

Academic Program Description Form

University Name: Al- Furat Al-Awsat Technical University
Faculty/Institute: Polytechnic College - Karbala
Scientific Department: Renewable Energy Techniques Engineering
Academic or Professional Program Name:
Final Certificate Name: Technical Bachelor's
Academic System: 1St Semester
Description Preparation Date: 26/11/2025
File Completion Date: 18/01/2026

Signature:

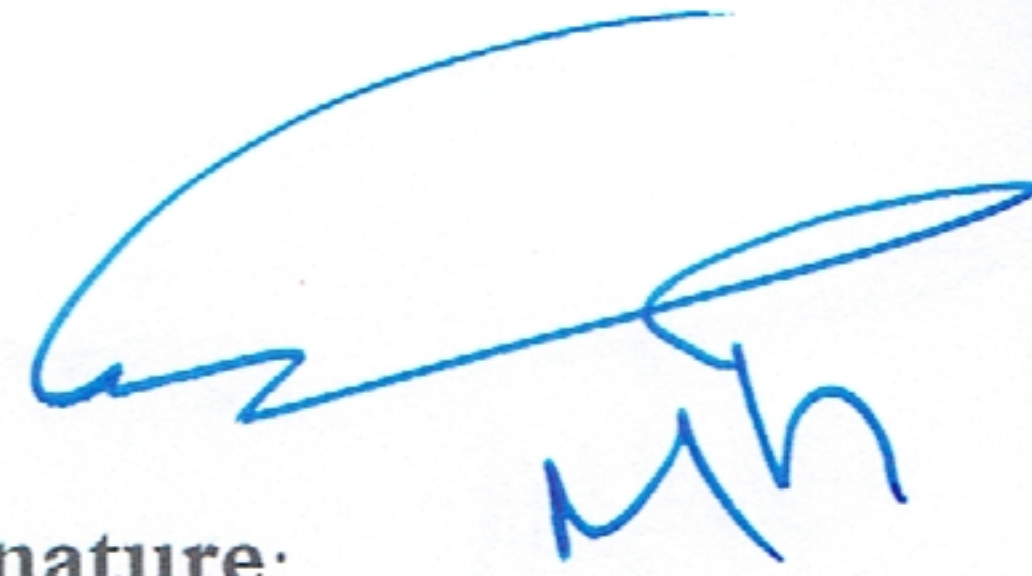


Head of Department Name:

Asst. Prof. Dr. Hakim T. Kadhim

Date: 18/01/2026

Signature:



Scientific Associate Name:

Asst. Prof. Dr. Mohammed Fadhil Neamah

Date: 26-3-2026

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

Department: Asst. Prof. Ali Neamah Hassan

Signature:

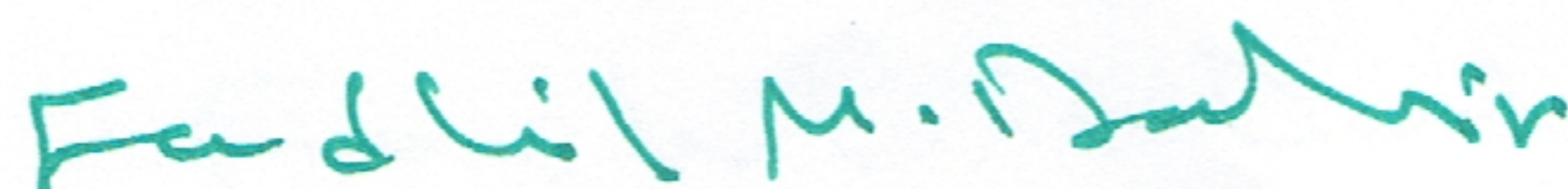


Date:

Approval of the Dean

Signature:

Prof. Dr. Fadil Mohammed Dhahir

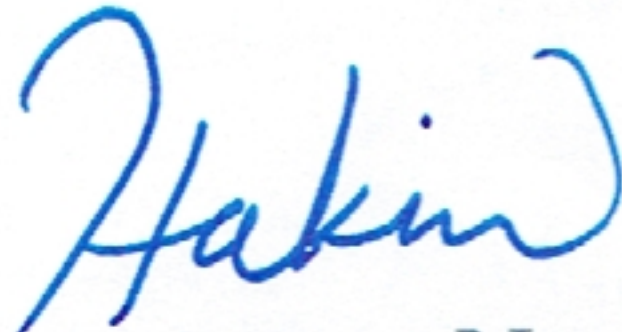


18-1-2026

Academic Program Description Form

University Name: Al- Furat Al-Awsat Technical University
Faculty/Institute: Polytechnic College - Karbala
Scientific Department: Renewable Energy Techniques Engineering
Academic or Professional Program Name:
Final Certificate Name: Technical Bachelor's
Academic System: 2nd Semester
Description Preparation Date: 26/11/2025
File Completion Date: 18/01/2026

Signature:

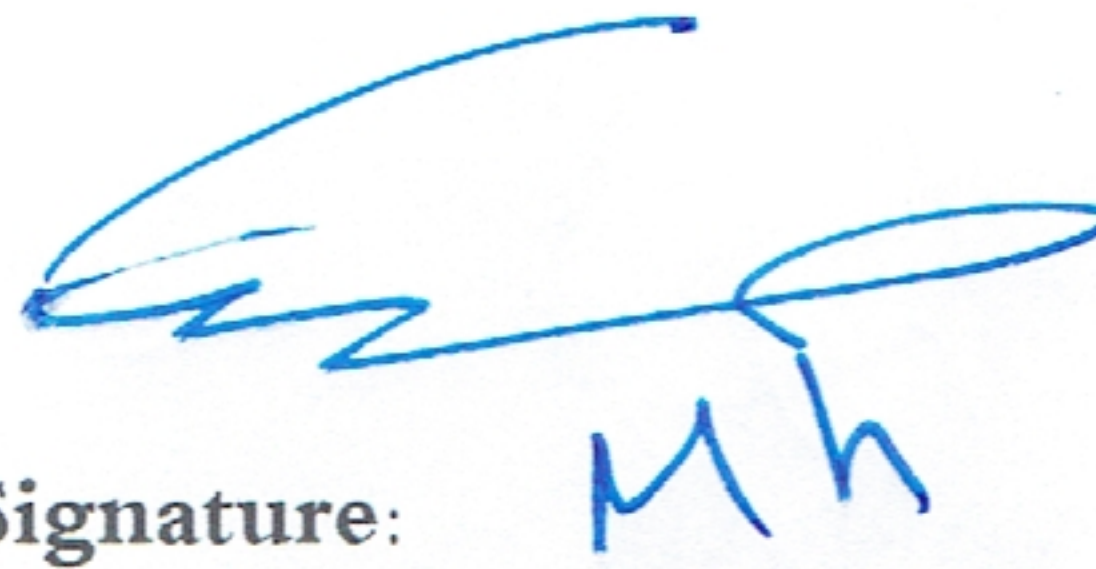


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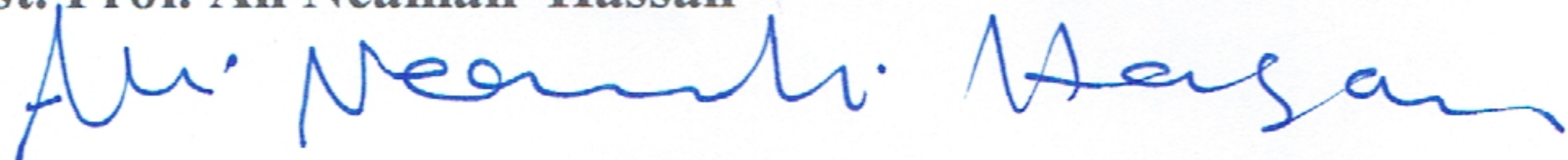
Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

Department: Asst. Prof. Ali Neamah Hassan

Signature:

Date:



Approval of the Dean

Signature:

Prof. Dr. Fadil Mohammed Dhahir

Fadil M. Dhahir
18-1-2026

Academic Program Description Form

University Name: Al- Furat Al-Awsat Technical University

Faculty/Institute: Polytechnic College - Karbala

Scientific Department: Renewable Energy Technology Engineering

Academic or Professional Program Name:

Final Certificate Name: Technical Diploma

Academic System: Annual

Description Preparation Date: 26/11/2025

File Completion Date: 18/01/2026

Signature:



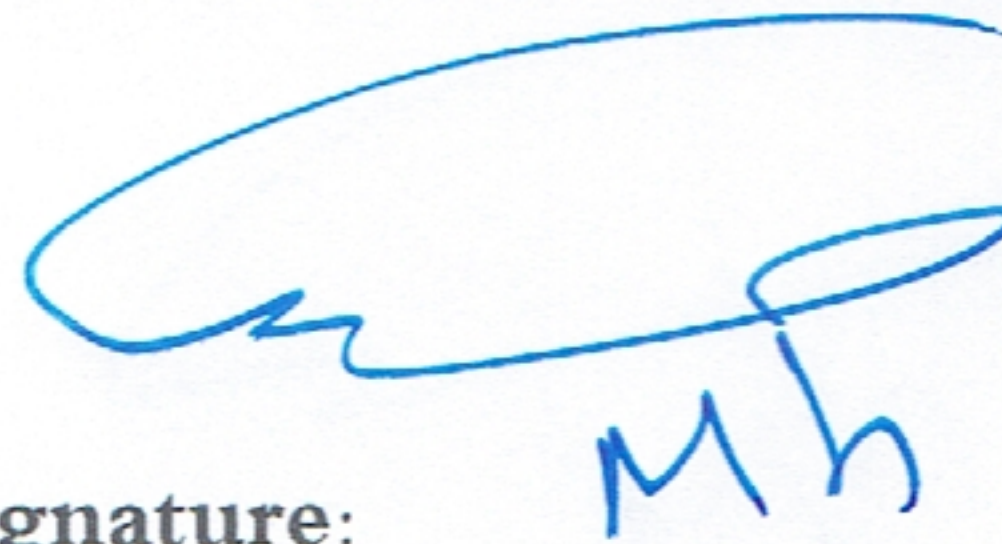
Head of Department Name:

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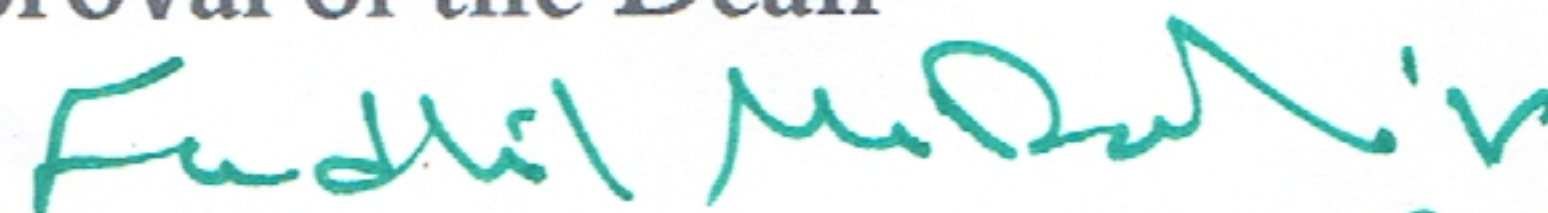
Department: Asst. Prof. Ali Nimah Hassan

Signature:



Date:

Approval of the Dean



Signature:

18-1-2026

Prof. Dr. Fadhil Mohammed Dhahir

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



Academic Program and Course Description Guide

2026-2025

Introduction:

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

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

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

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

Concepts and terminology:

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

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

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

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

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

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

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

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

1. Program Vision

The department aims to prepare technical personnel capable of installing and operating solar energy systems and other renewable energy systems.

2. Program Mission

The department is moving towards expanding the base of technical education and its applications in the field of alternative and clean energy to graduate national cadres with a level of education and skill to keep pace with global developments and fulfill the following: Using computer and Internet technologies in education and training. Keeping pace with technological development in the field of manufacturing renewable energy systems and devices and activating the relationship with the private sector in the field of industry, training and technical qualification. Develop future plans to develop educational and training curricula and graduate technical cadres in the field of renewable energy. Producing research and creative projects that serve society, by creating a stimulating environment for learning and intellectual creativity.

3. Program Objectives

The department aims to graduate qualified technical personnel to be a link between the specialist and the skilled worker. It prepares and prepares the graduate, provides him with theoretical and practical information, and works on installing modern energy systems so that he is able to carry out his own work and the graduate is a resource for the cadres of the electricity generation and distribution station systems.

4. Program Accreditation

NON

5. Other external influences

NON

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	---			
College Requirements	11	44	36%	
Department Requirements	12	76	64%	
Summer Training	1	---		
Other	---			

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
First stage		mathematics	4	–
		Electronics	2	2
		The Electric circuits and measurments	2	2

		Engineering Drawing		3
		Renewable Energy Source	2	2
		Human Rights and Democratic	2	
		Arabic Language	2	
Second stage		Energy Storage Systems	2	2
		Electrical Installation	2	2
		Electrical Power Equipment	2	2
		Photovoltaic Systems	2	2
		PLC System	2	2
		Occupation Safety	2	
		English language	1	
		Solar Cell	2	2
		Computer		3
		Arabic Language	2	
		Baath party Crimes	1	

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	Learning Outcomes Statement 1
Skills	
Learning Outcomes 2	Learning Outcomes Statement 2
Learning Outcomes 3	Learning Outcomes Statement 3
Ethics	
Learning Outcomes 4	Learning Outcomes Statement 4
Learning Outcomes 5	Learning Outcomes Statement 5

9. Teaching and Learning Strategies

There are several strategies followed in the department, which are:
 Developed lecture - brainstorming - in-person and electronic
 education - discussion circles - exploration education - discussion strategy -
 cooperative education - public speaking strategy - human development
 courses for students

10. Evaluation methods

Daily exams – questions during the lecture – extracurricular activities – final exams

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
استاذ مساعد	هندسة ميكانيكية	حراريات			2	
استاذ مساعد	هندسة كيمائية	مواد هندسية			1	
مدرس	مكائن والات	مكائن والات زراعية			1	

	زراعية					
مدرس مساعد	ميكانيك قوى	حراريات			1	
مدرس مساعد	علم فيزياء	بصريات الكثرونية			1	
مدرس مساعد	هندسة ميكانيكية	مكائن هيدروليكية			1	
مدرس مساعد	علوم سياسية	علاقات دولية			1	
مدرس مساعد	هندسة كهربائية	قدرة			1	
مدرس مساعد	هندسة كهربائية	اتصالات			1	
مدرس مساعد	علوم رياضيات	علوم رياضيات			1	

Professional Development

Mentoring new faculty members

The number of teachers in the department is 9 with different academic titles, and there is a part-time teacher

Professional development of faculty members

The department's need for postgraduate studies, master's or doctoral studies, is updated annually according to the department's plan

12. Acceptance Criterion

Central admission – scientific academy

13. The most important sources of information about the program

Scientific Division

14.	Program Development Plan
NON	

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
first stage		Electronic		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		Mathematic		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
		English Language		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Second stage		Power electronics		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

- learning outcomes under evaluation.

MODULE DESCRIPTION FORM

Module Information

اسم المادة	Principles of solid state electronics		Module Delivery		
نوع المادة	<u>B (Basic)</u>		☒ Theoretical ☒ Practical ☒ Lecture		
رمز الوحدة					
ECTS	4				
SWL(ساعة / نصف)	<u>120</u>				
Module Level		1	Semester of Delivery		1
Administering Department		Department of Renewable Energy Engineering Technologies (BS-BMT)	College	Polytechnic College / Karbala	
Module Leader	Ali Sajid Shakir		e-mail	ali.shakir@atu.edu.iq	
Module Leader's Acad. Title		Assistant teacher	Unit commander qualifications		Master's
Module Tutor			e-mail		
Peer Reviewer Name			e-mail		
تاريخ موافقة اللجنة العلمية		10/2025			

Relation with other Modules

Basic requirements unit	There is no classroom	There is no classroom	
Common requirements unit	There is no classroom	There is no classroom	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	1. Understand the basic principles of electronics, such as current, voltage, resistance, capacitors, and transistors. 2. Distinguish between analog and digital circuits. 3. Understand the relationship between electrical physics and practical applications in circuits. 4. Enhance analytical and logical thinking in dealing with electronic signals and systems.
Module Learning Outcomes	Electronics Learning Outcomes First: Knowledge and Understanding Outcomes 1- Define basic concepts in electronics, such as current, voltage, resistance, and active and passive electronic components. 2- Explain the operating principle of basic electronic components (diodes, transistors, capacitors, and operational amplifiers). 3- Distinguish between analog and digital circuits in terms of construction and operation. 4 - Understand how signals are transmitted and transformed within electronic systems. 5 - Link electrical theories and physical concepts of electronics to practical applications. Second: Intellectual Skills Outcomes 1- Analyze electronic circuits using appropriate electrical laws and equations. 2- Design simple electronic circuits for specific applications, such as amplification or switching. 3- Deduce the impact of changing circuit components on the overall performance of the system. 4- Evaluate circuit performance through experimental results or computer simulations. 5- Employ logical reasoning skills to solve technical problems in electronics. Third: Practical Skills Outcomes 1. Use laboratory equipment accurately and safely, such as an oscilloscope, MultiMate, and power supply.

