Transportation when suppository In types different from Loads (resistive , inductive , capacitive) from where voltage And the current .	Study of the characteristics of the transmission line model at the receiving end when loaded with resistive , inductive and capacitive , loads	to implement experiments Multiple with all type from Loads + Discussion Differences .	a report Comparison + Representation Results in Tables Fees + Test practical basic .
tenth	**2**	It is calculated The student amount drop effort in model line Transport , compare that With the results expected	Voltage drop on transmission line model	measurement Voltage on Lines during Download + Compare values The calculated And the measurement .	analysis Results Written + Test applied small .
eleventh	**2**	Applies The student Techniques compensation Facial For lines Transportation And he rules on Its effectiveness in to improve Performance .	Face compensation for power transmission lines	to explain detailed on Techniques Compensation + Experience Using simulation or tools Laboratory	a report Lab + Discussion Artistic around impact Compensation
twelfth	**2**	He specifies The student type Holidays in cables floor building on road Delivery And readings , whether He was The stage connected On the ground or castle between Phases	Identify faults in ground cables using One phase -1 connection to the In case -2 ground of short circuit between phases	an offer Scenarios Faults + Implementation experiments a statement Holidays Practically .	analysis condition Holidays in Report + Questions Applied To determine Holidays building on Measurements .
thirteenth and fourteenth	**2**	Review The student experiments previous In a way comprehensive And corrects Concepts wrong , with Strengthening Skills The process .	General review of experiences	Sessions review practical Group + Replay to implement parts from experiments According to The need	sharing Active + Test preparatory practical or My theory
fifteenth	**2**	Applies The student all Skills acquired in exam practical comprehensive Covers all experiments	Practical exam with experiments	a test practical complete Includes to implement an	revision immediate According to performance

				experience and analysis Its results under supervision direct .	Practical + Notes Oral + Evaluation Written

68. Curriculum Development Plan	
Continuously updating the curriculum to keep pace with developments in the :labor market (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 network systems and power generation**	
69. infrastructure	
Classrooms, laboratories and worksho	**There are classrooms equipped to accommodate students and prepared to provide a suitable learning .environment**
11- Required textbooks	**Electrical Networks Lectures Booklet 1** **" Electrical Machines and Power Systems" Study and Analysis**
12- (Main References (Sources	**"Power System Analysis "□ John J. Grainger & William D. Stevenson**
ت) Recommended books and ,references (scientific journals (.reports, etc	**" Transmission and distribution of electrical energy"** Author: **Dr. Mahmoud Gilani** Publisher: **Dar Al-Fajr for Publishing and Distribution – Cairo**
ث) ,Electronic references .....,websites	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

70. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technica University / Al-Hawija Technical Institute
71. Scientific Department
Department of Electrical Technology
72. Course Name/Code
1 Maintenance Workshop
73. Available attendance forms
In presence
74. semester/year
Decisions
75. (Number of study hours (total
45 =15*3
76. Date this description was prepared
19-6-2025
77. (Course objectives (general objectives of the course
The student will also be able to: 1. Uses various equipment, tools and components used in workshops. .2 Acquires technical skills and experience in the field of various electrical maintenance works. 3. Gain self-confidence to practice electrical engineering work, track fau and learn how to repair them. .4
78. Course outcomes , teaching, learning and assessment methods **Course outcomes** A- 1identification The student on works Maintenance For devices Electrical A-2 identification The student on Business Technical electrical in Track Malfunctions For devices electrical And get to know on How to Fixit A -3 identification The student on various the components electrical and electronic

How to Use it in building circles Electrical A-4 identification The student on How to Unlock And installation Yes In the face of machines Electrical A -5 identification The student on How to to examine machines electrical after Wrapit		
Outputs	Teaching and learning methods	Evaluation methods
knowledge A-1 Introducing the student to electrical appliances maintenance work. A-2 Introducing the student to electrical technical work in tracing faults in 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 electrical machine parts	**7. Theoretical lectures** **8. Group discussions** **9. Case studies**	**9. Theoretical tests** **10. My work performance evaluation** **11. Safiya's participation** **12. Research reports**
B- Skills B1 - Acquire the skill of assembling DC machines, methods of rewinding DC machines. B2 - Acquire the skill of designing and studying three-phase electrical transformers. B3 - Acquire the skill of rewinding Stator coils of a three-phase induction motor and a squirrel cage. B-4 Acquire the skill of assembling the engine and testing the engine under the load assigned to it. B-5 Acquire the skill of periodic maintenance of a split-phase motor, conduct the necessary tests on it, identify faults and methods of treating them.	**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 C-1 Practical skills enable The student researches identifying and treating faults in electrical appliances. C-2 Practical skills that enable the student to cooperate In working with others. C-3 Maintaining the safety of the equipment and furniture in the workshop, as they are public property. C-4 The student's ability to think in an organized manner and .thus make decisions	**7. Interaction and application** **8. modern technologies** **9. group learning**	**9. Continuous assessment** **10. Performance evaluation during practical training** **11. Final evaluation** **12. Field visit reports**

lame of the material Maintenance 1 Workshop	Second academic year	Weekly hours			Numb er of units
		N	A	M	
		0	3	3	3

course 1 Details of the curriculum for the Maintenance Workshop practical curriculum only) three hours each week)

Course structure -10					
week	watches	**Outputs Learning required**	**or the topic / name Unity**	**Teaching method**	**Evaluation method**
the first	3	acquisition Skill and experience Technical in Unity theme	- installation machinery The current continuous - Ways re He wrapped machinery direct current fee Detailed	to implement exercises	evaluation continuous
the second	3	acquisition Skill and experience Technical in Unity theme	stabilizing Brushes - How to cleaning surface Units the situation Applied For brushes carbon - carbon	to implement exercises	evaluation continuous
the third	3	acquisition Skill and experience Technical in Unity theme	a test Communication And the pieces And isolation	to implement exercises	evaluation continuous
the four	3	acquisition Skill and experience Technical in topic Unity	Files member Production For the birth stream continuous- to prepare and collecting information- He wrapped file member Production And install Files on Examples Simplified on Sewers the heart Iron Wrap	to implement exercises	evaluation continuous
Fifth	3	acquisition Skill and experience Technical in topic Unity	Insulation Palo Varnish- drying - delivery The children Shelf Final- choice Final For member Production- fee complete For member Production Fully His files And its connections and its uses	to implement exercises	evaluation continuous
Sixth	3	acquisition Skill and experience Technical in Unity theme	Files field- to gather Information For files parallelism And the sequence- formation Connectors same The clip The big one- Properties Domain files succession And parallelism Ways Tie it in god.Wrap on	to implement exercises	evaluation continuous

			. Template		
Seventh Eighth+	3	acquisition Skill and experience Technical in Unity theme	a job Files And install Monogamy Poles- Test Complete machine- converter electrician- to equip And cut sheets Iron Heart And collect it He wrapped Files And isolation Varnished and training simplified before Form on a job template Wrap	to implement exercises	evaluation continuous
Ninth	3	acquisition Skill and experience Technical in topic Unity	delivery And connect The children Shelf - a test Polarity- a test Listen Arriya - a test The contract And test Insulation in Files. Examples on design And replay He wrapped adapter small ability	to implement exercises	evaluation continuous
tenth	3	acquisition Skill and experience Technical in topic Unity	- D A ship Transformers The three Phases design basic Detailed drawing	to implement exercises	evaluation continuous
eleventh	3	acquisition Skill and experience Technical in topic Unity	to equip And cutting sheets the heart Iron And Installation And - Wrapping files - collect it drying - isolation Palo Varnish	to implement exercises	evaluation continuous
twelfth	3	acquisition Skill and experience Technical in Unity theme	a test leakage - a test Listen Arriya a test Polarity	to implement exercises	evaluation continuous
the third ten	3	acquisition Skill and experience Technical in Unity theme	Engines deductive(Hittah) re He wrapped Files fixed member For engine inductive tripartite Phases The cage squirrel- account And drawing shape The year For files And Remove Materials Insulating and cleaning sewers- isolation Sewers Member constant-He wrapped Files And its formation then Install it on sewers	to implement exercises	evaluation continuous
the fourteen	3	acquisition Skill and experience Technical in Unity theme	He wrapped And delivery I Shelf Files And test Listen Arriya	to implement exercises	evaluation continuous

fifteenth	3	acquisition Skill and experience Technical in Unity theme	to choose - to choose The contract in Files Select leak - Insulation And its measurement Ground For the engine	to implement exercises	evaluation continuous

- 11 structure Infrastructure :	
1-books The reporter Required	The booklet Laboratory private In the workshop
2- the reviewer Home (Sources)	- 1 He wrapped Engines electrical ,.Dr moon - 2 Reference in Transformers electrical , Franklin Sticant , SA
A books References that Recommended It has(magazines) Scientific, Reports ,)	- 1Troubleshooting And maintenance machines Electrical Bank settings International For shapes Illustrative Technical.
for - the reviewer electronic, Sites Internet	-1 location The Institute Technical /Al- Rumaitha- 2Sites Companies Global

- 12 plan development The decision Academic :
- 1Participation in The state Art Different Private By the material To gain My coach The workshop expertise Bigger
- 2 examining on last what I reached for him Technology Modern in This is amazing The material .

79. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technica University / Al-Hawija Technical Institute
80. Scientific Department
Department of Electrical Technology
81. Course Name/Code
Programmable Logic Control(PLC)
82. Available attendance forms
My presence
83. semester/year
Decisions
84. (Number of study hours (total
45 =15*3
85. Date this description was prepared
19-6-2025
86. (Course objectives (general objectives of the course
1- identification The student on principles Control logical The programmer . -2 Introducing the student to how programmable logic controls the operation of equipment and devices for various purp
87. Course outcomes , teaching, learning and assessment methods **Course outcomes** A-1 identification The student principles a job Control logical The programmer. A – 2 identification The student Special Azt Use the PLC A- 3 identification The student System Store Information in the PLC A-4 Introducing the student to the PLC instructions A-5 Introducing the student to the PLC programming languages

Outputs	Teaching and learning methods	Evaluation methods
ج- knowledge A-1 identification The student principles a job Control logical The programmer. A- 2 identification The student features Use the PLC	**10. Theoretical lectures** **11. Group discussions** **12. Case studies**	**13. Theoretical tests** **14. My work performance evaluation** **15. Safiya's participation** **16. Research reports**
B- Skills B- 1acquisition The student skill programming PLC B- The student acquires the skill of 2 usingPLC to control the field in factories and laboratories. B- 3 acquisition The student skill maintenance Units the PLC	**10. Interactive lectures** **11. Real-life case studies** 12. **Field visits to facilities**	**13. Short and final tests** **14. Performance evaluation during practical training** **15. Applied projects** 16. **Field visit reports**
C-Values C-1 Encouraging the development of students' professional and technical thinking. C-2 Working to develop a distinguished 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 new ideas. C-4 Practical skills that enable the student to usePLC applications in future life.	**10. Interaction and application** **11. modern technologies** 12. **group learning**	**13. Continuous assessment** **14. Performance evaluation during practical training** **15. Final evaluation** **16. Field visit reports**

lame of the material		**Weekly hours**	

Programmable Logic Control	Second academic year	N	A	M	Number of units
		1	2	3	3

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

- 10 structure Course :

week	watches	Learning outcomes Required	name Unity/or the topic	road education	Evaluation method
the first	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams
the second	3	Understanding the topic of unity	**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..**	Lectures+ Applications practical	evaluation direct + Exams
the third	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams
the four	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams

Fifth	3	Understanding the topic of unity	**The Memory System and I/O Interaction** **5-1 Memory Overview** **5-2 Memory Types** **5-3 Memory Structure and Capacity** **5-4 Memory Organization and I/O Interaction**	Lectures+ Applications practical	evaluation direct + Exams
Sixth	3	Understanding the topic of unity	**Configuring the PLC Memory—I/O Addressing 5-6 Summary of Memory, Scanning, and I/O Interaction 5 7 Memory Considerations.**	Lectures+ Applications practical	evaluation direct + Exams
Seventh	3	Understanding the topic of unity	**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.**	Lectures+ Applications practical	evaluation direct + Exams
The eighth	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams
Ninth	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams
tenth	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams
eleventh	3	Understanding the topic of unity	**Special Function I/O and Serial Communication Inter-axing** **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**	Lectures+ Applications practical	evaluation direct + Exams
the second ten	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams

the third ten	3	Understanding the topic of unity	**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.**	Lectures+ Applications practical	evaluation direct + Exams
the fourteen	3	Understanding the topic of unity	**PLC System Documentation** **14-1 Introduction to Documentation 142** **Steps for Documentation** **14-3 PLC Documentation Systems -4 Conclusion .**	Lectures+ Applications practical	evaluation direct + Exams
fifteenth	3	Understanding the topic of unity	**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**	Lectures+ Applications practical	evaluation direct + Exams

Infrastructure:	
1-books The reporter Required .1 Participation in the state Art different Private With material Control logical programmer (PLC)	Lectures Academic
2- the reviewer Home (Sources) .2 examining on last what I reached for him Technology Modern in Applications the .PLC	the reviewer Related By the material and existing I have library The Institute
A books References that Recommended It has(magazines) Scientific, Reports .3 stay Do Art Developmental For the cadre laboratory Which Develop Their ability in training Students in the picture The most efficient)	books and magazines Scientific related to the subject ofPLC: Basics , Instructions , applications.
for - the reviewer electronic, Sites Internet .... .4 to open laboratory specialized With material the PLC Uses	LD A ship the components , Principles , Applications , locationThe Institute sources Internet different, Sites Companies Global

88. Educational institution
Ministry of Higher Education and Scientific Research / Northern Techni University / Al-Hawija Technical Institute
89. Sectionscientific
Department of Electrical Technology
90. Course Name/Code
industrial establishments ELTP208
91. Available attendance forms
in presence
92. semester/year
Decisions
93. Number of study hours(kidney)
4*15=60
94. Date this description was prepared
19-6-2025
95. Course objectives (general objectives of the course)
1- Training the student on the methods of foundationsIndustrialComparis between different types of foundati **2 - Understand the main concepts and know the rules and laws used calculating electrical loads and cable si** **The capacity of the circuit breaker to be connect**

3- Introducing the student to the types of cables and the load capacity of ea cable.To the maximumA current that can pass throug

4 -Preparing the student to study the various calculations required in electri installations and to become familiar with the various theories for studyi those calculation

5Preparing and enabling the student to establish factories and heavy equipment and how

control them from equipment used in factories and electrical laborato

96. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

17. Understanding industrial basics (voltage, current, resistance).

18. Installation of foundations(Lighting, control circuits, factory establishment motors).

19. Use of protection devices (breakers, fuses, grounding and controls).

20. Reading electrical diagramsAnd implement it practically.

21. Implementing safety proceduresAnd risk prevention.

22. Breakdown maintenance(Detect and repair 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, laboratories, and workshops), which the course seeks to achieve for students.

Its importance:

1- Providing safe electricityFor homes and factories.

2- Prevent fires and electric shocks.

3- Operate machinery and equipment efficiently.

4- Meet the requirements of regulations and standard specifications.

5- Facilitate maintenance and reduce breakdowns

How is it determined?:

25.	**Study of labor market needs**
26.	**Review of professional standards**
27.	**Evaluate students' capabilities and the workshop**
28.	**Formulate clear and measurable goals**
29.	**Linking with other courses**
30.	**Periodic update according to developments**

Outputs	Teaching and learning methods	Evaluation methods
ج- knowledge **A1-During the academic year, the student learns the basics of electrical installations.** **A2-The student learns about electrical installations, how to read them, and the factors affecting them..** **A3-The student learns the types of connections used in home installations..** **A4-knowledgeSafety standardsand the risk of electric shock**	**1- Theoretical lectures using presentations.** **2- Real-life case studies of foundation failures.** **3- Short research on modern distribution systems**	**1- Written tests (essay and objective questions).** **2- Analytical reports on protection systems.** **1-Theoretical tests** **2- Practical tests** **3- Reports**
B - Skills **B1-Ability to design and conduct experiments, analyze and interpret data.** **B2-Ability to identify, formulate and solve problems.** **B3 -Mastery of the necessary mathematical, basic and engineering sciences.** **B4-Ability to use the techniques and skills required in the work.**	**1- Practical experiments (workshops on electrical installations).** **2- Simulation using programs such as:AutoCAD Electrical.** **3- Field visits to electrical construction sites**	**1- Practical performance tests (such as installing a lighting circuit).** **2- Project evaluation (design and implementation of a control circuit)**
C- Values **A1-Commitment**with safety standards at work **A2-to bearProfessional responsibilityIn implementing the foundations** **A3-the jobWith a teamTo implement electrical projects** **A4-respectStandards and regulations(such as delivery terms)**	**1- Group discussions on professional ethics.** **2- Role playingFor situations that require ethical decisions.** **3- Observe and imitate models of distinguished professionals.**	**1- Peer evaluationFor team performance.** **2- Observing behavior during practical training (commitment to safety).** **3- Self-reports on practical experiences**

97. Course structure A- (Theoretical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	**Identify cables-Cable components and**	**• cables-Cable components and**	**An introductory lecture about the method + classification**	**Short test (theoretical) on the**

		operating voltage, cable types according to the type of insulation (MIMPVCTRSVRI) and paper cables with lead sheath.	operating voltage, cable types according to the type of insulation (MIMPVCTRSVRI) and paper cables with lead sheath.	of materials (conductor, semiconductor, insulator)	classification of materials
the second	2	8-Student understanding of the basicsCable extension and faults 9-Get to knowIdentify faults inelectrical circuits	Cable laying methods, possible faults in cables, how to determine 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	Electrical circuit components identification test.
the third	2	10-Introducing the student toHow to protect and handle motors from overcurrents	Protection of electric motors, protection against overcurrents due to short circuits	Study of the properties of copper and aluminum (electrical, mechanical) + their applications	Practical Evaluation (Comparison between Copper and Aluminum)
Fourth	2	4- TStudent supervisorHow to protect and handle motors from overcurrents	Protection aga overcurrents due increased loads	Explanation of insulating materials (air, oil, solids) + permittivity laws	Short test on the properties of insulators
Fifth	2	6-Study of propertiesLines and how to deal with the fall of one of the phases	Protection against the disappearance or fall of one of the phases and protection against voltage drop	Lecture on Magnetism (Force, Magnetic Materials, Laws)	Students are assessed individually by giving them the opportunity to participate in the class by answering questions.
Sixth	2	6-Understand the topicbreakersmagnetic circuits	Circuit breakers, types (oil, SF6, vacuum breakers, air pressure breakers)	Application of Kirchhoff's laws to magnetic circuits	Short tests andEvaluate participation in discussions
Seventh	2	4-Introducing the student toSubstations, Busbars, and Switchboards	Substations, Busb Pneumatic Switchbo Classification of Control Pa	Study of mechanical properties (tensile, stress, elasticity)	Theoretical test on mechanical properties
The eighth	2	5-Study stagesLighting and the foundations of optical engineering 6-Knowing how electrical energy is generated, transmitted and distributed	Lighting, basics of optical engineering, light sources, lighting systems and their types, light measuring devices	Explanation of the stages of energy transmission (generation, transmission, distribution) + distribution panels	Power transmission diagram + distribution panels explanation
Ninth	2	7-Solving various questions to strengthen the student's knowledge of the subject, such	Solved questions on how to design and calculate	Theoretical explanation of generation,	Short test on types of stations and

		as lighting for halls, workshops, and laboratories. 8-Teaching a student how to supply electricity to a buildingIn additionTo know the capacity of the electrical transformers used	electrical lighting for halls, workshops and courtyards	transmission and distribution systems. +Visual presentation of building power supply diagrams + practical examples. +Workshop on installing distribution panels	transformer capacities
tenth	2	3-Knowing and studying electrical switches and their types 4-Teaching the student toInsulation and grounding	Grounded system and isolated system comparison in case of fault, equalities and advantages of each system	Explanation of electrical switch types + drawing of application circuits	Circle drawing test using keys.
eleventh	2	7-Introducing the student to the protection devices used inIndustrial establishments andelectrical 8-Learn about fuses, their types, advantages and disadvantages 9-Teaching the student how to select 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 sizes (cables), factors on which current rates depend	Study of fuses (types, specifications, how to choose them)	Evaluating the selection of suitable fuses for different circuits
twelfth	2	3-Solve questions to strengthen the student	Solved questions on voltage drop calculations	Sweet questions and training	Short tests andEvaluate participation in discussions
thirteenth	2	7-Study of electrical wiring systems 8-Knowing how to number wires and cables at work and taking into account the colors of the wires whenEstablishment	Technical methods of wiring, study of wiring systems, wiring methods, and methods used for this	View wiring systems(BB, TRS, PVC) + Wire numbering	Wiring systems knowledge assessment.
fourteenth	2	5-Teaching the student the typesFoundationshousehold electrical 6-Know the advantages and disadvantages of each type, safety requirements and general appearance.For establishmentAnd the tools used in it	Establishing dangerous places (examples of dangerous places) The specifics of establishing in dangerous places and the steps that must be taken for that	Home Foundation Study (Safety Requirements, Tools, Cost)	Evaluate participation in discussions

fifteenth	**2**	**6-studyGroundingKnowing its components and connection and connection equipment 7-Know the different ways to reduce resistance.Groundingand the necessary equipment and devicesGround it 8-Teaching the student the importance ofGroundingThe difference between grounded and ungrounded systems and measurement methods**	**Grounding, its types, installation of grounding conductors for substations, buildings and lightning arresters**	**Lecture on grounding (components, measurement methods, importance)**	**Short tests andEvaluate participation in discussions**

14- Course structure B-(Practical vocabulary)

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	**4-Implementing safety procedures in workshops and factories. 5-First aid for electric shock. 6-Take fire prevention measures.**	**Warnings and precautions to be taken while working in workshops and factories, as well as training on how to provide first aid for electric shock and how to warn of fires.**	**Lecture and practical application of safety and first aid**	**Short theoretical test + practical application for first aid and safety**
the second	**2**	**Recognizing symbols for electrical tools and components.**	**Knowing the symbols for devices, tools, and all necessary pendants used in electrical installations**	**Display electrical symbols and classify tools**	**Symbol and Tool Classification Test**
the third	**2**	**Preparing cables for work-Peeling process-Preparing ends for reinforced and plastic insulated cables. Use of mechanical piston-Hydraulic crimping of the metal ends of the cable connectors**	**Preparing cables for work-Peeling process-Preparing ends for reinforced and plastic-insulated cables using a mechanical press.-Hydraulic crimping of the metal ends of the cable connectors**	**Practical training on Wasalti workTwist and T**	**Practical evaluationImplementation of Twist and T joints**
Fourth	**2**	**Use of fuses of all kinds (wireable)-Khartoum-High capacity circuit**	**Use of fuses of all kinds (wireable)-Khartoum-High capacity circuit**	**Practical application of my connectionMarried Joint and T with Weld**	**Evaluation of the quality of joints and welding(Married Joint and T)**

		breaker (HCCB) for power circuit protection including dismantling, installation and fixing using small circuit breaker-Thermal curve drawing of the breaker	breaker (HCCB) for power circuit protection including dismantling, installation and fixing using small circuit breaker-Thermal curve drawing of the breaker		
Fifth	2	Thermal and magnetic protection starters (direct-on-line starters) Use of starters with different operating voltages to start the engine, including internal rewiring of the starter-Adjusting current limits	Thermal and magnetic protection starters (direct-on-line starters) Use of starters with different operating voltages to start the engine, including internal rewiring of the starter-Adjusting current limits	Practical application ofto implement connectionStraight and T for CTS wires with solder	Check straight connections andT with welding
Sixth	2	The key to the knife and how to use it to control an electrical circuit-How to protect the user from the dangers of sparks	The key to the knife and how to use it to control an electrical circuit-How to protect the user from the dangers of sparks	Practical training forConnecting and welding aluminum and paper cables	Aluminum joint and welding evaluation
Seventh	2	Multiple keys-Use of different types of it-Use the specified keys to end the movement.	Multiple keys-Use of different types of it-Use the specified keys to end the movement.	Practical application ofInstalling a simple lighting circuit (switch + lamp) with a systemCleat	Circuit installation test (switch + lamp)
The eighth	2	Measuring ground resistance using a ground meter-Measurement of the laboratory grounding network, ground leakage circuit breakers, and selection of the disconnecting current	Measuring ground resistance using a ground meter-Measurement of the laboratory grounding network, ground leakage circuit breakers, and selection of the disconnecting current	Implementation and practical application ofInstalling two lamps in parallel in a systemCleat	Parallel Circuit Installation Evaluation
Ninth	2	1- Using voltage breakers for leakage current 2- Creating an automatic circuit to fill	1- Using voltage breakers for leakage current 2-	Practical training forInstallation of lighting circuit, fan and socket with separate control	Evaluation of lighting, fan and socket circuit installation

		the tanks using a float switch	Creating an automatic circuit to fill the tanks using a float switch		
tenth	2	Use specific keys 1- In elevators, a circuit is created to achieve the elevator operation theory and implement it. 2- Use the specified keys in the crane to create a circuit that shows the operation of the crane in the transport and ascension states and implement the circuit.	Use specific keys 1- In elevators, a circuit is created to achieve the elevator operation theory and implement it. 2- Use the specified keys in the crane to create a circuit that shows the operation of the crane in the transport and ascension states and implement the circuit.	Training onTwo-way lamp control circuit installation (ladder system)	Ladder circuit installation test
eleventh	2	Stopping the engines (braking) in a way 1- Direct currentDC Brake 2- Reverse currentCounter current braking	Stopping the engines (braking) in a way 1- Direct currentDC Brake 2- Reverse currentCounter current braking	Practical application ofInstalling a 3-way control circuit usingTwo Pole Relay	3-Place Control Circuit Installation Evaluation
twelfth	2	3D electrical energy meters-Disassembly and assembly Connect and play-How to set the meter to measure power factor using an ammeter. Using a magnetic ring to measure current and voltage.	3D electrical energy meters-Disassembly and assembly Connect and play-How to set the meter to measure power factor using an ammeter. Using a magnetic ring to measure current and voltage.	Practical training forInstalling a control circuit for multiple lamps usingTwo-way switch.	Multi-lamp circuit installation evaluation
thirteenth	2	Making a control circuit to operate a three-phase induction motor using contactors in the following way?	Making a control circuit to operate a three-phase induction motor using contactors in the following way?	Practical application ofInstallation and operation of a fluorescent lamp withThermal Relay	Test andFluorescent lamp operation check
fourteenth	2	Three-phase induction motor starter switch (/Y) Mapping (connection and disconnection diagram for different switch states) Studying possible faults.	Three-phase induction motor starter switch (/Y) Mapping (connection and disconnection diagram for different switch	Implementation and practical application ofInstalling two fluorescent lamps in series withChook.	Evaluation of installing two fluorescent lamps in series

		Rotary switches and their use in starting a three-phase induction motor-to reverse the trend-To operate a motor from two sources-To operate two motors alternately	states) Studying possible faults. Rotary switches and their use in starting a three-phase induction motor-to reverse the trend-To operate a motor from two sources-To operate two motors alternately		
fifteenth	2	Metal pipe installation (pipe cutting)-Make a tooth for her-Connection using plugs-Making a bend for the bream using a bending machine)	Metal pipe installation (pipe cutting)-Make a tooth for her-Connection using plugs-Making a bend for the bream using a bending machine)	Practical training forInstallation of a mercury lamp and a sodium lamp	Mercury and sodium lamp installation test

98. Curriculum Development Plan

Continuously developing educational content to keep pace with modern requirements, such as:

1-IncludeQualitative specializations in line with digital transformation

2-OrganizationDiscussion sessions with industry leaders

3- Follow-upGlobal technical developments in the electrical field

4- ResidenceApplied exhibitions to showcase modern innovations

5-DevelopmentField training programs in leading companies

99. infrastructure

Classrooms, laboratories a workshops	**Well-equipped and equipped halls and laboratories are available to provide a suitable environment for teaching and learning.**
13- Required textbooks	**Home and industrial electrical installations •Basics of Electricity and Electrical Circuits •International Electrical Code (IEC) - Latest Editi**
14- Main References (Sources)	**"Electrical Engineering: Principles and Applications" "Electrical Engineering: An Introduction" "Fundamentals of Electrical Engineering" "Electricity and Electronics for HVAC"**

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

100. educational institution
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
101. Scientific Department
Department of Electrical Technology
102. Name of theScheduled/ Digital electronics
ELTP 105 Electrical Installations
103. Available attendance forms
In presence
104. semester/the second
Decisions
105. 4/Number of study hours
60=15*4
106. Date this description was prepared
2025-6-20
107. (Course objectives (general objectives of the course
• Logic circuit applications(The mosque HalfThe perfect collector, the half-and-full ,subtractor, the comparisons

- Encodersand circles Prediction
- (Identifying types of series circuitsTD,(JK),(SR - Flip flop
- Learn about the types of recorders and methodsIts design,How to enter and exit .dataIncluding,And scroll the records to the right and to the left
- Identify the typesCounters,Synchronous and asynchronous, and their design methods