	2. Read and draw electronic circuits using standard symbols. 3. Conduct practical experiments to apply and verify theoretical concepts. 4. Uses simulation software (Proteus, Multisim, LTspice) to analyze circuits before actual implementation. 5. Adheres to laboratory safety procedures while working with electronic devices. Fourth: General and Transferable Skills Outcomes 1. Works within a team to complete collaborative electronic projects and designs. 2. Documents technical results and reports in a scientific and organized manner. 3. Communicates effectively to explain technical and electronic ideas. 4. Demonstrates a commitment to academic and laboratory work ethics. 5. Develops self-learning skills to keep pace with developments in the field of electronics.
Indicative Contents المحتويات الإرشادية	Guided Contents for Electronics 1- Basic Electronics Concepts • Definition of electronics and its importance in daily life and industry. • The difference between analog and digital circuits. • Basic electrical quantities: voltage, current, resistance, power. • Basic electrical laws: Ohm's law, Kirchhoff's current and voltage laws. 2- Basic Electronic Components • Passive Components: - o Resistors - o Capacitors - o Inductors • Active Components: - o Diodes and their types. - o Transistors (BJT, MOSFET) and their uses. - o Operational Amplifiers. 3- Electronic Circuits

	• Simple switching circuits and their theoretical analysis. • Rectifier circuits and AC-to-DC conversion. • Amplifier circuits. • Switching circuits. • Basic digital logic circuits if the course includes a digital component 4- Measurement and Practical Experiments • Use laboratory equipment: multimeter, oscilloscope, and power supply. • Read and draw electrical circuits using standard symbols. • Conduct experiments to verify the performance of electronic circuits • Implement safety procedures in laboratories. 5- For practical and technical applications • Application of electronics in everyday devices: computers, phones, smart cars. • Design simple circuits for practical projects. • Introduction to advanced systems: control systems, communications and power systems.
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Learning and Teaching Strategies	
Strategies	Teaching and learning strategies and methods: 1. The scientific lecture method. 2. Discussion method: Asking students questions that help them learn scientific analysis.

	3. Encouraging students to engage in dialogue, ask questions, and offer innovative ideas and opinions. 4. Brainstorming. 5. Critical thinking strategies in learning.
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Student Workload (SWL)			
Structured SWL (h/sem)	120	Structured SWL (h/w)	4
Unstructured SWL (h/sem)	240	Unstructured SWL (h/w)	
Total SWL (h/sem)	360		

Module Evaluation					
		Time/number	Weight (marks)	Week	Relevant learning outcomes
Formative assessment	Short tests	2	10% (10)	5 and 15	LO #1, #2 and #10, #11
	Home work	5	10% (10)	2,6	LO #3, #4 and #6, #7
	Project design	2	10% (10)	6,10	LO#6
	Report	1	10% (10)	12	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (5+5)	4,7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Overall evaluation			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Semiconductor theory and atomic structure
Week 2	Energy levels and conduction in crystals
Week 3	Gap current and electron movement, electron-hole pairs
Week 4	Doping and obtaining positive and negative types

Week 5	P-N Junction – Barrier Voltage, Effects of Heat on the Junction, Forward and Reverse Bias
Week 6	Diode Applications in DC Circuits and First, Second, and Third Approximations in Solving Problems
Week 7	Diode Applications in AC Circuits, Half-Wave Rectifiers, and Transformers
Week 8	Bridge-Type Full-Wave Rectifier
Week 9	Center-Plug Full-Wave Rectifier
Week 10	Filters, Capacitive Input Filter and Time Constant Calculation, Choke Input Filter
Week 11	Voltage Multipliers
Week 12	Cut-Off and Binding Circuits
Week 13	Zener Diodes and Their Applications
Week 14	Light-Emitting and Light-Receiving Diodes, Schottky, Tunnel, and Pin Diode
Week 15	Collector Bias - Self-Biasing - Feed-Back Bias - Voltage Divider Bias - Practical Examples
Week 16	Final Exam

Delivery Plan (Weekly Syllabus)

Week	Material Covered
Week 1	Learn about the equipment used in the lab.
Week 2	How to connect a diode in forward bias.
Week 3	How to connect a diode in reverse bias.
Week 4	Half-wave rectifier.
Week 5	Half-wave rectifier with filter.
Week 6	Full-wave rectifier (bridge) and (center socket).
Week 7	Full-wave rectifier with filter
Week 8	Positively biased and unbiased diodes
Week 9	Negatively biased and unbiased diodes
Week 10	Positively biased and unbiased diodes

Week 11	Negatively biased and unbiased diodes
Week 12	Voltage doubler
Week 13	Properties of a Zener diode in forward bias
Week 14	Voltage regulation using a Zener diode
Week 15	Light-emitting diode

Learning and Teaching Resources			
	Text		Available in the library?
1	- Semiconductors	Required textbooks	yes
2	- Semiconductor Engineering	Recommended supporting books and references (scientific journals, reports, etc.)	NO
3	Information from research published in internationally peer-reviewed journals	Electronic references, websites	

Grading Scheme

Group	Grade	appreciation	Marks %	Definition
Success Group (50-100)	A - Excellent	Excellent	90 - 100	Outstanding performance
	B - Very good	Very good	80 - 89	Above average with some errors
	C – Good	Good	70 - 79	Good work with noticeable errors
	D - Satisfactory	Satisfactory	60 - 69	Fair but with major flaws
	H – Enough	Enough	50 - 59	The work meets minimum standards.
Failure Group (0-49)	FX – Failure	Precipitate (in process)	(45-49)	More work required but credit given
	F – Failed	Failed	(0-44)	A large amount of work is required.

Note: Decimals greater than or less than 0.5 will be rounded up to the highest or lowest whole mark (e.g., a mark of 54.5 will be rounded up to 55, while a mark of 54.4 will be rounded up to 54). The University has a policy of not condoning a 'close pass failure' and therefore the only adjustment to marks awarded by the original mark(s) will be the automatic rounding shown above.

1. Course Name:					
Computer 2					
2. Course Code:					
3. Semester / Year:					
Annual / Second					
4. Description Preparation Date:					
2025/9/1					
5. Available Attendance Forms:					
In-person					
6. Number of Credit Hours (Total) / Number of Units (Total)					
1 hour / 2 units					
7. Course administrator's name (mention all, if more than one name)					
Name: Assistant Lecturer Ahmed Hasan Radhi Email: ahmed.raddi@atu.edu.iq					
8. Course Objectives					
Course Objectives			1- Teaching and training students on computers, their malfunctions, and the use of programs and applications relevant to their studies. 2-Introducing students to the internet and ensuring proper and safe use. 3- Training students on online communication. 4- Introducing students to artificial intelligence.		
9. Teaching and Learning Strategies					
Strategy		1- Explanation and clarification. 2- Delivering lectures using a question-based approach and discussing them with the audience. 3- Utilizing visual aids such as handouts and data show presentations. 4- Teamwork-based activities. 5- Presenting examples of subject topics to students. 6- Scientific lessons conducted in laboratories.			
10. Course Structure					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-2	2	The student will	Security and Network What is a Network?	-Listening,	Preparing classroom and home assignments

		understand network their types, and components	Types of Networks.. Basic Network Components. Basic network components.	Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing reports on the academic program .Conducting surprise and scheduled exams.
3-4-5	3	The student will learn the fundamentals of networking, network troubleshooting, and identifying common errors	Network security basics. understanding network threats . network troubleshooting. Introduction to Network Troubleshooting, Common Network Issues and Symptoms, Network Troubleshooting Tools and Utilities. Using Command-Line Tools for Diagnostics, Identifying and Resolving Connectivity Issues, Diagnosing Network Performance Problems	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program .Conducting surprise and scheduled exams
6-7	2	"The student will be aware of what commerce and banking services are and will be able to benefit from them	E-commerce: Concepts Electronic Banking Services, and Online Banking Services:ATM Services and Debit card service	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program Conducting surprise and scheduled exams