Specific objectives

Outputs	Teaching and learning methods	Evaluation methods
• **Acquire the skill of designing and connecting comparator and switching circuitsFor systemsDecimal and binary** • **Building circles(The mosqueThe half and full offererFor numbersUp to four ranks** • **Building different types of oscillators and generating square waves** • **Building progressive positive meter circuitsAnd descending and circlesDigital to analog conversion**	**Theoretical lectures -1 .using presentations Real-life case studies -2 .of foundation failure A brief research on -3 modern distribution systems**	**Written tests (essay and objective -1 .(questions Analytical reports on protection -2 .systems Theoretical tests -1 Practical tests -2 Reports -3**
B - Skills ,Ability to design and conduct experiments-B1 .analyze and interpret data Ability to identify, formulate and solve-B2 .problems Mastery of the necessary mathematical, basic- B3 .and engineering sciences Ability to use the techniques and skills required-B4 .in the work	**Practical experiments -1 workshops in electrical) .(installations Simulation using -2 :programs such as .AutoCAD Electrical Field visits to electrical -3 construction sites**	**Practical performance tests (such -1 .(as installing the lighting circuit Project evaluation (control circuit -2 (design and implementation**
C- Values Commitmentwith occupational safety standards**-A1 to bearProfessional responsibilityIn-A2 implementing the foundations the jobWith the teamTo implement electrical-A3 projects respectStandards and Regulations(such as-A4 (delivery terms**	**Group discussions on -1 .professional ethics Role-playing in -2 situations that require .making ethical decisions Observe and imitate -3 models of distinguished .professionals**	**Peer evaluation of team -1 .performance Monitoring behavior during -2 practical training (commitment to .(safety Self-reports on practical -3 experiences**

108. (structure The decision-(Vocabulary Theory					
week	hours	Required learning outcomes	/Unit name	Teaching method	Evaluation method
the first	**2**	Definition of number systems Historical overview System components	Number systems	**Learn about digital systems**	**Learn about digital systems**
the second	**2**	Convert from decimal to binary Converting from decimal to other systems Convert from hexadecimal to binary	Converting between number systems	**Learn about digital :systems the binary system**	**Learn about digital systems and the gateway system**
the third	**2**	Convert from binary to octal Convert from hexadecimal to octal Convert from octal to hexadecimal	Converting between number systems	Identifying Digital 16 Systems	Learn about modular circuits
Fourth	**2**	Addition and subtraction in .binary 1 Supplement 2 Supplement	- Collection the proposal in order The duoY.Use The 2F the complement the first .proposal The duoY	**Learn about digital ,systems the gateway system**	**Getting to know the vibrators**
Fifth	**2**	Gates and their importance Fundamentals of logic gates	Gates logical,Foundations . Gates logical	**Getting to know the electronic gates**	**Identifying meters**
Sixth	**2**	circleANDElectronic NOT Using diode	ANDUsing This He would like And resistance,gate NOT Using diode	**Learn about Punic algebra**	**Learn about data conversion circuits**
Seventh	**2**	((gate NAND ((gate NOR ((gate XOR	gate NAND)Lao(,gate)No(NORgate)o ,r(confinement A XOR	**Learn about modular circuits**	,Traditional tests ,assignments formative ,assessment -practical tests, self and peer ,assessment participation and contribution
The eighth	**2**	Bolognese relation Finding the truth table	De Morquin's theory	**Learn about transmission circuits**	,Traditional tests ,assignments formative ,assessment -practical tests, self and peer ,assessment

					participation and contribution
Ninth	**2**	Writing the equation from the logic circuit Use of both types of total results	De Morquin's theory	**Getting to know De Morcain's theory**	,Traditional tests ,assignments formative ,assessment -practical tests, self and peer ,assessment participation and contribution
tenth	**2**	Karnaugh Map for Dusty People Examples	Karnaugh Map	**Learn about the Karnaugh map**	,Traditional tests ,assignments formative ,assessment -practical tests, self and peer ,assessment participation and contribution
eleventh	**2**	Karnaugh map for three variables Examples	Karnaugh Map	**Learn about the Karnaugh map**	,Traditional tests ,assignments formative ,assessment -practical tests, self and peer ,assessment participation and contribution
twelfth	**2**	**Karnaugh map for four variables** **Examples**	**Karnaugh Map**	**Learn about the Karnaugh map**	**,Traditional tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution**
thirteenth	**2**	**Single-order digital comparator** **Two-order digital comparator**	**Digital Comparator**	**Digital Comparato r Recognition**	**,Traditional tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution**
fourteenth	**2**	**binary to octal** **binary to decimal**	**rDecoder**	**Recognize the ascending**	**,Traditional tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution**

fifteenth		**Octal to binary** **decimal to binary**	**Encoding**	**Learn about descending circuits**	**,Traditional tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution**

15-(structure theScheduledfor-(Vocabulary The process					
week	hours	Required learning outcomes	Unit name/the topic	Teaching method	Evaluation method
the first	**2**	**Learn about digital systems**	Number systems	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
the second	**2**	**Learn about digital systems: the binary system**	Converting between number systems	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
the third	**2**	**Identifying Digital Systems 16**	Converting between number systems	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
Fourth	**2**	**Learn about digital**	Collection the - proposal in	,Presentation ,explanation	,Traditional tests ,assignments

		systems, the gateway system	order The duoY.Use The complement the first 2F the proposal The .duoY	questions and ,answers discussion	formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
Fifth	**2**	**Getting to know the electronic gates**	Gates logical,Foundations . Gates logical	,Presentation ,explanation questions and ,answers discussion	,Traditional tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
Sixth	**2**	**Learn about Punic algebra**	ANDUsing This He would like And resistance,gate NOT Using diode	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
Seventh	**2**	**Learn about modular circuits**	(gateNAND gate)No(NOR,) gate)or(confinement ,A XOR	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
The eighth	**2**	**Learn about transmission circuits**	De Mocan's theory	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
Ninth	**2**	**Learn about programmable logic devices**	De Mocan's theory	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution

tenth	**2**	**Getting to know the vibrators**	Karnaugh Map	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
eleventh	**2**	**Learn about flip flop circuits**	Karnaugh Map	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
twelfth	**2**	**Identifying meters**	Karnaugh Map	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
thirteenth	**2**	**Identifying meters**	Digital Comparator	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
fourteenth	**2**	**Learn about data conversion circuits**	decoder Decoder	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer ,assessment participation and contribution
fifteenth	**2**	**Learn about data conversion circuits and .digital systems**	Coding Encoding	,Presentation ,explanation questions and ,answers discussion	Traditional ,tests ,assignments formative ,assessment ,practical tests self- and peer

					,assessment participation and contribution

109. Curriculum Development Plan

,Continuous development of educational content to keep pace with modern requirements :such as

1- IncludeQualitative specializations in line with digital transformation

2- Discussion sessions on regulation with industry leaders

3 Follow-upGlobal technological developments in the electrical field

4 ResidenceApplied exhibitions to showcase modern innovations

5 Developmental field training programs in leading companies

110. infrastructure

Classrooms, laboratories, and workshops	**Available Halls and laboratories Equipped Preparing well To .provide environment suitable For teaching and learning**
15- Required textbooks	**Compositions electrical Household and industrial** **basics electricity and circles electrical•** **The code electrician International(IEC) -Release Late**
16- Main references	**Engineering electrical:Principles and applications** **"Engineering electrical:introduction"** **"basics Engineering electrical"** **electricity and electronics For systems heating and ventilation and a** **"conditioning air**
A)Recommended books and references	:**Digital Design**By M. Morris Mano o This book is considered one of the basic books in the .field of digital circuit design o **Digital Fundamentals**By Thomas L. Floyd: This book covers the basic concepts and practical applications of digital .circuits 2. :**Websites** 3. :**Online training courses** o **Coursera**:Offering training courses in digital .electronics from prestigious universities o **edX**:Offers similar courses covering the basics of .digital circuits and their design 4. :**scientific journals** o **IEEE Xplore**:Contains recent articles and research in .the field of digital electronics

	These resources provide comprehensive coverage of the basic concepts and practical applications of digital circuits. • **Suggested related links: in formatQRC** 
for)Library AFor electronics .....,and websites	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

111. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technica University / Al-Hawija Technical Institute
112. Scientific Department
Department of Electrical Technology
113. Course Name/Code
2 Electrical networks
114. Available attendance forms
In presence
115. semester/year
Decisions
116. (Number of study hours (total
60 =15*4
117. Date this description was prepared
19-6-2025
118. (Course objectives (general objectives of the course
Complete knowledge of hydroelectric, thermal and gas generating -1 .stations and an idea about some other stations such as diesel Using overhead lines - Mechanical calculations including 2-A: - Calculating tension and slack when the distances from the ground are equal- Calculating the weight of snow accumulated on the wire- Calculating the amount of wind pressure force acting on the wire Calculations of the basic elements of overhead lines - Electrical 3-A calculations, including: - Calculating the resistance- Calculating the internal and external inductance of a single wire- Calculating the inductance of a three- way system consisting of three wires separated by equal distances from each other, Or at different distances or exchanged in location Calculate the capacitance of the single - phase system A triode 4-A consisting of three wires spaced equally apart, or At different distances and exchange locations
119. Course outcomes , teaching, learning and assessment methods **Course outcomes** A- Cognitive objectives 5. Operation and maintenance of electrical units of power plants.

Introducing the student to the types of power stations and introducing the student to the operating mechanism of each type of station and the degree of efficiency of each type of power station

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

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

Outputs	Teaching and learning methods	Evaluation methods
ج- knowledge The student gets to know Methods of -1 generating electrical energy Distinguish between each type of .2 .energy source Explain the mechanism of electrical .3 . energy production	**13. Theoretical lectures** **14. Group discussions** **15. Case studies**	**17. Theoretical tests** **18. My work performance evaluation** **19. Safiya's participation** **20. Research reports**
B- Skills The student gets to know Methods of -1 generating electrical energy Distinguish between each type of .2 .energy source Explain the mechanism of electrical .3 . energy production	**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 Student participation in classroom activities and submitting .assignments on time	**13. Interaction and application** **14. modern technologies** 15. **group learning**	**17. Continuous assessment** **18. Performance evaluation during practical training**

Adherence to occupational safety .rules while working in laboratories Attention control and attention test (selective attention)		**19. Final evaluation** **20. Field visit reports**

lame of the material **2 Electrical networks**	**Second academic year**	**Weekly hours**			**Numb er of units**
		N	**A**	**M**	
		2	**2**	**4**	**4**

theoretical(2 Details of the curriculum for Electrical Networks curriculum) two hours per week

120. **(**Course structure A- **(Theoretical vocabulary**

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	**2**	to understand Unity theme	**DC distribution networks and distributors that are fed from one end – to the other that are fed .from two ends Single-ended AC distributors**	**Interactive lectures supported by PowerPoint presentations , documentary videos, and a conceptual map of energy flow in the electrical system.**	**A + short test research assignment on the stages of development of energy systems**

the second	**2**	to understand Unity theme	**Ring distributors of - all types comparison between different distributors**	**,Explanatory video ,comparative study class discussion.**	**+ Analytical report short descriptive test.**
the third	**2**	to understand Unity theme	**Solve various examples for the first and second weeks**	**Real case presentation + application study**	**Oral presentation + in a group individual written assessment**
Fourth	**2**	to understand Unity theme	**Conditions for the stability of synchronous generators operating in parallel with the grid - load capacity curve How synchronous generators operate in parallel with each other and with the grid**	**Analysis of engineering ,drawings interactive ,discussion practical examples.**	**Practical test + homework**
Fifth	**2**	to understand Unity theme	**Methods for improving power factor are divided :into Static - - capacitors Synchronous motors - Phase advance devices**	**+ Video lecture comparison exercises**	**Essay question + homework**
Sixth	**2**	to understand Unity theme	**Types of errors in electrical networks and their division :into Symmetrical faults and fault current calculation in an electrical circuit**	**Solving applied + problems numerical simulation(via programs such as MATLAB).**	**Class test**

			- Asymmetrical errors and fault current calculation in electrical circuit Basic Units -) Calculation PU (		
Seventh	**2**	to understand Unity theme	**Protection ,principles ,definition various systems, and uses of protection ,relays ,disconnectors and circuit breakers in the electrical power system and measuring ,devices :including Voltage - - transformers Current transformers**	**Practical training + detailed explanations**	**Analytical test**
The eighth	**2**	to understand Unity theme	**Relays, their classification according to their working ,theory inductive relays against ,overcurrent against reverse ,power electronic relays**	**Exercise solutions, group discussion**	**achievement test**
Ninth	**2**	to understand Unity theme	**How to protect overhead lines Distance - protection (line impedance measurement - (protection Bar protection)BB (**	**Review session, classroom exercises**	**Short achievement test**

tenth	**2**	to understand Unity theme	**How to protect power transformers using differential protection**	**Electrical circuit drawing + applications**	**+ Drawing circles geometry problems**
eleventh	**2**	to understand Unity theme	**How to protect synchronous generators :using -Differential Protection -Digital Protection -Reverse Power Protection**	**View videos + view models of insulators**	**Practical report + test**
twelfth	**2**	to understand Unity theme	**Stator overcurrent protection and rotor overcurrent protection**	**Use of models or graphs**	**Research report**
The thirteenth	**2**	to understand Unity theme	**Percentage Reactance**	**Workshop, problem solving**	**Technical achievement test**
fourteenth	**2**	to understand Unity theme	**Power circuit diagram at the receiving end**	**Case studies of + collapse discussion of causes and prevention.**	**Final comprehensive exam**
fifteenth	**2**	to understand Unity theme	**Economic operation of ,power plants ,load factor ,load capacity calculating the cost per kilowatt-hour**		**Practical report + test**

course (practical 2 of the curriculum for the Electrical Networks Details **curriculum) two hours per week**

16-(Course structure B-(**Practical vocabulary**					
week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method

the first	**2**	The student learns about the operation of a fixed-time relay as a means of protection against overcurrent.	Fixed time relay against overcurrent	Practical explanation of the device + conducting an experiment on a protection board	My work performance note + brief report
Second and third	**2**	The student understands the principle of the inverse function against increasing current and applies it to a real device.	Inverse function against overcurrent	Theoretical explanation + experience connecting and testing the device	Technical Report + Analytical Questions
Fourth	**2**	The student applies a directional earth fault protection experiment and analyzes the results.	Directional earth fault protection	Schematic view of the connection + practical implementation of the experiment	Wiring diagram + written conclusions
Fifth	**2**	The student will be able to measure the useless power in an electrical circuit.	Measurement of useless power	Practical connection of devices + reading and discussing the results	Correct reading + interpretation of results in a report
Sixth	**2**	The student learns about the different types of cables and their components.	Identify the components of different types of .cables	View real samples + compare features	Field Notes + Worksheet
Seventh	**2**	The student observes the components of the gas station and its function during the visit.	Visit to a gas station	Field visit + questions directed by 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 in it.	Visit to a steam station	Field visit + practical explanation of the components	Detailed report + comparison with a gas station
tenth	**2**	The student follows the stages of work in a hydroelectric station and analyzes its energy production.	Visit to a hydroelectric station	Field visit + asking questions to technicians	Technical report + oral summary
eleventh	**2**	The student performs a breakdown voltage test on transformer oil.	Breakdown voltage test of a sample of transformer oil	Explanation of test steps + practical implementation	Reading values + recording a practical report
twelfth	**2**	Learn about the types of high and low voltage circuit breakers and their working principle.	Identify the high and low voltage circuit breaker	Real-world hardware demonstration + hands-on experience	Descriptive report + diagram

thirteenth and fourteenth	**2**	Understands the principle of automatic recovery of transmission lines and performs simulations of their condition.	Automatic restoration of transmission lines	Theoretical explanation + implementation of an experiment using a protection board	Performance Report + Practice Questions
fifteenth	**2**	Carries out overload and short circuit protection experiments on transmission lines.	Protection of transmission lines against overload and short circuit current	Fault simulation + monitoring of protection device performance	Results analysis + practical test

121. Curriculum Development Plan	
Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as: **7- Updating the curriculum to keep pace with developments in the field of electrical networks .** **8- .Holding scientific seminars with specialists in the field** **9- Monitoring scientific developments in electrical network systems and power generation**	
122. infrastructure	
Classrooms, laboratories and worksho	**There are classrooms equipped to accommodate students and prepared to provide a suitable learning environment.**
17- Required textbooks	**Electrical Networks Lectures Booklet 2** **" Electrical Machines and Power Systems" Study and Analysis**
18- (Main References (Sources	**"Power System Analysis" John J. Grainger & William D. Stevenson**
ج) Recommended books and references (scientific journals, reports, etc.)	**" Transmission and distribution of electrical energy"** Author: **Dr. Mahmoud Gilani**

	Publisher: **Dar Al–Fajr for Publishing and Distribution – Cairo**
ج) ,Electronic references .....,websites	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

123. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technica University / Al-Hawija Technical Institute
124. Scientific Department
Department of Electrical Technology
125. Course Name/Code
2 Maintenance Workshop
126. Available attendance forms
In presence
127. semester/year
Decisions
128. (Number of study hours (total
45 =15*3
129. Date this description was prepared
19-6-2025
130. (Course objectives (general objectives of the course
The student will also be able to: 1. Uses various equipment, tools and components used in workshops. .2 Acquires technical skills and experience in the field of various electrical maintenance works. 3. Gain self-confidence to practice electrical engineering work, track fau and learn how to repair them. .4
131. Course outcomes , teaching, learning and assessment methods **Course outcomes** A- 1identification The student on works Maintenance For devices Electrical A-2 identification The student on Business Technical electrical in Track Malfunctions For devices electrical And get to know on How to Fixit A -3 identification The student on various the components electrical and electronic

How to Use it in building circles Electrical A-4 identification The student on How to Unlock And installation Yes In the face of machines Electrical A -5 identification The student on How to to examine machines electrical after Wrapit		
Outputs	Teaching and learning methods	Evaluation methods
knowledge A-1 Introducing the student to electrical appliances maintenance work. A-2 Introducing the student to electrical technical work in tracing faults in 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 electrical machine parts	**16. Theoretical lectures** **17. Group discussions** **18. Case studies**	**21. Theoretical tests** **22. My work performance evaluation** **23. Safiya's participation** **24. Research reports**
B- Skills B1 - Acquire the skill of assembling DC machines, methods of rewinding DC machines. B2 - Acquire the skill of designing and studying three-phase electrical transformers. B3 - Acquire the skill of rewinding Stator coils of a three-phase induction motor and a squirrel cage. B-4 Acquire the skill of assembling the engine and testing the engine under the load assigned to it. B-5 Acquire the skill of periodic maintenance of a split-phase motor, conduct the necessary tests on it, identify faults and methods of treating them.	**16. Interactive lectures** **17. Real-life case studies** 18. **Field visits to facilities**	**21. Short and final tests** **22. Performance evaluation during practical training** **23. Applied projects** 24. **Field visit reports**
C-Values C-1 Practical skills enable The student researches identifying and treating faults in electrical appliances. C-2 Practical skills that enable the student to cooperate In working with others. C-3 Maintaining the safety of the equipment and furniture in the workshop, as they are public property. C-4 The student's ability to think in an organized manner and .thus make decisions	**16. Interaction and application** **17. modern technologies** 18. **group learning**	**21. Continuous assessment** **22. Performance evaluation during practical training** **23. Final evaluation** **24. Field visit reports**

lame of the material Maintenance 2 Workshop	Second academic year	Weekly hours			Numb er of units
		N	A	M	
		0	3	3	3

course 2 Details of the curriculum for the Maintenance Workshop practical curriculum only) three hours each week)

Course structure -10

week	watches	Outputs Learning required	or the topic / name Unity	Teaching method	Evaluation method
the first	3	acquisition Skill and experience Technical in Unity theme	Motor assembly and motor testing at the specified load - Study of the starting phase of three-phase motors - Direct method - Self-starter method	to implement exercises	evaluation continuous
the second	3	acquisition Skill and experience Technical in Unity theme	Induction motor protection devices and the use of timers	to implement exercises	evaluation continuous
the third	3	acquisition Skill and experience Technical in Unity theme	Change the final drive connection from star to .triangle and note∆ operated -Y The motor is originally the differences in current and torque in both .cases	to implement exercises	evaluation continuous
the four	3	acquisition Skill and experience Technical in topic Unity	Single phase induction motor, practical study of different types of single phase induction motors motor construction - capacitor motor - split - phase motor	to implement exercises	evaluation continuous
Fifth	3	acquisition Skill and experience Technical in topic Unity	Split-phase motor winding, testing, and periodic maintenance – faults and how to treat them – reversing the direction of rotation of the motor	to implement exercises	evaluation continuous
Sixth	3	acquisition Skill and experience Technical in Unity theme	Split-phase motor drawing - multiple examples	to implement exercises	evaluation continuous
Seventh Eighth+	3	acquisition Skill and experience Technical in Unity theme	Shaded pole motor winding of different types	to implement exercises	evaluation continuous
Ninth	3	acquisition Skill and experience Technical in topic Unity	- Continuity test - Polarity test - Ground test Short circuit test	to implement exercises	evaluation continuous
tenth	3	acquisition Skill and	Electrical and mechanical faults and their treatment methods	to implement exercises	evaluation continuous

		experience Technical in topic Unity			
eleventh	3	acquisition Skill and experience Technical in topic Unity	Winding the capacitor motor, carrying out the - necessary tests on it - polarity continuity test ground fault - short circuit between the coils	to implement exercises	evaluation continuous
twelfth	3	acquisition Skill and experience Technical in Unity theme	Winding the ceiling and table fan motor and performing the necessary tests	to implement exercises	evaluation continuous
the third ten	3	acquisition Skill and experience Technical in Unity theme	Home appliance maintenance - home refrigerator - mechanical and electrical faults and their treatment methods	to implement exercises	evaluation continuous
the fourteen	3	acquisition Skill and experience Technical in Unity theme	Home appliance maintenance - home freezers - home air conditioners - mechanical - and electrical faults and their solutions periodic maintenance	to implement exercises	evaluation continuous
fifteenth	3	acquisition Skill and experience Technical in Unity theme	Home appliance maintenance - washing - machine - electrical faults and how to fix them periodic maintenance	to implement exercises	evaluation continuous

- 11 structure Infrastructure :	
1-books The reporter Required	The booklet Laboratory private In the workshop
2- the reviewer Home (Sources)	- 1 He wrapped Engines electrical ,.Dr moon - 2 Reference in Transformers electrical , Franklin Sticant , SA
A books References that Recommended It has(magazines) Scientific, Reports ,)	- 1Troubleshooting And maintenance machines Electrical Bank settings International For shapes Illustrative Technical.
for - the reviewer electronic, Sites Internet	-1 location The Institute Technical /Al-Rumaitha- 2Sites Companies Global

- 12 plan development The decision Academic :
- 1Participation in The state Art Different Private By the material To gain My coach The workshop expertise Bigger - 2 examining on last what I reached for him Technology Modern in This is amazing The material .

132. Educational institution

Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute

133. Sectionscientific

Department of Electrical Technology

134. Course Name/Code

Engineering drawingELTP106

135. Available attendance forms

in presence

136. semester/year

Decisions

137. Number of study hours(kidney)

3*30=90

138. Date this description was prepared

22-6-2025

139. Course objectives (general objectives of the course)

- 1 Understanding the basic rules of engineering drawing using a computer.
-2 Draw basic models using this program.
-3 Design and draw the proposed models.

140. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

1- Engine Detailed drawings: accurately show the dimensions and components of the design.

2-Assembly drawings: show how the components will be fitted together.

3-Diagrams (architectural/electrical/mechanical): represent the general systems and subsystems.

4-Bills of materials (BOM): list parts, materials, and quantities.

5-3D models: to realistically display the design.

6-Digital manufacturing files (STL, DXF, etc.): used in manufacturing and printing machines.

7-Revision and release documents: document various changes and releases.

identification:

ering drawing is a universal language for engineers and technicians, used to convey design ideas with complete accuracy, in addition to being a key tool for implementing manufacturing, infrastructure, architecture, and others, by adhering to unified standards.(ISO/ASME/ANSI) Specifies the characteristics of the shape, dimensions, materials, tolerances, and type of sections and surfaces.

Its importance:

1: **3D representation on a 2D surface**: Via orthogonal projection methods (front/top/side projection)

2: **Accurate and clear specifications**:Includes length, angles, scales, line type, tolerances, materials, surface description, and data such as the artist's name, references, and time stamps. .

How is it determined: So that it includes all the information necessary to ensure that the item is manufactured or executed accurately and clearly. In general, the output is divided into a detailed drawing(Detail Drawing) and Assembly Drawing

Outputs	Teaching and learning methods	Evaluation methods
A-knowledge A1-knowledgeAnd understanding basics The drawing Engineering Using AutoCAD A2 - IDAnddrawing shapesEngineering BasicUsing the computer A3-knowledgeAnd understanding orders The program A4 - Knowing how to draw shapesBinaryDimensions A5 - Knowing how to draw shapesThe TrilogyDimensions A6-Knowledge of writing and setting dimensions For shapes Engineering	•**Direct practical training:**Using AutoCAD in classespaternal uncleWhy with realistic examples in drawing?Engineering. •**Interactive education :** Combining short theoretical explanation with practical application, and encouraging students to solve exercises gradually	1 - Monitor students' performance step by step during practical lessons, providing immediate feedback to improve performance.

	(from simple to complex).). •**cooperation and offers:**Implement small projects within teams to enhance teamwork and present the results for discussion.	2- Use short exercises after each unit to measure understanding of key concepts and commands.
B -Skills B1 - Drawing shapesEngineering BinaryDimensions B2 - Drawing shapesEngineering The TrilogyDimensions B3-to implementCommands to get the drawingEngineering B4 - Putting the dimensions of the drawing and writing on the drawing	1.**Direct practical training:** •Using AutoCAD in computer labs with gradual exercises (from simple to complex)). 2.**Project-based learning:** •Implement small projects (such as creating electrical diagrams) to link theory with practice.. 3.**Collaboration and Offers:** •Work in teams to create integrated drawings and present the results for group discussion.	1- Short practical evaluation: •Quick tests during classes to measure mastery of basic commands (such as drawing shapesD/3D).2 2- Applied projects: •Evaluate a final project (such as creating a complete

		engineering drawing) with an emphasis on accuracy and adherence to standards .. 3- Peer assessment: •Students participate in evaluating each other's work under the supervision of the teacher to promote self-assessment.
C-values A1 - Instilling a spirit of creativity in students and ensuring that they find innovative solutions to various problems. A2 - Developing students' ability to work as effective teams that produce distinguished results.	Stimulating the creative side of students by presenting various scientific problems and asking students to find appropriate scientific solutions	Direct evaluation: This evaluation is carried out by the instructor

A3 - Developing a sense of responsibility among students and preparing them psychologically to bear the burdens placed on their shoulders. A4 - Developing the values of diligence and perseverance in completing work to achieve satisfactory results.	for them in various ways. Developing the spirit of cooperation among students by forming work teams and motivating students to make all necessary efforts to work in different circumstances and with different people.	directly, by observing the student's interaction during the lecture and recording the notes. About that Practical projects: The student's ability to achieve and innovate, to work within teams, and to produce results and solutions to various scientific problems are evaluated.
141. Course structure **(Theoretical and practical vocabulary)**		

week	watches	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	3hours	Introducing the student to the interfaces program AutoCAD How to use	**The importance of engineering drawing. Getting to know the interfaces AutoCAD program**	Show about Road power point With the app	**Through participation and exams**
the second	3hours	How to use Commands for purpose The drawing	**Display orders borderDrawing and units**	Show about Road power point With the app	**Through participation and exams**
the third	3hours	Student education On how Using commands For more accurate drawing	**Drawing accuracy commands GRID , POLAR, OSNAP**	Show about Road power point With the app	**Through participation and exams**
Fourth	3hours	How to use Ready-made commands	**Drawing commands ElementsRectangle Circle, Polygon, Arc**	Show about Road power point With the app	**Through participation and exams**
Fifth	3hours	Student education Use Commands	**Modification ordersErase Copy, Move, Mirror,**	Show about Road power point With the app	**Participation**

		To modify and facilitate The drawing			
Sixth	3hours	Student education On the dimensions of the drawing precisely	**Put different dimensions on Drawing elements and control it Using a square Dimensions mode dialogue**	Show about Road power point With the app	**Through participation and exams**
Seventh	3hours	How to control Font type and color	**Control specifications Drawing types of lines, Element colors, Its characteristics**	Show about Road power point With the app	**Through participation and exams**
The eighth	3hours	How to use Commands to facilitate The drawing	**Element drawing commands Ellipse, Donut, Wipeout, Revision Cloud**	Show about Road power point With the app	**Through participation and exams**
Ninth	3hours	Student education Use Commands To modify and facilitate The drawing	**Modification orders OtherOffset, Scale, Stretch, Rotate**	Show about Road power point With the app	**Through participation and exams**
tenth	3hours	Knowing how Add text Line control color and others	**Add texts Its methods and control With its specifications**	Show about Road power point With the app	**Through participat**

					ion and exams
eleventh	3hours	To know the account spaces Sizes and lengths	**Dealing withorders tape Parametric**	Show about Road power point With the app	**Through participation and exams**
twelfth	3hours	How to use misleading And specification and others	**Hovering and shading and sectors**	Show about Road power point With the app	**Through participation and exams**
thirteenth	3hours	Student education Use Commands to work Layers and control	**Layers And control its settings**	Show about Road power point With the app	**Through participation and exams**
fourteenth	3hours	Teaching the student how to drawing blocks	**Blocks(Blocks)**	Show about Road power point With the app	**Through participation and exams**
fifteenth	3hours	Student education Types of blocks	**Types of blocks And include and control itforIts specifications.**	Show about Road power point With the app	**Through participat**

					ion and exams

142. Curriculum Development Plan
Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as:

10- Updating the curriculum to keep pace with developments in the field Engineering drawing. **11- Follow up on scientific developments inUpdate the program continuously.**