			Phone banking , Social banking ,electronic alert, mobile banking		
8-9	2	"The student will be able to identify errors or malfunctions	Computer Troubleshooting: Introduction to Computer Troubleshooting : Common Hardware Issues and Solutions Diagnosing Software Problem . Hardware Components: Diagnosis and Repair, Using Safe Mode for Troubleshooting	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports the academic program Conducting surprise and scheduled exams
10-11	2	The student will understand software issues and techniques for removing harmful viruses.	Troubleshooting Operating System issues , Identifying and resolving Blue Screen Error dealing with slow Computer Performance. virus and malware removal techniques updating drivers and software."	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports the academic program Conducting surprise and scheduled exams
12-13	2	"The student will be able to understand the nature of artificial intelligence	Introduction to ;Definition of history of AI techniques and approaches.. KEY characteristics of AI benefits of AI challenges and ethical considerations.	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports the academic program Conducting surprise and scheduled exams

14-15	2	The student will be able to understand the role of data and artificial intelligence systems	Challenges and Limitations of AI, The Role of Data in AI Systems. AI Tools and Frameworks."	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports for the academic program Conducting surprise and scheduled exams
16	1	The student will be able to understand mobile technology applications that rely on artificial intelligence	The Role of Artificial Intelligence Modern Smartphones: Mobile Technology that Rely on Virtual Assistants (Google Assistant, Alexa)	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports for the academic program Conducting surprise and scheduled exams
17-18	2	"The student will learn about real-time translation services and the challenges of applying artificial intelligence	Adaptive Learning Real-Time Translation Services The Future of Artificial Intelligence Smartphone Technology, Challenges of Implementation Mobile Devices	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports for the academic program Conducting surprise and scheduled exams
19-20	2	The student will learn about the mechanisms of applications and tools in artificial intelligence.	AI Applications and Tools: Overview of AI Applications in Various Industries: Education, Healthcare, Transportation, and Media	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports for the academic program Conducting surprise and scheduled exams
21-22	2	The student will learn about the principles of automation as well as the use of AI in marketing	"Finance, Robotics and Automation Technologies. Artificial Intelligence	-Listening, Discussion -E-learning, Practical Application	Preparing classroom and home assignments Preparing reports for the academic program Conducting surprise

			Marketing: Targeting and Personalization	- PowerPoint - Questions and Answers	and scheduled exams
23-24	2	The student will learn about image analysis and the concept of smart cities	Artificial Intelligence Image and Video Analysis, and Smart Cities. Future Trends in Applications and Tools	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program. Conducting surprise and scheduled exams
25-26	2	"The student will learn about the impact of artificial intelligence on enhancing public safety and explore perspectives on AI and its political implications	AI and society Introduction to AI and its societal impact, the role of AI in enhancing public safety. Cultural Perspectives on AI Adoption, AI Governance: Political Implications	Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program Conducting surprise and scheduled exams
27-28	2	The student will learn about ethical challenges in artificial intelligence and transparency in AI systems. The student will explore the ethical implications of autonomous systems and ethics in marketing and advertising	"Ethical Challenges in Artificial Intelligence: Introduction to AI Ethics, Transparency and Explainability of AI Systems, Privacy Concerns in AI Data Usage. "Ethical Implications of Autonomous Systems, Ethics of AI-Based Marketing and Advertising	-Listening, Discussion -E-learning, Practical Application - PowerPoint -Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program Conducting surprise and scheduled exams
29	1	"The student will understand ethical considerations	Ethical Considerations in Education, Human	Listening, Discussion -E-learning,	Preparing classroom and home assignments Preparing reports

		education, human rights, and application of artificial intelligence	Rights, and Application of Artificial Intelligence	Practical Application - PowerPoint - Questions and Answers	the academic program Conducting surprise and scheduled exams
30	1	The student will be able to understand future trends in artificial intelligence as well as emerging technologies	"The Future of Artificial Intelligence: Future Trends in AI, Research, and Emerging Technologies	Listening, Discussion - E-learning, Practical Application - PowerPoint - Questions and Answers	Preparing classroom and home assignments Preparing reports on the academic program Conducting surprise and scheduled exams

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1-Graham Brown ,David Watson , Cambridge IGCSE Information and Communication Technology ,3 rd Edition (2020) 2-Alan Evans , Kendall Martin ,Mary Anne Poatsy ,Technology In Action Complete,16 th Edition (2020). 3-Ahmed Banafa , Introduction to Artificial Intelligence (AI), 1 st Edition (2024). 4-Microsoft Office 2019 Step 1 ST Edition by Curran Fryc &Joan Lambert 5- Computer basics 2016 Al-Khidr Ali Al-Khidr 6- Dr. Adel Abdel Nour, Introduction to the World of Artificial Intelligence 2005
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Course Description Form

Course description form

Course Description: Photovoltaic Systems

This course provides a comprehensive overview of photovoltaic (PV) systems, including the principles of solar energy conversion, PV cell and module technologies, system components, and design methods. Students will gain both theoretical understanding and practical experience through lectures and laboratory sessions focused on sizing, designing, and analyzing standalone and grid-connected PV systems.

Educational institution	Al-Furat Al-Awsat Technical University / Karbala Technical Institute
Scientific department/center	Renewable Energy technique - second stage
1- Course name/code	Photovoltaic Systems

2- Instructor's name	Lect. Dr. Mohammed Omar Ali
3- Email	mohammad.ali@atu.edu.iq
4- Academic title	Lecturer
5- Attendance forms available	Attendance
6- Semester / year	Annual
7- Number of study hours (total)	120 hours (60 theoretical hours + 60 practical hours)
8- Date this description was prepared	01/10/2025

9- Course objectives:

This course aims to provide Analyze the physical principles of PV cell operation, including the photovoltaic effect, I-V characteristics, and efficiency factors, Understand the role and specifications of system components such as PV modules, inverters, batteries, charge controllers, and mounting structures, Model and simulate PV system performance under varying environmental and load conditions using appropriate software tools. One of the objectives of this course in the educational institutions attended by students is:

- 1- Understand the fundamental physics of solar radiation and PV conversion.
- 2- Describe the construction and characteristics of PV cells and modules.
- 3- Analyze PV system components including inverters, batteries, and charge controllers.
- 4- Design and evaluate standalone and grid-connected PV systems.
- 5- Use simulation tools and perform measurements in real PV setups.

10- Definition of student

- Introducing the student to the various electronic switches made from semiconductor materials such as (silicon, germanium).
- Teaching the student how to build power electronics systems.
- Teaching the student to analyze electronic circuits and their applications.
- Teach the student to use mathematical equations to make mathematical conclusions.
- Teaching the student how to find and derive mathematical equations from signals entering and leaving electronic circuits.
- Teach the student how to build, operate and use laboratory equipment.
- Teaching and training the student to read the values of incoming and outgoing current and voltages.
- Learning about the waves coming out and entering electronic circuits and how to convert them from one form to another by controlling and changing some electronic elements.
- Teaching the student to use electronic devices accurately and how to use means and methods of protection for the devices and the student.

11- Course outcomes and teaching, learning and evaluation methods

A- Cognitive objectives:

1. A strong interest in renewable energy, particularly photovoltaic systems, with a proactive attitude toward learning new technologies and their real-world applications.
2. Ability to analyze technical problems, interpret data from PV systems, and apply engineering principles to develop effective solutions.
3. Engagement in lectures, discussions, and laboratory sessions through questioning, collaboration, and hands-on experimentation.
4. Competency in using engineering tools such as circuit simulators, PV design software (e.g., PVsyst, MATLAB), and basic instrumentation.
5. Commitment to academic integrity, lab safety, and an ethical approach to sustainable engineering practices and environmental awareness.
6. The student will be able to present a clear and comprehensive picture of occupational safety and protection methods.

B- Course-specific skills objectives

- Applying theoretical topics through experiments on direct and alternating current circuits and training the student to use laboratory equipment for various measurements.
- Know the specifications, characteristics and features of electronic elements.
- Determine the basic devices to implement the experiment according to the components and measurements required in the circuit design.
- The student acquires manual skills in using tools and laboratory equipment.
- Training the student to read results from laboratory devices accurately.
- The student gains self-confidence in implementing and practicing electrical technical work.

- Enabling the student to link and apply designs to laboratory boards and how to choose appropriate devices to carry out the experiment.

C- Emotional and value goals

- Guiding students in group work
- Activating the holding of workshops and seminars and activating the role of the Educational Guidance Committee
- Providing students with practical skills in laboratories and laboratories
- Providing students with the ability to think about solving practical problems
- Directing students to take care and maintain the property of the laboratory, department, and institute
- Developing students' Internet research skills
- Operating and maintaining electronic devices and control devices of all types. Maintaining, assembling and operating measuring devices and high-power devices of all types

D- Transferable general and qualifying skills (other skills related to employability and personal development).