143. infrastructure	
Classrooms, laboratories and workshops	**Equipped laboratories are available to accommodate students and are prepared** **To provide a suitable environment for learning**
19- Required textbooks	**The prescribed engineering drawing lectures binder**
20- Main References (Sources)	**https://faculty.uobasrah.edu.iq/uploads/teaching/1711798938.pdf**
A- Recommended books and references (scientific journals, reports, etc.)	**https://www.smartdraw.com/cad/engineering-drawing-software.htm?srsltid=AfmBOoqDqQ2hjW1riiDu_ZmtTLd6-itW7EDrm7zUii1JMSEtmWi8ii2i**
B-Electronic references, websites,.....	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

144. Educational institution
Ministry of Higher Education and Scientific Research / Northern Technical Univers / Al-Hawija Technical Institute
145. Sectionscientific
Department of Electrical Technology
146. Course Name/Code
electrical drawingELTP106
147. Available attendance forms
In presence
148. semester/year
Decisions
149. Number of study hours(kidney)
3*30=90
150. Date this description was prepared
22-6-2025
151. Course objectives (general objectives of the course)
- 1. Understand the basic rules of electrical drawing using a computer. **-2 Draw basic models using this program.** **-3 Design and draw the proposed models.**
152. OutputsThe decisionTeaching, learning and assessment methods

Course outcomes

1. Circuit Diagrams
2. Electrical Wiring Diagrams
3. Distribution Diagrams
4. Load and Cable Schedules
5. Grounding Diagram
6. Bill of Materials (BOM)
7. Documents

identification: An electrical diagram is a graphic representation of electrical components and circuits using standard symbols. This diagram is intended to

simplify understanding how electrical devices and materials are connected within a system. It is used to illustrate how electrical current flows in a circuit and is used 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. **Electrical circuit design illustration**
2. **Facilitate maintenance and repair**
3. **Precise system control**
4. **Ensure safety and security**

How is it determined: It is determined based on the type of electrical system, the components used, the required connections, and safety and efficiency requirements. By accurately identifying these factors, an effective electrical drawing 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
١- knowledge A1-knowledgeAnd understanding basics The drawing Electrician Using AutoCAD A2 - IDAnddrawing shapeselectrical BasicUsing the computer A3-knowledgeAnd understanding ordersThe program A4-Knowledge of writing and setting dimensions For shapes Electrical 5- Knowing the symbols of the electrical circuit 6- How to draw an integrated electrical circuit	•**Direct practical training:**Using AutoCAD in classespaternal uncleWhy with realistic examples in drawing?Engineering. •**Interactive education :** Combining short theoretical explanation with practical application, and	1- Monitor students' performance step by step during practical lessons, providing immediate feedback to improve performance. 2- Use short exercises after each unit to

	encouraging students to solve exercises gradually (from simple to complex).). •**cooperation and offers:**Implement small projects within teams to enhance teamwork and present the results for discussion.	measure understanding of key concepts and commands.
B -Skills B1-Drawing symbols that are not in the program B2-Integrated circuit drawing B3-to implementCommands to getelectrical drawing B4 - Putting the dimensions of the drawing and writing on the drawing	4.**Direct practical training:** •Using AutoCAD in computer labs with gradual exercises from simple to complex. 5.**Project-based learning:** •Implement small projects (such as creating electrical diagrams) to link theory with practice.. 6.**Collaboration and Offers:** •Work in teams to create	1- Short practical evaluation: •Quick tests during classes to measure mastery of basic commands. 2- Applied projects: •Evaluate a final project (such as creating a complete engineering drawing) with an emphasis on accuracy and

	integrated drawings and present the results for group discussion.	adherence to standards.. 3- Peer assessment: •Students participate in evaluating each other's work under the supervision of the teacher to promote self-assessment.
C-values A1 - Instilling a spirit of creativity in students and ensuring that they find innovative solutions to various problems. A2 - Developing students' ability to work as effective teams that produce distinguished results. A3 - Developing a sense of responsibility among students and preparing them psychologically to bear the burdens placed on their shoulders. A4 - Developing the values of diligence and perseverance in completing work to achieve satisfactory results.	Stimulating the creative side of students by presenting various scientific problems and asking students to find appropriate scientific solutions for them in various ways. Developing the spirit of cooperation among students by forming work teams and motivating students to make all necessary	Direct evaluation: This evaluation is carried out by the instructor directly, by observing the student's interaction during the lecture and recording the notes. About that Practical projects: The student's ability to achieve and innovate, to

	efforts to work in different circumstances and with different people.	work within teams, and to produce results and solutions to various scientific problems are evaluated.

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

week	watc hes	Required learning outcomes	Unit name/topic	Teaching method	Evaluation method
the first	3hou rs	Introducing the student to the interfaces program AutoCAD How to use	**The importance of drawingelectric ian. Getting to know the interfaces AutoCAD program**	Show about roadPower Point With the app	**Through participa tion and exams**
the seco nd	3hou rs	How to use Commands purpose The drawing	**Display orders borderDrawing and units**	Show about roadPower Point With the app	**Through participa tion and exams**
the third	3hou rs	Student education On how Using commands For more accurate drawing	**Drawing accuracy commands GRID , POLAR, OSNAP**	Show about roadPower Point With the app	**Through participa tion and exams**

Fourth	3hours	How to use Ready-made commands	**Drawing commands ElementsRectangle Circle, Polygon, Arc**	Show about roadPower Point With the app	**Through participation and exams**
Fifth	3hours	Student education Use Commands To modify and facilitate The drawing	**Modification ordersErase Copy, Move, Mirror,**	Show about roadPower Point With the app	**Participation**
Sixth	3hours	Student education On the dimensions of the drawing precisely	**dimensionDifferent on Drawing elements and control it Using a square Dimensions mode dialogue**	Show about roadPower Point With the app	**Through participation and exams**
Seventh	3hours	How to control Font type and color	**Control specifications Drawing types of lines, Element colors, Its characteristics**	Show about roadPower Point With the app	**Through participation and exams**
The eighth	3hours	How to use Commands to facilitate The drawing	**Element drawing commands Ellipse, Donut, Wipeout, Revision Cloud**	Show about roadPower Point With the app	**Through participation and exams**

Ninth	3hours	Student education Use Commands To modify and facilitate The drawing	**Modification orders OtherOffset, Scale, Stretch, Rotate**	Show about roadPower Point With the app	**Through participation and exams**
tenth	3hours	Knowing how Add text Line control color and others	**Add texts Its methods and control With its specifications**	Show about roadPower Point With the app	**Through participation and exams**
eleventh	3hours	To know account spaces Sizes and lengths	**Dealing withorders tape Parametric**	Show about roadPower Point With the app	**Through participation and exams**
twelfth	3hours	How to Use Tools for drawing Required circle	drawing circles Electrical using Existing symbols Or draw non-symbols Present in the program	Show about roadPower Point With the app	**Through participation and exams**
thirteenth	3hours	Student education How to do it Drawing and operation	**drawing an operating circuit And a control circuit for the engine**	Show about roadPower Point With the app	**Through participation and exams**

fourteenth	3hours	Student education	**Drawing models cable trays**	Show about roadPower Point With the app	**Through participation and exams**
fifteenth	3hours	Student education Print on The program	Printing	Show about roadPower Point With the app	**Through participation and exams**

154. Curriculum Development Plan
Continuously updating the curriculum to keep pace with developments in the labor market (Curriculum Update Committee, Scientific Committee) such as: **12- Updating the curriculum to keep pace with developments in the fieldelectrical drawing.** **13- Follow up on scientific developments inUpdate AutoCAD software continuously.**

155. infrastructure	
Classrooms, laboratories and workshops	**Equipped laboratories are available to accommodate students and are prepared** **To provide a suitable environment for learning**
21- Required textbooks	**Electrical drawing lecture notes**
22- Main References (Sources)	**https://faculty.uobasrah.edu.iq/uploads/teaching/1711798938.pdf**
A-Recommended books and references (scientific journals, reports, etc.)	**https://www.smartdraw.com/cad/engineering-drawing-software.htm?srsltid=AfmBOoqDqQ2hjW1riiDu_ZmtTLd6-itW7EDrm7zUii1JMSEtmWi8ii2i**

B-Electronic references, websites,.....	**https://www.qrcodechimp.com/page/srcyif3uvk4a4**

156. Educational institution/
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
157. Scientific Department
Electrical techniques
158. / Course Name/Code
/ 1 ComputerNTU102
159. Available attendance forms
In presence
160. / Chapter/Year
2025/2024 / Second semester
161. (Number of study hours (total
45=15*3
162. Date this description was prepared
2025/6/20
163. (Course objectives (general objectives of the course This course aims to introduce students to the basic concepts of information technology and computer use. This course includes studying computer hardware componentssuch ,as the processor, memory and input/output units, as well as software, as , including operating systems and various applications . well as the concept of computer viruses and how to deal with them **course 1 Top scorer of the University Computer Science:**

- Provide students with a comprehensive understanding of computer components and their functions
.
- Develop students' skills in using operating systems and basic software.
- Knowledge of computer generations
- Knowledge of using software
- Learn how to format floppy disks
- Educating students about the importance of information security and data protection methods.
- Knowing the concept of computer viruses and how to deal with them
- Know how to access the Internet
- Learn about computer components
- Learn about the evolution of computers throughout history
- Dealing with operating systems
- Gaining the skill of using the Windows operating system
- Learn about software types
- Identify and use storage unit types
- Perform basic computer maintenance
- Understanding networking basics
- Application of information security principles
- Gain the skill to get rid of viruses that may infect the computer
- Use of office software

- Searching the Internet and Using Email

Enable students to understand the basics of networking and use the Internet .effectively

164. Course outcomes , teaching, learning and assessment methods

Course outcomes

identification: It is a set of knowledge, skills and values that the course seeks to achieve in students .

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and helps in designing and evaluating academic courses.

How is it determined? The course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outputs	Teaching and learning methods	Evaluation methods
Knowledge : outputs **By the end of this course, the student is :expected to be able to** **Identify the hardware and software .1 .components of the computer**	1. **Lecture using PowerPoint** 2. **Discussion with students** 3. **Display exercise solutions for each .topic**	**Oral and written questions and -1 discussions** **Presentation of the lecture -2** **Data Show -3 Using solve Show explanations And -3 mathematical problems**

Explain the difference between operating .2 .systems and application programs Describe the basics of the Internet and .3 .networks Understanding the basic concepts of .4 .information security Distinguish between types of software and .5 .their uses in the work environment	4. Assigning students to practical cases 5. Student costs for preparing reports on course topics	,Practical application -4 ,cooperative learning brainstorming
Second : Skills outputs: Running and using popular operating .1 systems such asWindows . Microsoft Office ,applications (Word .(Excel, PowerPoint Send and receive email and manage .3 .attachments Browse the Internet effectively using .4 .search engines Perform file saving, retrieval, and .5 .organization operations on the computer	Practical (applied) training .1 Project-based learning .2 Cooperative learning .3 .Simulation and software .4 Self-education using the .5 Internet Targeted training .6 Practical duties .7	Practical application .1 Projects .2 Direct observation .3 Homework and practical .4 activities Self-assessment .5 Presentations .6
Third: Valuesand Attitudes :	Class discussions .1 Case studies .2	Direct observation .1

Demonstrate commitment to .1 .computer and information ethics **Respecting the intellectual property .2 .rights of software and digital content** **Work as a team when carrying out .3 .joint tasks and projects** **Demonstrate interest in developing .4 .personal technical skills** **Adhere to safety and cybersecurity .5 .procedures when using the computer**	**Values-based learning .3** **Group activities .4** **Behavioral role model of the .5 teacher**	**Class discussions and .2 participation** **Achievement book .3** **Questionnaires and self- .4 assessment**

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

week	Methods of measurement and evaluation	Technologies used	Teaching method	Chapter title	Theoretical time And my work	Subheadings
the first	**Assignments -1 and duties** **Quiz -2** **Practical test -3** **Monthly test -4** **Final written -5 exam** **Cooperative -6 learning**	**Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using**	**Theoretical and practical**	**Introduction to the computer and its history of development**	**1 hour theoretical hours of 2 work**	**History of computer development from the first generation to the current generation**

		Microsoft Board , practical ,application collaborative learning, and .brainstorming				Introduction to computer types ,desktop) ,laptop, tablet .(server Introduction to the computer and its history of development
the second	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Computer hardware components	1 1 hour theoretical hours of 2 work	The main physical components of a computer are the) processor CPU ,( ) memoryRAM storage units ,( )HDD, SSD ,(and input and .output units Explain the function of

						each component and how it .works
the third	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	- Software and operating systems	1 hour theoretical hours of 2 work	Software :definition Operating systems (such asWindows, Linux and (application .programs Functions and types of operating .systems Familiarize yourself with different user .interfaces
Fourth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4	Presenting the lecture using the , data show presenting	Theoretical and practical	Operating system Windows 11	1 hour theoretical hours of 2 work	Windows system concept

	Final written -5 exam Cooperative -6 learning	explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming				Its advantages and basic requirements How to create and manage files and folders Organize files effectively and use file .systems Data Backup and Restore
Fifth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Desktop Home Screen Components	1 hour theoretical hours of 2 work	Icon concept How to deal with mouse activities The importance and components of the taskbar

Sixth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoreti cal and practical	Start menu	1 hour theoretical hours of 2 work	UseStart to access programs The concept of assigned tasks Exit the system andshut down the calculator
Seventh	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoreti cal and practical	My Computer	1 hour theoretical hours of 2 work	Getting to knowMy Computer tablets Formatting floppy disks Dealing with the trash Recover deleted items

The eighth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoreti cal and practical	Control Panel	1 hour theoretical hours of 2 work	Taking advantage of control panel programs Control Panel Icons Settings in the control panel Desktop background appearance Add and remove programs
Ninth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical application, and .learning	Theoreti cal and practical	) Programs Accessories (	1 hour theoretical hours of 2 work	Benefit from additional) programs Accessories (Like calculator and calendar

tenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Use of media programs	1 hour theoretical hours of 2 work	Image media Video media Window Media player
eleventh	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Help	1 hour theoretical hours of 2 work	Learn how to get helpand its different .methods
Twelve	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application	Theoretical and practical	Information security	1 hour theoretical hours of 2 work	Basic principles of information security Types of cyber ,threats (viruses malware, data

	Cooperative -6 learning	,collaborative learning .and brainstorming				protection ,strategies ,passwords (encryption
thirteenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Networks and the Internet	1 hour theoretical hours of 2 work	Introduction to Computer Networks Types of networks LAN, WAN How to connect ,to the Internet Internet protocols
Fourteenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Online Search and Web Tools	1 hour theoretical hours of 2 work	Use search engines effectively Evaluating the credibility of online sources Introduction to cloud tools and services like Google Drive
The fifteenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems	Theoretical and practical	Online Search and Web Tools	1 hour theoretical hours of 2 work	Learn about artificial intelligence platforms

	Final written -5 exam Cooperative -6 learning	usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming				manage email Send and receive emails

Curriculum Development Plan

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

14- Develop curricula that are compatible with the labor market
15- Holding scientific seminars and conferences aimed at updating curricula
16- Follow up on scientific developments in the field of specialization

Infrastructure -11

Classrooms, playgrounds a workshops	**Available**
23- Required textbooks	**Available**
24- Main References (Sources)	**The book "Computer Basics and Office Applications" by Dr. Ziad -1 :Muhammad Abboud, Dr. Ghassan Hamid Abdul Majeed and others This book covers the basics of computer science, according to the / curriculum of the Ministry of Higher Education and Scientific Research**

	Research and Development Department, and is a reference for first-year .students in all Iraqi universities **.2 :The book "Computer Principles" by Dr. Osama Youssef Khalil** **This book covers the basics of computer hardware, software, and .operating systems, and is a good reference for beginners** **.3 The book "Introduction to Computers" by Dr. Muhammad Al- :Saeed** **This book provides a detailed explanation of the computer and its .components, types of software, and networks** **.4 The book "Principles of Computer and Information Technology" by :Dr. Hossam El-Din Mustafa** **It contains a simplified explanation of the various components of the computer, along with an explanation of the programs and applications .used in it** **.5 The book "Computer Basics and Applications" by Dr. Abdullah :Hassan** **,This book covers a variety of topics including computer components .operating systems, word processing, and spreadsheets** **.6 The book “Introduction to Computers and Their Applications” by : Dr. Abdul Rahman Al-Shaiji** **The book covers the basic principles of computers in terms of hardware .and software, and includes practical applications** **.7 The book “Computer Principles: A Comprehensive Guide” by a :group of authors** **A comprehensive book that explains in detail everything related to .computer components, software, and networks, with illustrative examples**

خ) Recommended books and references (scientific (.journals, reports, etc	**1. Hasoub Academy" : website** **○ ,Provides comprehensive articles and lessons on computer basics programming, and operating systems.** **2. Learn"" website:** **○ It contains free educational courses in various computer fields, including computer basics.** **3. Rawaq"" website:** **○ It offers free courses in Arabic that include topics on computer principles and information technology.** **4. Noor Library"" website:** **○ It contains many Arabic books in the field of computers, including books on basic principles.** **5. My Educational Lessons YouTube Channel:** **○ Provides a visual explanation of computer principles and programming concepts in Arabic.**
د) ,Electronic references ..... ,websites	**.1w3schools.com** **To learn programming languages such asHTML, CSS, JavaScript .** **.2geeksforgeeks.org** **.Detailed explanation of programming concepts and algorithms** **.3tutorialspoint.com** **.Lessons in computer, networking, cyber security , operating systems** **.4mozilla.org** **) A comprehensive reference for web developersHTML, CSS, JavaScript .(**

166. Educational institution/
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
167. Scientific Department
Electrical techniques
168. / Course Name/Code
Computer2 /NTU201
169. Available attendance forms
In presence
170. / Chapter/Year
2025/2024 / First semester
171. (Number of study hours (total
45=15*3
172. Date this description was prepared
2025/6/20
173. (Course objectives (general objectives of the course This course aims to introduce students to the basic concepts of information technology and computer use. This course includes studying computer hardware componentssuch ,as the processor, memory and input/output units, as well as software, as , including operating systems and various applications . well as the concept of computer viruses and how to deal with them

course 2 Top scorer of the University Computer Science:

- **Provide students with a comprehensive understanding of computer components and their functions.**
- **Develop students' skills in using operating systems and basic software.**
- **Knowledge of computer generations**
- **Knowledge of using software**
- **Learn how to format floppy disks**
- **Educating students about the importance of information security and data protection methods.**
- **Knowing the concept of computer viruses and how to deal with them**
- **Know how to access the Internet**
- **Learn about computer components**
- **Learn about the evolution of computers throughout history**
- **Dealing with operating systems**
- **Gaining the skill of using the Windows operating system**
- **Learn about software types**
- **Identify and use storage unit types**
- **Perform basic computer maintenance**

- **Understanding networking basics**
- **Application of information security principles**
- **Gain the skill to get rid of viruses that may infect the computer**
- **Use of office software**
- **Searching the Internet and Using Email**

Enable students to understand the basics of networking and use the Internet effectively.

174. Course outcomes , teaching, learning and assessment methods

Course outcomes

identification: It is a set of knowledge, skills and values that the course seeks to achieve in students .

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and helps in designing and evaluating academic courses.

How is it determined? The course outcomes are determined based on the objectives of the academic program to which the course belongs.

Outputs	Teaching and learning methods	Evaluation methods

Knowledge : outputs **By the end of this course, the student is :expected to be able to** **Identify the hardware and software .1 .components of the computer** **Explain the difference between .2 operating systems and application .programs** **Describe the basics of the Internet and .3 .networks** **Understanding the basic concepts of .4 .information security** **Distinguish between types of software .5 .and their uses in the work environment**	6. **Lecture using PowerPoint** 7. **Discussion with students** 8. **Display exercise .solutions for each topic** 9. **Assigning students to practical cases** 10. **Student costs for preparing reports on course topics**	**Oral and written questions and discussions -1** **Display the lecture using The data show -2** **Presenting explanations and solving mathematical .problems -3** **Practical application, cooperative learning, brainstorming -4**
Second : Skills outputs: **Running and using popular operating .1 systems such asWindows .** **Microsoft Office ,applications (Word .(Excel, PowerPoint** **Send and receive email and manage .3 .attachments** **Browse the Internet effectively using .4 .search engines**	**Practical (applied) training .1** **Project-based learning .2** **Cooperative learning .3** **.Simulation and software .4** **Self-education using the Internet .5** **Targeted training .6** **Practical duties .7**	**Practical application .1** **Projects .2** **Direct observation .3** **Homework and .4 practical activities** **Self-assessment .5** **Presentations .6**

Perform file saving, retrieval, and .5 organization operations on the .computer		
Third: Valuesand Attitudes : **Demonstrate commitment to computer .1 .and information ethics** **Respecting the intellectual property .2 .rights of software and digital content** **Work as a team when carrying out .3 .joint tasks and projects** **Demonstrate interest in developing .4 .personal technical skills** **Adhere to safety and cybersecurity .5 .procedures when using the computer**	**Class discussions** .1 **Case studies .2** **Values-based learning .3** **Group activities .4** **Behavioral role model of the .5 teacher**	**Direct observation .1** **Class discussions and .2 participation** **Achievement book .3** **Questionnaires and .4 self-assessment**

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

week	Methods of measurement and evaluation	Technologies used	Teaching method	Chapter title	Theoretical time And my work	Subheadings

the first	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Introduction to Microsoft Office	1 hour theoretical hours of 2 work	Learn about - Office programs The importance of , Word, Excel and PowerPoint in the work environment
the second	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Getting started withMicrosoft Word	1 1 hour theoretical hours 2 of work	Main - interface Create a new - document Save and - open) documents HDD, SSD ,(drives

the third	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Formatting text in Word	1 hour theoretical hours 2 of work	Font - formatting Paragraphs Distances - and separation Icons and - lists	
Fourth	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application	Theoretical and practical	Working with tables and images inWord	1 hour theoretical hours of 2 work	Insert tables Insert and - edit images Working with - illustrations	

		collaborative learning, and .brainstorming					
Fifth	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Insert other elements inWord	1 hour theoretical hours of 2 work	Insert - hyperlinks Add equation - Use of - symbols	
Sixth	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application	Theoretical and practical	Print and final review inWord	1 hour theoretical hours of 2 work	Preview - before printing Review - spelling and grammatical .errors Prepare the - page for printing	

		collaborative learning, and .brainstorming					
Seventh	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Working with documents inWord	1 hour theoretical hours of 2 work	Create a table of contents - Add indexes - Use of patterns and templates -	
The eighth	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application	Theoretical and practical	Working on projects inWord	1 hour theoretical hours of 2 work	Final project - UsingWord Submitting - the project work	

		collaborative learning, and .brainstorming					
Ninth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application collaborative learning, and .brainstorming	Theoretical and practical	Getting Started with Microsoft Excel	1 hour theoretical hours of 2 work	Main interface - Create - spreadsheets Data types - ((texts	
tenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture using the , data show presenting explanations, and solving mathematical problems using Microsoft Board , practical ,application	Theoretical and practical	Function inExcel	1 hour theoretical hours of 2 work	Basic formulas - Equations Mathematical and financial functions	

		collaborative learning, and .brainstorming					
eleventh	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Formatting tables and creating charts	1 hour theoretical hours of work 2	Formatting cells - and tables Create charts - Customize - charts	
The second ten	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Printing inExcel	1 hour theoretical hours of work 2	Prepare the - page for printing Report - coordination Use multiple - worksheets	
thirteenth	Assignments and duties -1 Quiz -2 Practical test -3 Monthly test -4 Final written exam -5 Cooperative learning -6	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Getting Started with Microsoft PowerPoint	1 hour theoretical hours of work 2	Main interface - Create a new- presentation Save and open - presentations	

Fourteenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Design slides and content inPowerPoint	1 hour theoretical hours of work 2	Text formatting - Insert images and tables Add shapes and - illustrations
The fifteenth	Assignments -1 and duties Quiz -2 Practical test -3 Monthly test -4 Final written -5 exam Cooperative -6 learning	Presenting the lecture , using data show ,presenting explanations and solving mathematical problems usingMicrosoft Board , ,practical application ,collaborative learning .and brainstorming	Theoretical and practical	Professional effects and presentation	1 hour theoretical hours of work 2	Add transitions an .motion effects Practice giving - professional presentations

Curriculum Development Plan

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

17- Develop curricula that are compatible with the labor market

18- Holding scientific seminars and conferences aimed at updating curricula

19- Follow up on scientific developments in the field of specialization

Infrastructure-11	
Classrooms, playgrounds a workshops	**Available**
25- Required textbooks	**Available**
26- Main References (Sources)	**The book "Computer Basics and Office Applications" by Dr. Ziad -1 :Muhammad Abboud, Dr. Ghassan Hamid Abdul Majeed and others This book covers the basics of computer science, according to the / curriculum of the Ministry of Higher Education and Scientific Research Research and Development Department, and is a reference for first-year .students in all Iraqi universities .2 :The book "Computer Principles" by Dr. Osama Youssef Khalil This book covers the basics of computer hardware, software, and .operating systems, and is a good reference for beginners .3 The book "Introduction to Computers" by Dr. Muhammad Al- :Saeed This book provides a detailed explanation of the computer and its .components, types of software, and networks .4 The book "Principles of Computer and Information Technology" by :Dr. Hossam El-Din Mustafa**

	It contains a simplified explanation of the various components of the computer, along with an explanation of the programs and applications .used in it **.5 The book "Computer Basics and Applications" by Dr. Abdullah :Hassan** **,This book covers a variety of topics including computer components .operating systems, word processing, and spreadsheets** **.6 The book “Introduction to Computers and Their Applications” by : Dr. Abdul Rahman Al-Shaiji** **The book covers the basic principles of computers in terms of hardware .and software, and includes practical applications** **.7 The book “Computer Principles: A Comprehensive Guide” by a :group of authors** **A comprehensive book that explains in detail everything related to .computer components, software, and networks, with illustrative examples**
ذ) Recommended books and references (scientific (.journals, reports, etc	**6. Hasoub Academy" : website** **○ ,Provides comprehensive articles and lessons on computer basics programming, and operating systems.** **7. Learn"" website:** **○ It contains free educational courses in various computer fields, including computer basics.** **8. Rawaq"" website:** **○ It offers free courses in Arabic that include topics on computer principles and information technology.** **9. Noor Library"" website:**

	○ It contains many Arabic books in the field of computers, including books on basic principles. 10. My Educational Lessons YouTube Channel: ○ Provides a visual explanation of computer principles and programming concepts in Arabic.
ر) ,Electronic references ..... ,websites	.1w3schools.com To learn programming languages such asHTML, CSS, JavaScript . .2geeksforgeeks.org .Detailed explanation of programming concepts and algorithms .3tutorialspoint.com .Lessons in computer, networking, cyber security , operating systems .4mozilla.org) A comprehensive reference for web developersHTML, CSS, JavaScript .(

176. ducational institution/
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
177. Scientific Department
Electrical techniques
178. / Course Name/Code
/SportsNTU 104
179. Available attendance forms
My presence
180. / Chapter/Year
2025/2024 / First semester
181. (Number of study hours (total
30=15*2
182. Date this description was prepared
2025/6/18
183. (Course objectives (general objectives of the course **The goal of sports courses is to develop the individual physically, psychologically, and socially . through sports activities. Here are the most important general objectives of the sports course** **University Sports Course Top Scorer:**

.1Developing physical fitness and general health:

Enhancing students' physical fitness levels in line with the requirements of university life and daily activities.

Contribute to the prevention of chronic diseases associated with lack of movement (such as obesity, heart (disease, diabetes.

Developing motor and .2athletic skills:

,Providing students with basic and advanced skills in selected sports activities (such as: football, basketball (volleyball, swimming, or fitness exercises.

Developing neuromuscular coordination and various motor abilities.

Promoting positive values and .3behaviors :

Instilling the concepts of sportsmanship, commitment, discipline, and cooperation.

Building positive healthy behaviors that contribute to improving the quality of life.

.4Raising awareness of the importance of physical activity:

Enabling the student to understand the relationship between physical activity and mental and physical health.

Encouraging students to adopt an active and continuous lifestyle after university.

Developing psychological and social .5aspects :

Strengthening self-confidence, controlling emotions, and accepting loss.

Enhancing communication and teamwork skills in an educational sports environment.

Supporting the academic and applied aspects in related disciplines (for specialized students .6) :

Enabling students to understand sports rules, laws and training principles.

Preparing students for career paths in athletic training, public health, or physical education

184. Course outcomes , teaching, learning and assessment methods

Course outcomes

identification: It is a set of knowledge, skills and values that the course seeks to achieve in students .

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and helps in designing and evaluating academic courses.