- Applied skills within laboratories, workshops and laboratories.
- Working in the field of maintenance and repair of electrical appliances.
- Skills in using electronic switches in electronic circuits.
- Electronic circuit analysis skills.
- Designing applied circuits for some electronic components.
- Computerized electrical mapping.
- Practical visits.
- summer training

Teaching and learning methods.

- Theoretical lecture
- Practical lecture
- Discussion with students and students among themselves

- Preparing reports and projects related to the scientific material of the lecture
- Summer training in the private and public sectors
- E-Learning
- Using modern methods in teaching and training students
- Forming discussion circles during lectures to discuss study topics
- Assigning students to class duties

Evaluation methods:

- Daily exams
- Monthly and final exams
- Ask exercises and questions
- Assigning homework
- Weekly reports of practical experiments in laboratories
- Extracurricular duties and volunteer work

12- Course structure

the week	hours	Required learning outcomes	Name of the unit or topic	Teaching method	Evaluation method
1	4	Introduction to Renewable energies.	Define renewable and non-renewable energy sources, Identify different types of renewable energy systems.	Lectures + Practical applications	Daily, monthly, and annual exams
2	4	Types and properties of Solar PV Cells.	Understand the working principle of a photovoltaic cell, Compare the structural, electrical, and material properties	Lectures + Practical applications	Daily, monthly, and annual exams

			of various PV cells.		
3	4	Principle operation of PV cell.	Understand the generation of electric current in a material when exposed to light.	Lectures + Practical applications	Daily, monthly, and annual exams
4	4	Equivalent circuit of PV cell.	Analyze performance under various conditions, Simulate PV behavior in software.	Lectures + Practical applications	Daily, monthly, and annual exams
5	4	Open Circuit Voltage and Short Circuit Current.	Calculate Fill Factor (FF), Estimate Maximum Power Point (MPP), Design protection devices (e.g., circuit breakers)	Lectures + Practical applications	Daily, monthly, and annual exams
6	4	Maximum Power Point (MPP).	Operating at MPP maximizes system efficiency and energy harvest, Environmental conditions constantly change (irradiance, temperature), so the MPP also shifts.	Lectures + Practical applications	Daily, monthly, and annual exams
7	4	Characteristics of PV cell (power output, efficiency and filling factor).	Plot I-V and P-V curves under different irradiance and temperature, Compare results across different PV technologies	Lectures + Practical applications	Daily, monthly, and annual exams

8	4	Parallel and Series Solar Cells.	Observe effects of partial shading on a series-connected string, Compare I-V and P-V characteristics of each configuration.	Lectures + Practical applications	Daily, monthly, and annual exams
9	4	Effect of environmental parameters on PV cell operation (solar radiation, temperature, dust and shadow).	Compare I-V curves before and after cleaning a panel, simulate shading using obstacles; measure power drop and hot spot formation.	Lectures + Practical applications	Daily, monthly, and annual exams
10	4	Advantages of diodes (Bypass and blocking diodes).	Identify when and where to use bypass vs blocking diodes, Understand diode symbols, orientation, and effects in circuit diagrams.	Lectures + Practical applications	Daily, monthly, and annual exams
11,12	4	Batteries (advantage, types, connection and reasons of damage).	Stores excess energy generated during the day for use at night or during outages, Provides uninterrupted power during grid failures.	Lectures + Practical applications	Daily, monthly, and annual exams
13,14	4	Inverter (principle, on grid, off grid, and grid tied with battery backup.	Synchronizes with the utility grid and feeds excess solar power back to the grid.	Lectures + Practical applications	Daily, monthly, and annual exams
15	4	Solar controller	The primary function of	Lectures	Daily,

		charger (principle, MPPT, PWM, Built in).	a solar charge controller is to regulate the voltage and current coming from the solar panels to ensure that the batteries are charged in the most efficient and safe manner.	+ Practical applications	monthly, and annual exams
16	4	Solar Cables (types and selection).	Selecting the right cables is crucial to the overall performance, efficiency, and safety of a photovoltaic system.	Lectures + Practical applications	Daily, monthly, and annual exams
17	4	Saving of PV system components (saving modules, inverter, charger and battery).	Proper cleaning of the solar panels to prevent dust, debris, and dirt buildup which can reduce efficiency, Use of protective coatings or installation methods to safeguard against environmental wear such as moisture, hail, or extreme weather.	Lectures + Practical applications	Daily, monthly, and annual exams
18	4	PV module, PV array and Photovoltaic System Types.	Understand the construction and function of PV modules, distinguish between different types of PV	Lectures + Practical applications	Daily, monthly, and annual exams

			technologies, classify various types of PV systems based on their configuration and application.		
19,20	4	Standalone Systems (Off grid) or Isolated Systems.	Understand the structure and function of standalone PV systems, Apply sizing techniques and safety standards for isolated installations.	Lectures + Practical applications	Daily, monthly, and annual exams
21,22	4	Network Connected Home Systems (Possibility for Own Consumption).	Understand the architecture and function of home-based grid-connected PV systems, Design PV systems optimized for residential consumption with or without storage.	Lectures + Practical applications	Daily, monthly, and annual exams
23,24	4	Network-Connected Photovoltaic Systems (On grid).	Understand the configuration and components of on-grid PV systems, Assess the economic and environmental benefits of on-grid systems.	Lectures + Practical applications	Daily, monthly, and annual exams
25,26	4	Hybrid Systems. Independent Systems for Economic Purposes.	Differentiate between standalone, hybrid, and grid-connected PV	Lectures + Practical applications	Daily, monthly, and annual

			systems, Understand the design and components of hybrid renewable energy systems.		exams
27,28	4	Network Connected Solar Power Plants (Farms).	Understand the design and operation of large-scale grid-connected solar farms, Explain the technical requirements for interconnecting solar farms to the grid.	Lectures + Practical applications	Daily, monthly, and annual exams
29,30	4	Power Factor calculation and improvement.	Define power factor and explain its significance in electrical systems, Identify causes of low power factor in PV and conventional systems.	Lectures + Practical applications	Daily, monthly, and annual exams

13- Course structure	
1- Main references (sources)	- James P. Dunlop, <i>Photovoltaic Systems</i>, American Technical Publishers, Latest Edition. - A widely used textbook that covers PV fundamentals, components, and system

	design with practical examples. • Roger A. Messenger and Jerry Ventre, <i>Photovoltaic Systems Engineering</i>, CRC Press, 3rd Edition. • Focuses on the engineering aspects of PV systems, including performance analysis and design. • Solar Energy International (SEI), <i>Solar Electric Handbook: Photovoltaic Fundamentals and Applications</i>, SEI, Latest Edition. • A practical guide with a strong focus on real-world PV installation and system design practices. • Duffie, J. A., & Beckman, W. A., <i>Solar Engineering of Thermal Processes</i>, Wiley, 4th Edition. • Useful for understanding solar radiation and energy modeling concepts.
2- Electronic references and websites	• Various Internet sources
3- Recommended books and references (scientific journals, reports)	• Solar Energy – Elsevier • Publishes research articles on solar radiation, materials for solar cells, and system performance. • Progress in Photovoltaics: Research and Applications – Wiley • High-impact journal covering advanced research in PV technologies and applications. • Renewable Energy – Elsevier • Covers broader renewable topics, including photovoltaic systems and hybrid energy

1- Course Name: Ethics and Occupational Safety – Second Year
2- Course Code: [Not specified]
3- Semester / Year: Annual / Second Year
4- Date of Description Preparation: 01 / 09 / 2024
5- Attendance Modes Available: In-person
6- Total Study Hours / Units: 2 hours theoretical (weekly) - for 30 weeks
7- Course Coordinator(s): Name: M. Khalid Hatoum Swain - Email: khalid.swain@atu.edu.iq
Name: M. Khalid Hatoum Swain
M. Khalid Hatoum Swain Email: khalid.swain@atu.edu.iq
solutions. • IEEE Journal of Photovoltaics – IEEE • Peer-reviewed journal focused on the science and engineering of PV systems.

14- Course development plan

- Forming committees of subject teachers at Al-Furat Al-Awsat Technical University to update the curriculum
- Matching vocabulary with the labor market and the private sector
- Preparing courses for trainers in the laboratory so that they can train students more efficiently
- Providing laboratories with modern equipment that keeps pace with scientific development in developed countries

Material Description : Ethics and occupational safety

8- Course Objectives:	
Course Learning Objectives:	1. To introduce students to the general and specific goals: providing a clear and comprehensive image of occupational safety and protection methods to prevent and reduce workplace accidents.
	2. All activities and actions aimed at providing preventive services and precautions (occupational health) to protect workers from work-related hazards and conditions surrounding the workplace, including direct injuries and occupational diseases.

9- Teaching and Learning Strategies:					
Strategy:	1. Explanation and clarification. 2. Lecture with questions and discussions. 3. Independent ability to identify problems and find appropriate solutions. 4. Use of visual educational tools such as Data Show, Handouts. 5. Building the scientific research personality of the student.				
10. Course Outcomes, Teaching and Evaluation Methods:					
A. Knowledge Objectives: 1. To introduce the student to preventive services and precautions (occupational health) to protect workers from workplace hazards. 2. Occupational safety procedures aim to protect other production elements such as machinery, equipment, raw materials, buildings, and preserve the environment from pollution. 3. These are administrative procedures to maintain the physical, mental, and social health of workers at the workplace by following the necessary and sufficient health and preventive principles to prevent direct injury and occupational diseases.					
Evaluation Methods: 1. Weekly theoretical quizzes. 2. Traditional exams (written questions) - monthly and final. 3. Report on safety and its concept. 4. Q&A sessions with multiple-choice questions through the classroom platform. 5. Daily exams during lectures. 6. Continuous surprise and weekly quizzes. 7. Classroom activities and exercises. 8. Directing students to benefit from electronic websites. 9. Midterm exam. 10. Final exam.					
10- Course Structure:					
Week	Hours	Desired Learning Outcomes	Unit or Topic Name	Learning Method	Assessment Method
1- 2	2	The student's ability to understand the concept of occupational safety ethics	Topic: Unit 1 – Ethics: Concept, origins, general rules, sources, moral values, importance to individuals and society.	Listening, e-learning, , PowerPoint use, discussion, Q&A	: Daily assessments, surprise exams, predefined tests, written and practical homework.
3 - 4 - 5	2	The student's ability to understand the concept of occupational safety ethics	Topic: Unit 2 – Work and Profession: Importance, behaviors, definition, differences among job/work/craft, and professional standards.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessments, surprise exams, predefined tests, written and practical homework.
6 - 7	2	The student's ability to understand the concept of	Topic: Unit 3 – Values and Professional Ethics: Honesty, sincerity,	Listening, e-learning, , PowerPoint use,	Daily assessment, reports, pop quiz, pre-

		occupational safety ethics	advice, fairness, good behavior, and proficiency.	discussion, Q&A	scheduled exam, practical exam, homework
8 - 9	2	The student's ability to understand the concept of occupational safety ethics	Topic: Unit 4 – Professional Ethics: Nature, positive impact, characteristics, traits, and steps to achieve acceptable ethics.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
10 - 11	2	The student's ability to understand the concept of occupational safety ethics	Topic: Unit 5 – Unethical Behavior Patterns in the Profession: Administrative corruption, bribery (definition, types, causes), fraud (definition, nature, manifestations).	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
12 - 13	2	The student's ability to understand the concept of occupational safety ethics	Topic: Unit 6 – Methods to Instill Ethical Values: Tools, levels, elements of ethical charters, and reinforcement methods (per Kreitner and Kinicki).	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
14 - 15	2	The student's ability to understand the concept of occupational safety ethics.	Topic: Unit 7 – Ethics in Engineering Professions: Role of technician, ethical/technological values, professional conditions, Islamic vs Western perspectives.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
16 - 17	2	The student's ability to understand the concept of occupational safety ethics	Topic: Causes of electric shock injuries.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework

18	2	The student's ability to understand the concept of occupational safety ethics	Topic: Assisting victims of electric shock – rescuing the injured.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
19	2	The student's ability to understand the concept of occupational safety ethics	Topic: Artificial respiration – treating burns.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
20	2	The student's ability to understand the concept of occupational safety ethics	Topic: Effects of electrical current grounding.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
21 - 22	2	The student's ability to understand the concept of occupational safety ethics	Topic: Fire alarm systems – control unit.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
23	2	The student's ability to understand the concept of occupational safety ethics.	Topic: Audible alarm tools – bells and sirens.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
24	2	The student's ability to understand the concept of occupational safety ethics	Topic: Monthly exam.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam,

					practical exam, homework
25	2	The student's ability to understand the concept of occupational safety ethics	Topic: Occupational health and safety guidelines.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
26	2	The student's ability to understand the concept of occupational safety ethics	Topic: Reducing unsafe behaviors and practices.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
27	2	The student's ability to understand the concept of occupational safety ethics	Topic: Personal protective equipment – Eye and ear protection.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
28	2	The student's ability to understand the concept of occupational safety ethics	Topic: Fire-fighting tools – Heat and smoke detectors.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
29	2	The student's ability to understand the concept of occupational safety ethics	Topic: Buildings that require fire alarm systems.	Listening, e-learning, , PowerPoint use, discussion, Q&A	Daily assessment, reports, pop quiz, pre-scheduled exam, practical exam, homework
		The student's ability to understand the	Topic: Types of electrical injuries.	Listening, e-learning, practical	Daily assessment, reports, pop

30	2	concept of occupational safety ethics		application, PowerPoint use, discussion, Q&A	quiz, pre-scheduled exam, practical exam, homework	
11-						
Course Assessment:						
Grade distribution out of 100 according to student assignments such as daily preparation, daily and oral tests, monthly and written exams, reports, etc.		Second Semester:				
First Semester:	Theory:	Attendance, Assignments, and Tests:	Total:	Theory:	Attendance, Assignments, and Tests:	Total:
Theory:	20%	5%	25%	20%	5%	25%
12-						
Learning and Teaching Resources:		Prescribed Books (if any): - Prescribed textbook				
Required Textbooks (Curriculum, if any):		- Graham Br., translated by Eng. Mohammed Abdul Majid Nas Industrial Safety and Accident Prevention, Institute of Occupational Safety and Insulation – Eng. Diyaa Al-Qasimi, 1				
Main References (Sources):		- Global Network by Adam Al-Buraidi, Occupational Health and Safety Recommended Supporting References (scientific journals, reports, etc.) - Industrial Management by Aysar Sawsan, Fares Jabaz Shlash - www.safetyeng.com				
Electronic References, Internet Sites:		- Global Network by Adam Al-Buraidi, Occupational Health and Safety - Foreign previous studies on occupational health practices in Ghana: An overview				
Electronic References, Internet Sites:		Electronic References, Internet Sites: [Not specified]				

Course Description Form

13.Course Name:	
English 2	
14.Course Code:	
15.Semester / Year:	
Annual System	
16.Description Preparation Date:	
6/9/2023	
17.Available Attendance Forms:	
In-person	
18.Number of Credit Hours (Total) / Number of Units (Total)	
30 h / 2 u	
19.Course administrator's name (mention all, if more than one name)	
Name: Jaafar Haasan Jasim Email: Jaafar.ejam@atu.edu.iq	
20.Course Objectives	
Course Objectives	1. Conduct modern research and studies to keep up with the vocabulary of the new language. 2. Providing students with scientific skills in the language that will enable them later to write a CV and conduct interviews with companies. 3. Giving students an idea of how to translate from Arabic to English and vice versa.
21.Teaching and Learning Strategies	
Strategy	Cognitive Strategies: • Improving the student's skills in writing, reading, listening and speaking. • Enhancing the student's ability to understand the language without the need to refer to its meaning in Arabic. Methods: • Lecture. • Discussion with students and making groups. • Visual aids.
22. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1	Students understand the topic	Getting to know you	Lecture and discussion	Quiz
2-3	2	Students understand the topic	WB unit 1 / The way we live	Lecture and discussion	Open-book exercise
4-5	2	Students understand the topic	WB unit 2 / It all went wrong	Lecture and discussion	Quiz
6-7-8	3	Students understand the topic	WB unit 3/Let's go shopping/WB unit 4	Lecture and discussion	Open-book exercise
9	1	Students understand the topic	What do you want to do?	Lecture and discussion	Quiz
10	1	Students understand the topic	WB unit 5	Lecture and discussion	Open-book exercise
11-12	2	Students understand the topic	Tell me what's it like? / WB unit 6	Lecture and discussion	Quiz
13	1	Students understand the topic	Famous couples	Lecture and discussion	Open-book exercise
14	1	Students understand the topic	WB unit 7	Lecture and discussion	Quiz
15-16	2	Students understand the topic	Do's and don'ts / WB unit 8	Lecture and discussion	Open-book exercise
17-18	2	Students understand the topic	Going places / WB unit 9	Lecture and discussion	Quiz
19-20	2	Students understand the topic	Search to death / WB unit 10	Lecture and discussion	Open-book exercise
21	1	Students understand the topic	Things that change the world	Lecture and discussion	Quiz