How is it determined? The course outcomes are determined based on the objectives of the academic program to which the course belongs.		
Outputs	Teaching and learning methods	Evaluation methods
Knowledge : outputs **Identify the benefits of physical activity for -1 .general health** **Knowing the rules and methods of different -2 .sports** **Understanding the concepts of physical -3 fitness, nutrition, and safety during physical .performance**	**Theoretical explanation -1 .and classroom discussions** **Use of multimedia and -2 .presentations** **Linking mathematical -3 .concepts to life applications**	**Theoretical tests -1 multiple choice, true or) .(false, essay** **.Oral questions -2** **Teacher's comments -3 on understanding and .class participation**
Skills : outputs **Performing basic motor skills (such as -1 .(running, jumping, throwing** **Properly implementing skills related to group -2 .and individual sports** **Use sports equipment and tools in a correct -3 .and safe manner**	**.Learning by doing -1** **Individual and group -2 .training** **Learning based on -3 .educational stations** **Practical simulation of -4 .games**	**Direct observation -1 .during performance** **Practical evaluation -2 .using the rubric** **Filming and -3 reviewing the .performance** **Practical -4 .competitions**

Third: Valuesand Attitudes : **Enhancing the spirit of cooperation and -1** **.teamwork during sports activities** **Commitment to the rules of the game and -2** **.sportsmanship** **Respect colleagues and teachers and behave -3** **.ethically in competitions**	**Cooperative group -1** **.activities** **Discussions about the -2** **importance of values in** **.sports** **Educational situations -3** **.during play** **A good example from the -4** **.teacher**	**Classroom -1** **observation of behavior** **and values during the** **.activity** **Self-evaluation and -2** **'my colleagues** **. evaluation** **Reports or records of -3** **.student behavior in class** **.And sustainable**

185. **(**Course structure **(Theoretical and practical vocabulary**

Methods of measurement and evaluation	Technologies used	Teaching method	Subheadings	Time(theoretical/ practical)	Chapter title
Written test- Oral participation	Presentation– Smart Board	Lecture+ Discussion	Definition of physical education- its objectives- its importance	1 hour theoretical	Introduction to Physical Education
Share- Short Quiz	PowerPoint- Video	Interactive lecture +	The importance of sports for general and mental health	1 hour theoretical	Health and Sports

		discussion				
Note- Fitness Test	Sports Equipment - Video	Practical explanation+ groups	Strength- Endurance - Speed- Flexibility- Balance	2 hours theoretical	Components of physical fitness	
My work performance evaluation	Video- Timer	Practical training+ supervision	The Importance of Warm-Up– Practical Applications	2 hours theoretical	Warm-up and cool-down	
Practical calendar	Simple Tools- Video	Group activity+ application	Flexibility exercises- dynamic and static balance	2 hours theoretical	Flexibility and balance	
Running Test- Performance Monitoring	Running Track- Temporary	Training stations	Endurance Tests- Progressive Exercises	2 hours	Muscular and cardiac endurance	
Recording Results- Notes	Weights- Resistance bands	targeted training	Resistance Training- Strength Basics	theoretical	Muscle strength	
Timing Test- Notes	Cones- Timing	Individual + group training	Speed Tests- Agility Exercises	2 hours	Speed and agility	

Theoretical Test- Participation	Blackboard - Video	Explanation+ Discussion	Football- Basketball- Volleyball	theoretical	Team Games Rules	
Practical evaluation	Balls- Network	Field training	Passing- Shooting- Control	2 hours	football skills	
Individual Performance Note	Balls- Hoops	Training stations	Dribbling- Shooting- Passing	theoretical	basketball skills	
Share and rate	Volleyball- Net	Pair+ Group Training	Send- Pass- Smash	2 hours	volleyball skills	
Group evaluation	Whistle- Refereeing Tools	Supervised matches	Skills Application- Team Division	theoretical	Practical matches	
Interact and share	Examples and scenarios	Discussion and dialogue	The concept of sportsmanship- ethics of play	2 hours	sportsmanship and ethics	
Final exam+ comprehensive performance evaluation	Full tools	Comprehensive testing and evaluation	Comprehensive Review- Practical Tests	theoretical	Final assessment	

Curriculum Development Plan

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

20- Develop curricula that are compatible with the labor market

21- Holding scientific seminars and conferences aimed at updating curricula

22- **Follow up on scientific developments in the field of specialization**

186. infrastructure	
Classrooms, playgrounds a workshops	**Available**
27- Required textbooks	**Available**
28- Main References (Sources)	**Physical Education and Sports - Foundations and Concepts :Author** **Dr. Nabil Awadallah, Dr. Khalil Balasma :Edition** **2018 ,Third Edition :publisher** **Arab Thought House, Cairo**

ز) Recommended books and references (scientific (.journals, reports, etc	**Physical Education and Sports - Foundations and Concepts** **:Author** **Dr. Nabil Awadallah, Dr. Khalil Balasma** **:Edition** **2018 ,Third Edition** **:publisher** **Arab Thought House, Cairo**
س) ,Electronic references ..... ,websites	**https://sdl.edu.sa** **,A major source of books, research and academic journals in Arabic and English < Available to Saudi university students via unified access**

187. Educational institution/
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Haw Technical Institute
188. Scientific Department
Electrical techniques
189. / Course Name/Code
/ 1 MathematicsTIAH100
190. Available attendance forms
In presence
191. / Chapter/Year

2025/2024 / First semester
192. (Number of study hours (total
30=15*2
193. Date this description was prepared
2025/6/19
(Course objectives (general objectives of the course .8 **Providing learners with basic mathematical knowledge and skills that enhance logical and analytical thinking, enable them to solve problems systematically, and apply mathematical concepts to real-life and academic situations, while developing academic values such as .discipline, precision, and teamwork** **: University Sports Course Top Scorer** • **Gain the mathematical knowledge necessary for the prescribed topics and .understand the meanings behind each mathematical concept** • **Develop an understanding of the nature of the foundations of mathematics as an integrated system of fundamental mathematical concepts, which will provide a .significant basis for understanding other mathematical disciplines** • **.The learner should be able to know the methods of solving equations** • **.The learner will be able to solve partial differential equations** • **.The student should be able to calculate the area and volume of objects** **.The learner will be able to solve all differential and integral problems**
Course outcomes , teaching, learning and assessment methods .9 **Course outcomes** **identification: It is a set of knowledge, skills and values that the course seeks to achieve in students.**

Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and helps in designing and evaluating academic courses. **How is it determined? The course outcomes are determined based on the objectives of the academic program to which the course belongs.**		
Outputs	Teaching and learning methods	Evaluation methods
Knowledge : outputs **Acquiring basic mathematical _1** **.concepts and terms** **Understanding and interpreting_2** **mathematical theories and laws** **Distinguishing between different_3** **.types of mathematical problems**	**.Theoretical lectures _1** **Explanation using_2** **.examples** **.Presentations _3** **Using visual and _4** **.interactive means**	• **Test theory** • **Oral questions** • **Safiya's participation** • **Discussions and written questions**
Second : Skills outputs: **Solve mathematical problems using _1** **.correct and systematic steps** **Applying mathematical concepts in _2** **.real-life situations** **Using mathematical tools or _3** **.software in analysis and calculation**	**Solving classroom and _1** **.individual exercises** **.Problem-based learning _2** **Using educational_3** **programs such asExcelr .** **Mathematical applications** **.in practical life**	1 - **Evaluate practical performance in solving .problems** **Homework and -2** **.practical projects** **. Practical tests -3**

		Skills - based -4 .assessment
Third: Valuesand Attitudes : Commitment to accuracy and -1 discipline in solving exercises and .problems Enhancing the value of cooperation -2 .and teamwork Respecting different opinions in -3 .mathematical thinking methods	Open and respectful -1 .discussions in class Cooperative learning in -2 .groups Providing life situations -3 that reinforce values .through mathematics Raising open questions -4 with more than one solution .	Classroom -1 observation of behavior .And discipline Colleagues evaluate -2 .each other Individual reports on -3 educational experience .and behavior Self-assessment -4 .questionnaires

(Course structure (theoretical and practical vocabulary .10

						Chapter title
Measurement methods	Technologies	Teaching method	Main title	Subtitle	theoretical	week
Written test	Explanati ,on Questions and	a lecture	Trigonometric ratios	Properties of trigonometric ratios	hours 2	First week

	,Answers Discussion					
Written test	**Explanati ,on Questions and ,Answers Discussion**	**a lecture**	**logarithms**	**logarithms**	**hours 2**	**The second week**
Oral exam	**Explanati ,on Questions and ,Answers Discussion**	**a lecture**	**Differentiation and derivation**	**Differentiation and derivation**	**hours 2**	**The third week**
Written test	**Explanati ,on Questions and ,Answers Discussion**	**a lecture**	**Differentiation and derivation**	**Derivative laws of algebraic functions**	**hours 2**	**4 Week**

Written test	**Explanati ,on Questions and ,Answers Discussio n**	**a lecture**	**Differentia tion and derivation**	**composite function (chain rule)**	**hours 2**	**5 Week**
Oral exam	**Explanati ,on Questions and ,Answers Discussio n**	**a lecture**	**Differentia tion and derivation**	**Practical exercises**	**hours 2**	**6 Week**
Written test	**Explanati ,on Questions and ,Answers Discussio n**	**a lecture**	**Differentia tion and derivation**	**Derivative of implicit ,functions derivative of trigonomet ric ,functions and inverse trigonomet**	**hours 2**	**The seventh week**

				ric functions		
Written test	Explanati ,on Questions and ,Answers Discussio n	a lecture	Differentia tion and derivation	Practical exercises	hours 2	The eighth week
Written test	Explanati ,on Questions and ,Answers Discussio n	a lecture	Derivation	Derivation rules	hours 2	9 Week
Written test	Explanati ,on Questions and ,Answers Discussio n	a lecture	Derivation	Completing the derivation rules	hours 2	The tenth week
Written test	Explanati ,on Questions	a lecture	Derivation	Derivative of	hours 2	Week eleven

	and ,Answers Discussion			logarithmic functions		
Oral exam	Explanati ,on Questions and ,Answers Discussion	a lecture	Derivation	Practical exercises	hours 2	The twelfth week
Oral exam	Explanati ,on Questions and ,Answers Discussion	a lecture	integration	integration	hours 2	thirteenth week
Oral exam	Explanati ,on Questions and ,Answers Discussion	a lecture	integration	Complete integration	hours 2	Fourteenth week

Written test	Explanati ,on Questions and ,Answers Discussio n	a lecture	integration	Practical exercises	hours 2	The fifteenth week

Curriculum Development Plan

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

-1 Course analysis and needs identification (review of current (educational outcomes

-2 Updating scientific content and diversifying teaching and learning .methods

. Follow up on scientific developments and improve evaluation methods -3

Infrastructure-11	
Classrooms, playgrounds a workshops	**Available**
29- Required textbooks	**Available**
30- Main References (Sources)	**Thomas Calculus 12th edition George B. Thomas. Maurice D. Weir.**

	Joel R. Hass .
ش) Recommended books and references (scientific (.journals, reports, etc	Journal of the American Mathematical Society (JAMS (.Mathematics for Science and Engineering - Author: I Adnan Yousef Al-Atoum Real Analysis - Dr. Abdul Karim Adwan Introduction to Linear Algebra - Dr. Mohamed Rizk Basics of Statistics - Dr. Mohamed Fathy
ص) ,Electronic references ..... ,websites	Khan Academy Free Interactive Lessons – Coursera Mathematics courses from prestigious universities edX Massive Open Courses – Project Euclid Access to mathematics and statistics research ArXiv Archive of Recent Research in Mathematics –

Educational institution/
Ministry of Higher Education and Scientific Research / Northern Technical University / Al-Hawija Technical Institute
Scientific Department
Electrical techniques
/ Course Name/Code
101 / 2 Mathematics TIAH

Available attendance forms
In presence
/ Chapter/Year
2025/2024 / Second semester
(Number of study hours (total
30=15*2
Date this description was prepared
2025/6/19
(Course objectives (general objectives of the course .8 **Providing learners with basic mathematical knowledge and skills that enhance logical and analytical thinking, enable them to solve problems systematically, and apply mathematical concepts to real-life and academic situations, while developing academic values such as .discipline, precision, and teamwork** **: University Sports Course Top Scorer** • **Gain the mathematical knowledge necessary for the prescribed topics and .understand the meanings behind each mathematical concept** • **Develop an understanding of the nature of the foundations of mathematics as an integrated system of fundamental mathematical concepts, which will provide a .significant basis for understanding other mathematical disciplines** • **.The learner should be able to know the methods of solving equations** • **.The learner will be able to solve partial differential equations** • **.The student should be able to calculate the area and volume of objects** • **.The learner will be able to solve all differential and integral problems**
Course outcomes , teaching, learning and assessment methods .9 **Course outcomes**

identification: It is a set of knowledge, skills and values that the course seeks to achieve in students. **Its importance: It provides the learner with a clear idea of what he will be able to do after completing the course, and helps in designing and evaluating academic courses.** **How is it determined? The course outcomes are determined based on the objectives of the academic program to which the course belongs.**		
Outputs	**Teaching and learning methods**	**Evaluation methods**
Knowledge : outputs **Acquiring basic mathematical concepts _1** **.and terms** **Understanding and interpreting_2** **mathematical theories and laws** **Distinguishing between different types of_3** **.mathematical problems**	**Theoretical _1** **.lectures** **Explanation using_2** **.examples** **.Presentations _3** **Using visual and _4** **.interactive means**	• **Theoretical tests** • **Oral questions** • **Safiya's participation** • **and discussions** • **Written questions**
Skills : outputs **Solve mathematical problems using _1** **.correct and systematic steps** **Applying mathematical concepts in real- _2** **.life situations** **Using mathematical tools or software in _3** **.analysis and calculation**	**Solving classroom _1** **and individual** **.exercises** **Problem-based _2** **.learning** **Using educational_3** **programs such as** **Excelr Mathematical .**	2 - **Evaluate practical performance in solving** **.problems** **Homework and -2** **.practical projects**

	applications in .practical life	. Practical tests -3 Skills - based -4 .assessment
Third: Valuesand Attitudes : Commitment to accuracy and discipline -1 .in solving exercises and problems Enhancing the value of cooperation and -2 .teamwork Respecting different opinions in -3 .mathematical thinking methods	Open and -1 respectful .discussions in class Cooperative -2 .learning in groups Providing life -3 situations that reinforce values .through mathematics Raising open -4 questions with more . than one solution	Classroom -1 observation of behavior .And discipline Colleagues evaluate -2 .each other Individual reports on -3 educational experience .and behavior Self-assessment -4 .questionnaires

(Course structure (theoretical and practical vocabulary .10

Chapter title						
week	theoretical	Subtitle	Main title	Teaching method	Technologies	Measurement
First week	hours 2	Matrices and determinants	Matrices	a lecture	,Explanation Questions ,and Answers Discussion	Written test

The second week	hours 2	Types of arrays	Matrices	a lecture	,Explanation Questions ,and Answers Discussion	Written test	
The third week	hours 2	Some algebraic operations on the matrix	Matrices	a lecture	,Explanation Questions ,and Answers Discussion	Oral exam	
4 Week	hours 2	Finding the determinants of a matrix of 3×3 capacity	Matrices	a lecture	,Explanation Questions ,and Answers Discussion	Written test	
5 Week	hours 2	Linear transactions	Linear transactions	a lecture	,Explanation Questions ,and Answers Discussion	Written test	
6 Week	hours 2	Cramer's theory or rule	Cramer's rule	a lecture	,Explanation Questions ,and Answers Discussion	Oral exam	
The seventh week	hours 2	Practical exercises	Cramer's rule	a lecture	,Explanation Questions ,and Answers Discussion	Written test	

The eighth week	**hours 2**	**Vectors and numerical values**	**Vectors**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Written test**	
9 Week	**hours 2**	**Algebraic operations on vectors**	**Vectors**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Written test**	
The tenth week	**hours 2**	**Practical exercises**	**Vectors**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Written test**	
Week eleven	**hours 2**	**Complex numbers**	**Complex numbers**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Written test**	
The twelfth week	**hours 2**	**Algebraic operations on complex numbers**	**Complex numbers**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Oral exam**	
thirteenth week	**hours 2**	**Practical exercises**	**Complex numbers**	**a lecture**	**,Explanation Questions ,and Answers Discussion**	**Oral exam**	
Fourteenth week	**hours 2**	**Complex number**	**Complex numbers**	**a lecture**	**,Explanation Questions**	**Oral exam**	

		writing formulas			,and Answers Discussion		
The fifteenth week	hours 2	Practical exercises	Complex numbers	a lecture	,Explanation Questions ,and Answers Discussion	Written test	

Curriculum Development Plan

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

23- Course analysis and needs identification (review of (current learning outcomes

24- Updating scientific content and diversifying teaching and learning methods

25- Follow up on scientific developments and improve . evaluation methods

Infrastructure-11

Classrooms, playgrounds a workshops	Available
31- Required textbooks	Available
32- Main References (Sources)	Thomas Calculus 12th edition George B. Thomas. Maurice D. Weir. Joel R. Hass .
ض) Recommended books and references (scientific (.journals, reports, etc	Journal of the American Mathematical Society (JAMS (.Mathematics for Science and Engineering - Author: Adnan Yousef Al-Atoum Real Analysis - Dr. Abdul Karim Adwan Introduction to Linear Algebra - Dr. Mohamed Rizk Basics of Statistics - Dr. Mohamed Fathy
ط) ,Electronic references ..... ,websites	Khan Academy Free Interactive Lessons – Coursera Mathematics courses from prestigious universities edX Massive Open Courses – Project Euclid Access to mathematics and statistics research ArXiv Archive of Recent Research in Mathematics –

194. Educational Institution

Ministry of Higher Education and Scientific Research / Northern Techni
University / Hawija Technical Instit

195. **Scientific Department:**

Department of Electrical Technologies

196. **Course Title / Code:**

Power Electronics 1

197. **Available Attendance Mode:**

In–person

198. **Semester / Academic Year:**

Modular Courses

199. **Total Study Hours:**

5 × 15 = 75

200. **Date of Course Description Preparation:**

19-06-2025

201. **Course Objectives (General Objectives):**

1- **To introduce students to the basic and electronic components of powe systems such as transformers, thyristors, and control circuits.**
2- **To enable students to analyze and design power electronic circuits to achieve high performance and required efficiency.**
3- **To enhance students' understanding of protection techniques in powe systems, such as overcurrent and electrical stress protection.**
4- **To link theoretical knowledge with practical and industrial applications fields such as smart grids and industrial electronics.**

202. **Course Learning Outcomes and Methods of Teaching, Learning, and Assessment:**

Learning Outcomes:

1. Understand the components and types of power electronic circuits.
2. Analyze and diagnose the performance of power electronic circuits.
3. Design electronic systems for power control.

4. Apply protection techniques in power electronic systems.
5. Use simulation tools to analyze circuits (such as MATLAB/Simulink).
6. Work collaboratively and effectively solve engineering problems.

Course Definition:
A course that explores how electronic devices and circuits are used to efficiently control and distribute electrical energy, with a focus on analysis, design, and protection in power systems.

Course Importance:
• Enabling precise control in electrical power systems.
• Improving the efficiency of power conversion and distribution.
• Developing skills in the design and maintenance of power electronic devices.
• Supporting modern industrial applications such as smart grids and electric drives.
• Enhancing understanding of safety and protection in power systems.

How Objectives Are Determined:
• Studying the needs of the current industrial and engineering market.
• Reviewing relevant academic curricula and standards.
• Analyzing student needs and prior knowledge in the field.
• Identifying the practical and theoretical skills required by the job market.
• Keeping up with technological advancements in the field of power electronics.

Outcomes	Teaching and Learning Methods	Assessment Methods
Knowledge	- Theoretical lectures	- Written exams
1. Understanding power circuit components	- Reading references and books	- Short questions
2. Comprehending control and power concepts	- Presentations	- Periodic evaluations

3. Identifying protection techniques	- Case studies	- Written reports
4. Knowing basics of simulation software	- Simulation using MATLAB/Simulink	- Electronic tests
Skills	- Practical lab training	- Practical project evaluations
1. Analyzing electrical circuits	- Circuit design projects	- Project reports
2. Designing electronic systems	- Teamwork	- Presentation assessments
3. Applying protection techniques	- Classroom discussions	- Class participation evaluation
4. Using simulation tools	- Solving applied problems	- Practical performance evaluation
Evaluation	- Comprehensive content review	- Final exams
1. Measuring theoretical understanding	- Periodic tests	- Written exams
2. Evaluating practical skills	- Applied projects	- Practical performance evaluation
3. Measuring teamwork and collaboration skills	- Group activities	- Group work evaluation
4. Monitoring improvement and innovation	- Presentations and research	- Research reports and articles

Chapter One

Time Distribution	Theory	Practical	Main Title	Subtopic	Teaching Method	Technologies	Assessment Methods
Week 1	2 hours	3 hours	Power Electronics	Introduction of Power Electronics	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Week 2	2 hours	3 hours	Power Electronics	Classification of Power Electronic Converters	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 3	2 hours	3 hours	Power Electronics	Single Phase Half Wave Uncontrolled Rectifier	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 4	2 hours	3 hours	Power Electronics	Single Phase Full Wave Uncontrolled Rectifier	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Chapter Two

Time Distribution	Theory	Practical	Main Title	Subtopic	Teaching Method	Technologies	Assessment Methods
Week 5	2 hours	3 hours	Three Phase Rectifier (uncontrolled)	Three phase half bridge uncontrolled rectifier	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, 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	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 7	2 hours	3 hours	Three Phase Rectifier (uncontrolled)	Comparison between single phase and three phase	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Chapter Three

Time Distribution	Theory	Practical	Subtopic	Teaching Method	Technologies	Assessment Methods
Week 8	2 hours	3 hours	Transistor as Switch	Introduction and Operating Modes of Transistors	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion
Week 9	2 hours	3 hours	Transistor as Switch	BJT switching time	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion

Week 10	2 hours	3 hours	Transistor as Switch	Improving BJT Switching Time	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion

Chapter Four

Time Distribution	Theory	Practical	Main Topics	Subtopics	Teaching Method	Technologies	Assessment Methods
Week 11	2 hours	3 hours	Field Effect Transistor	MOSFET	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 12	2 hours	3 hours	Field Effect Transistor	Working Principle of MOSFET	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Week 13	2 hours	3 hours	Field Effect Transistor	Unijunction Transistor (UJT)	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Weeks 14 and 15	2 hours	3 hours	Field Effect Transistor	UJT Characteristics	Theoretical explanation and practical application	Use of data show, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

10. Course Development Plan	
Continuous development of educational content to keep pace with modern requirements such as: **• Integrating the latest digital technologies and tools into the course.** **• Regularly updating scientific and practical information.** **• Including real case studies and modern industrial applications.** **• Encouraging interactive learning and practical projects.** **• Reviewing and adapting content based on student feedback and labor market needs.**	
11. Infrastructure	
Providing classrooms equipped with modern display technologies (projector, smart board).	**Classrooms, Laboratories, and Workshops**

Laboratories equipped with measurement devices and power electronics circuit simulators. Practical workshops for conducting experiments and circuit design.	
Basic books covering principles of power electronics, such as: • *Power Electronics* – Muhammad H. Rashid • *Power Electronics: Converters, Applications and Design* – Ned Mohan	**Required Textbooks**
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 Specialized books on control and power systems	**Main References (Sources)**

203. Educational Institution
Ministry of Higher Education and Scientific Research / Northern Techni University / Hawija Technical Instit
204. **Scientific Department:**
Department of Electrical Technologies
205. **Course Title / Code:**
Power Electronics 2
206. **Available Attendance Mode:**
In–person
207. **Semester / Academic Year:**
Modular Courses
208. **Total Study Hours:**
5 × 15 = 75
209. **Date of Course Description Preparation:**
19-06-2025
210. **Course Objectives (General Objectives):**
5- To introduce students to the basic and electronic components of powe systems such as transformers, thyristors, and control circuits. **6- To enable students to analyze and design power electronic circuits to achieve high performance and required efficiency.** **7- To enhance students' understanding of protection techniques in powe systems, such as overcurrent and electrical stress protection.** **8- To link theoretical knowledge with practical and industrial applications fields such as smart grids and industrial electronics.**
211. **Course Learning Outcomes and Methods of Teaching, Learning, and Assessment:**
Learning Outcomes: **7. Understand the components and types of power electronic circuits.** **8. Analyze and diagnose the performance of power electronic circuits.** **9. Design electronic systems for power control.**

10. Apply protection techniques in power electronic systems.
11. Use simulation tools to analyze circuits (such as MATLAB/Simulink).
12. Work collaboratively and effectively solve engineering problems.

Course Definition:
A course that explores how electronic devices and circuits are used to efficiently control and distribute electrical energy, with a focus on analysis, design, and protection in power systems.

Course Importance:
• Enabling precise control in electrical power systems.
• Improving the efficiency of power conversion and distribution.
• Developing skills in the design and maintenance of power electronic devices.
• Supporting modern industrial applications such as smart grids and electric drives.
• Enhancing understanding of safety and protection in power systems.

How Objectives Are Determined:
• Studying the needs of the current industrial and engineering market.
• Reviewing relevant academic curricula and standards.
• Analyzing student needs and prior knowledge in the field.
• Identifying the practical and theoretical skills required by the job market.
• Keeping up with technological advancements in the field of power electronics.

Outcomes	Teaching and Learning Methods	Assessment Methods
Knowledge	- Theoretical lectures	- Written exams
1. Understanding power circuit components	- Reading references and books	- Short questions
2. Comprehending control and power concepts	- Presentations	- Periodic evaluations

3. Identifying protection techniques	- Case studies	- Written reports
4. Knowing basics of simulation software	- Simulation using MATLAB/Simulink	- Electronic tests
Skills	- Practical lab training	- Practical project evaluations
1. Analyzing electrical circuits	- Circuit design projects	- Project reports
2. Designing electronic systems	- Teamwork	- Presentation assessments
3. Applying protection techniques	- Classroom discussions	- Class participation evaluation
4. Using simulation tools	- Solving applied problems	- Practical performance evaluation
Evaluation	- Comprehensive content review	- Final exams
1. Measuring theoretical understanding	- Periodic tests	- Written exams
2. Evaluating practical skills	- Applied projects	- Practical performance evaluation
3. Measuring teamwork and collaboration skills	- Group activities	- Group work evaluation
4. Monitoring improvement and innovation	- Presentations and research	- Research reports and articles

Chapter One

Week	Theory Time	Practical Time	Main Title	Sub-title	Teaching Method	Techniques	Assessment Methods
Week 1	2 hours	3 hours	Amplifiers	Operational Amplifier	Theoretical explanation and practical application	Using data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily homework, student inquiries, attendance

Week 2	2 hours	3 hours	Amplifiers	Inverting Voltage Amplifier	Theoretical explanation and practical application	Using data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily homework, student inquiries, attendance
Week 3	2 hours	3 hours	Amplifiers	Non-Inverting Voltage Amplifier	Theoretical explanation and practical application	Using data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily homework, student inquiries, attendance
Week 4	2 hours	3 hours	Amplifiers	Applications of Amplifier	Theoretical explanation and practical application	Using data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily homework, student inquiries, attendance

Chapter Two

Week	Theory Time	Practical Time	Main Title	Sub-title	Teaching Method	Techniques	Assessment Methods

Week 1	2 hours	3 hours	Amplifiers	Operational Amplifier	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 2	2 hours	3 hours	Amplifiers	Inverting Voltage Amplifier	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 3	2 hours	3 hours	Amplifiers	Non-Inverting Voltage Amplifier	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 4	2 hours	3 hours	Amplifiers	Applications of Amplifier	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Chapter Three

Time Distribution	Theory	Practical	Main Title	Sub-title	Teaching Method	Techniques	Assessment Methods
Week 8	2 hours	3 hours	Thyristor Construction, Characteristics and Family	Thyristor definition and characteristics	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 9	2 hours	3 hours	Thyristor Construction, Characteristics and Family	Thyristor Family	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 10	2 hours	3 hours	Thyristor Construction, Characteristics and Family	Test	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

Chapter Four

Time Distribution	Theory	Practical	Main Titles	Sub-titles	Teaching Method	Techniques	Assessment Methods

Week 11	2 hours	3 hours	AC to DC Converter	What is an AC/DC Converter	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Week 12	2 hours	3 hours	AC to DC Converter	Applications	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, 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	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance
Weeks 14 and 15	2 hours	3 hours	AC to DC Converter	Full Wave AC/DC Converter (Resistive Load)	Theoretical explanation and practical application	Use of data show device, presentation, explanation, Q&A, discussion	Daily quizzes, daily assignments, student inquiries, attendance

10. Course Development Plan	
Continuous development of educational content to keep pace with modern requirements such as: **• Integrating the latest digital technologies and tools into the course.** **• Regularly updating scientific and practical information.** **• Including real case studies and modern industrial applications.** **• Encouraging interactive learning and practical projects.** **• Reviewing and adapting content based on student feedback and labor market needs.**	
11. Infrastructure	
Providing classrooms equipped with modern display technologies (projector, smart board). Laboratories equipped with measurement devices and power electronics circuit simulators. Practical workshops for conducting experiments and circuit design.	**Classrooms, Laboratories, and Workshops**
Basic books covering principles of power electronics, such as: • *Power Electronics* – Muhammad H. Rashid • *Power Electronics: Converters, Applications and Design* – Ned Mohan	**Required Textbooks**
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	**Main References (Sources)**

Specialized books on control and power systems	