22	1	Students understand the topic	WB unit 11	Lecture and discussion	Open-book exercise
23-24	2	Students understand the topic	Dreams & reality/ WB unit 12	Lecture and discussion	Quiz
25-26	2	Students understand the topic	Earnings a living/ WB unit 13	Lecture and discussion	Open-book exercise
27-28	2	Students understand the topic	Love you and leave you / WB unit 14	Lecture and discussion	Quiz
29-30	2	Students understand the topic	Review	Lecture and discussion	Open-book exercise

23.Course Evaluation

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

24.Learning and Teaching Resources

Required textbooks (curricular books, any)	New Headway – Pre intermediate
Main references (sources)	Headway Series
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	Google Books

Course Description Form

25.	Course Name:
Electrical installations 2	
26.	Course Code: l7icfh5
KTED125	
27.	Semester / Year:
Annual (first and second semester) / second year	
28.	Description Preparation Date:
2025/12/20	
29.	Available Attendance Forms:
Daily attendance is mandatory	

30. Number of Credit Hours (Total) / Number of Units (Total)	
120 hours / 8 units	
31. Course administrator's name (mention all, if more than one name)	
Name: Ali Hussein abdulameer Ali.abdulameer.ikr29@atu.edu.iq	
32. Course Objectives	
Course Objectiv	1 Knowing how to use electrical installation tools, power unit components and devices involved in the operation. Buildings such as heating, elevators, lightning rods and hazardous areas. 2 Calculating the voltage drop values in the electrical power transmission wires. 3 How to choose electrical cables and identify faults in them. 4. Knowing the methods of implementing electrical projects, preparing estimated statements, and bills of quantities.
33. Teaching and Learning Strategies	
Strategy	1 Theoretical lectures and practical applications 2 Presentations 3 Evaluating students individually by giving them the opportunity to participate in the classroom by answering questions 4 Evaluating students collectively through daily exams with practical and theoretical questions 5 Exams for the first and second semesters and final exams for the first and second rounds Using modern methods to present the theoretical and practical aspects, such as electronic projectors that attract the attention of students so that the idea is better conveyed to the student 7. Giving students classroom assignments that require the effort of their personal and psychological skills through optional methods. 8. Questioning students through discussion groups by asking intellectual questions such as how, why, when.

Specific topics.

9.Using brainstorming and feedback to activate students' accumulated experiences, linking the subjects they have learned in previous academ stages with new ones.

10. Providing students with practical skills through practical applications.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	theUnit Topic	Cables - Cable Components and Voltage Lectures + - Operation, Types of Cables According to the Type Practical Applications Insulator))M.L.M.P.V.C.T.R.S.VRI and Paper Cables with a Lead Sheath	Lectures + Practical Applications	Live Assessment + Exams
2	4	the Topic	U Methods of cables, faults that may occur in cables, how to determine the type and location of the fault.		
3	4	the Unit Topic	Protection of electric motors, protection against overcurrents resulting from overcurrent Lectures + Practical Applications		

			Short circuit		
4	4	the Unit Topic	Protection against overcurrents resulting from increased load		
5	4	the Unit Topic	Protection against the disappearance or loss of one of the phases and protection against voltage drops		
6	4	the Unit Topic	Reality: The electrical circuit, its types. And oil, sulfur fluoride circuit breaker. Discharge breakers, power circuit breakers)		
7	4	the Unit Topic	Substations, vertical busbars, air pressure switchboard, classification, AC control panels		
8	4	the Unit Topic	Excitation, foundations of optical engineering, light sources, lighting systems and their quality, light measuring devices		
9	4	theUnit Topic	Solved questions on how to design and calculate electrical lighting for halls workshops and yards		
10	4	theUnit Topic	Grounded system and isolated system comparison in case of fault, equal		
11	4	theUnit Topic	Voltage drop in single-phase and three-phase feeders, meaning of voltage drop, causes of voltage drop, damage resulting from voltage drop, testing the sizes of		

			cable feeders (factors on which current rates depend)		
12	4	theUnit Topic	Solved questions on voltage drop calculations		
13	4	theUnit Topic	Technical methods of wiring, study of the wiring system, wiring methods, and the methods used for that		
14	4	theUnit Topic	Establishing Dangerous Places Examples For Dangerous Places (Privacies Establishing in Dangerous Places and the Steps to Take for That		
15	4	theUnit Topic	Grounding, Types, Installation Grounding Conductors for Substations and Buildings and Lightning Arrester		
16	4	theUnit Topic	Definition of electrical energy expenditures Pricing (fixed and variable costs) Energy expenditure calculation systems and pricing systems of all kinds		
17	4	theUnit Topic	Energy meters, three-phase energy meter, its internal components and		

			errors that occur in it, methods of connecting the meter, power factor measuring device, its components and theory of operation		
18-19	4	theUnit Topic	Power factor, the importance of improving the power factor, methods of improving the power factor, solved examples on how to calculate the power factor Electric heating, general methods of heat transfer, methods of heat transfer, types of heaters, leakage through walls, heat transfer coefficient of materials, thermal insulation, points to be taken into account when calculating spaces and rooms		
20	4	theUnit Topic	Solved examples of heating		
21	4	theUnit Topic	Electric elevators, choosing the location of the elevator, choosing its type, and the tests that must be followed when choosing an elevator for a specific service (capacity, required specifications, speed), calculating travel time, elevator efficiency, and type of service.		
22	4	theUnit Topic	Types of elevators: passenger, freight, and service elevators. The main components of the elevator: the driver or the		

			rotator, the motor, the stops, the car, the balance load, the indicators, the controllers, and the safety devices.		
23	4	theUnit Topic	Build the intake motor and reduction ratio.		
24	4	theUnit Topic	Stop group, signaling system associated with the ascent and descent of the elevator		
25	4	the Unit Topic	Types of motors used in Elevators: Specifications, Speed Regulation for AC and DC motors		
26	4	the Unit Topic	Safety Precautions and Friction Stops For sliding elevator, lower and upper springs For elevator. Lighting		
27	4	the Unit Topic	Lightning arresters, how lightning occurs and is discharged, specifications for good implementation of lightning arresters, protecting buildings and facilities from lightning.		
28	4	the Unit Topic	Solved examples of circuit calculations lightning rod		
29	4	theUnit Topic	Project implementation methods, tenders and their requirements, tender analysis and the foundations on which the tender is based.		

30	4	theUnit Topic	Estimation, its types, methods of conducting it, estimating the materials needed for a foundation work and the amounts required. Factors affecting the cost of engineering work.		
35.Course Evaluation					
First Semester Exams					
10 marks - Theoretical					
10 marks - Practical					
5 marks – Evaluation					
Second Semester Exams					
10 marks - Theoretical					
10 marks - Practical					
-5- Assessment (Daily Tests)					
Final Exam					
40 marks - Theoretical					
10 marks - Practical					
36.Learning and Teaching Resources					
Required textbooks (methodology any)			Methodical books		
Main references (sources)			References related to the subject and available the Institute's library		
Supporting books and references recommended by scientific journals, reports...)			1- Electrical wiring of buildings (by Raphael & Neidle) 2- Electrical lifts by Rs. Philips 3- Practice on low voltage switch gears (by Siemense Publication)		

Electronic references, websites	Institute website, various Internet sources websites of international companies
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Course Description Form

37.	Course Name:
SOLAR ENERGY	
38.	Course Code:
39.	Semester / Year:
Annual (2025–2026)	
40.	Description Preparation Date:
Beginning of the academic calendar (2025–2026)	
41.	Available Attendance Forms:
Lectures + Lab	
42.	Number of Credit Hours (Total) / Number of Units (Total)
43.	Course administrator's name (mention all, if more than one name)
Name: Assist Lecturer Rassol Hamad Rasheed Email: rassol.rasheed.ikr35@atu.edu.iq	
44.	Course Objectives
Course Objectives	1. Expanding the student's knowledge through his introduction to new sources of energy other than traditional sources. The primary objective of the course lies in the importance of renewable energy and its applications, which has become one of the most important fields proposed in the twenty-first century for economic and environmental reasons, and in the importance of obtaining renewable (sustainable) and

	clean energy as a guarantee for the present and security for the future. 2. Getting to know renewable energy sources and how to benefit from them to obtain energy and learn about the various application systems associated with those sources. 3. Studying traditional energy sources, sources of energy consumption, the world's energy needs, as well as environmental problems related to the use of traditional energies and studying ways and methods to reduce energy consumption. 4. Knowledge of the basics of various renewable energy sources and the technologies required for associated energy systems. 5. Studying the types of renewable energy, its working principle, properties, applications, development prospects, and explaining the importance of using such energies from an environmental and economic perspective. 6. Providing students with scientific and applied research skills.
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45. Teaching and Learning Strategies

Strategy	1. Theoretical lectures 2. Practical application and laboratory experiments 3. Discussions, workshops and seminars 4. Using modern presentation and teaching methods 5. Field visits and professional training 6. Review the latest published research in the field of renewable energy 7. Self-education
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46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Knowledge of renewable energy sources and their applications,	General introduction to renewable energy Renewable energy sources	1. Theoretical lectures 2. Practical application and	• Daily and oral tests • Monthly tests • Practical tests

		and identification of environmental problems resulting from the use of traditional fuels	and applications Renewable Energy and environmental problems (Acid rain, Ozone layer depletion, Global climate change, Nuclear hazards)	laboratory experiments 3. Discussions, workshops and seminars 4. Using modern presentation and teaching methods 5. Field visits and professional training 6. Review the latest published research in the field of renewable energy 7. Self-education	● Reports ● Extracurricular activities ● Projects ● Annual tests
2	3	How to calculate the solar time equation	The sun Reckoning of time (the equation of time and longitude correction)		
3	3	Calculating solar angles required for solar energy applications	Solar angles (declination, hour angle, solar altitude angle, solar azimuth angle, Sunrise and sunset times and day length, incidence angle)		
4	3	Calculating solar radiation incident on different surfaces	Extraterrestrial solar radiation, Atmospheric attenuation, Terrestrial irradiation, Total radiation on tilted surfaces.		
5	3	Knowing the types and characteristics of fixed solar collectors	SE collectors Stationary collectors (Flat-Plate Collectors, Compound Parabolic Collectors, Evacuated Tube Collectors)		
6	3	Knowing the types and	Sun-tracking concentrating		

		characteristics of tracking solar collectors	collectors (Parabolic Trough Collectors, Fresnel collectors, Parabolic Dish Reflectors, Heliostat Field Collectors)		
7	3	Learn about the characteristics and advantages of solar heating systems	Solar water heating systems Passive systems (Thermosiphon systems, Integrated collector storage)		
8	3	Know the characteristics of features Direct and indirect heating systems	Active systems (Direct Circulation Systems, Indirect Water Heating Systems, Pool Heating Systems)		
9	3	Learn about renewable energy storage systems	Heat storage systems (Air System Thermal Storage, Liquid System Thermal Storage, and Thermal Analysis of Storage Systems).		
10	3	Learning how to design the module and array and know the auxiliary devices and	Module and array design (module design, and array Design) Differential temperature		

		equipment in renewable energy systems	controller, Placement of Sensors		
11	3	Calculating the amount of hot water required and knowing the practical requirements for renewable energy systems	Hot water demand Practical considerations (pipes, supports, insulation, pumps, valves, and instrumentation).		
12	3	Calculating the heating and cooling load of buildings	Solar Space Heating and Cooling Calculation of heat load		
13	3	Heating and cooling buildings with solar energy	Solar space heating and cooling (Space heating and service hot water, Air systems, Water systems, Location of auxiliary heater, Heat pump systems) Solar cooling (Adsorption units, Absorption units) Solar cooling with absorption refrigeration		
14	3	Learn about solar heating processes for industrial purposes	Industrial Process Heat (Solar industrial air and water systems, Solar		

			steam generation systems) Chemistry Applications (Reforming of fuels, Fuel cells, Materials processing, Solar detoxification)		
15	3	Knowing the types, features and characteristics of solar dryers and greenhouses	Solar Dryers (Active Solar Energy Dryers, Passive Solar Energy Dryers Greenhouses and Greenhouse materials.		
16	3	Knowledge of the types, features and characteristics of water desalination systems and solar desalination processes	Solar Desalination Systems, Desalination processes Direct collection systems (Classification of Solar Distillation Systems, Performance of Solar Stills)		
17	3	Learn about solar cells, their working principle, and the components of the solar electrical generation system	Solar cells, Structure of Photovoltaic PV System		
18-19	3	Knowledge of the components	Design of PV system Hybrid PV/T		

		and characteristics of the solar generation system and the hybrid system	systems and applications		
20	3	Knowledge of the components, characteristics and working principle of solar thermal electricity generation systems	Solar Thermal Power Systems (Parabolic trough collector systems, Power tower systems)		
21	3	Knowledge of the components, characteristics and working principles of dish collector systems and solar ponds	Solar Thermal Power Systems (Dish systems, Solar ponds)		
22	3	Learn about the basics of wind energy, wind turbines, and the aerodynamics of rotors and wind turbines	Introduction to Wind Energy Power available in the WE Wind turbine WT power and torque Classification of WTs (Horizontal axis WTs, Vertical axis WTs) Characteristics of wind rotors Aerodynamics of WTs (Airfoil, Aerodynamic theories)		
23	3	Know how to	Rotor design -		

		design a wind turbine rotor and how to analyze wind data	Rotor performance Analysis of wind data		
24	3	Learn the characteristics and advantages of wind conversion systems and wind generators	Wind energy conversion systems Wind electric generators (Tower, Rotor, Gear box, Power regulation, Safety brakes, Generator) Wind farms, Offshore wind farms Wind pumps - Wind water heater		
25	3	Know the characteristics of wind energy conversion, power curve, and capacity factor in wind energy	Performance of wind energy conversion system Power curve of wind turbine Capacity factor		
26	3	Learn about power generation from water and water turbines	Introduction, Water Cycle Water Turbines		
27	3	Identify the characteristics, features and working principle of hydropower stations	Hydropower Plants (Run - of - River Power Plants, Storage Power Plants, Pumped - Storage Power Plants)		

			system design		
28	3	Knowledge of bioenergy and its use in heat and electricity generation plants	Tidal Power Plants, Wave Power Plants		
29	3	Learn about geothermal power plants, their characteristics and the principle of their operation	Introduction to bioenergy (biomass, biogas, biofuel) Biomass Heating (Wood as a Fuel, Fireplaces and Closed Wood burning Stoves, Wood Pellet Heating) Biomass Heat and Power Plants		
30	3	Identify tidal energy and wave energy, their characteristics, and their principle of operation	Introduction to geothermal energy Geothermal Plants (Geothermal Heat Plants, Geothermal Power Plants), Geothermal Heat pump		

47.Course Evaluation

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

48.Learning and Teaching Resources

Required textbooks (curricular books, any)	1- Soteris Kalogirou , 2009 “ solar energy engineering – processes and systems “ 1st Ed. Elsevier Inc. ., USA 2- Sathyajith Mathew, 2006 , “ Wind Energy , Fundamentals , Resource Analysis and Economics “, Springer , Netherlands . 3- Volker Quaschnig , 2010 ,” Renewa
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13- Course Name: Energy Storage Systems
14- Course Code:
15- Semester/Year: Second
16- Date of Description Preparation: 10/13/2024
17- Available Attendance Modes: Physical attendance /
18- Total Study Hours (Total)/Total Units (Total): 120/
19- Course Coordinator Name (if more than one name, list all): Asst. Prof. Ridha Hameed Mageed
Name: Asst.prof. Ridha Hameed Mageed Email:
Asst. Prof. Ridha Hameed Mageed inkr.red@atu.edu.iq

	energy and climate change “ John Wiley and Sons, Ltd.
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Material Description Energy Storage Systems

20- Course Objectives:					
Course Learning Objectives:	1. Acquire a practical understanding of various energy storage system types.				
	2. Develop skills in inspecting and maintaining energy storage systems.				
	3. Ability to link energy storage systems to applications.				
	4. Understand the basics of battery charging and discharging management.				
	5. Understand the role of energy storage in improving grid stability and reducing reliance on traditional generators. Also, understand the fundamental economic and environmental aspects related to energy storage systems.				
	6. Develop self-learning and information retrieval skills.				
21- Teaching and Learning Strategies:					
Strategy:	Prepare the student for work in the specialized field by utilizing computer skills.				
22- Course Structure:					
Week	Hours	Desired Learning Outcomes	Unit or Topic Name	Learning Method	Assessment Method
1	4	Student will be familiar with	Introduction to Energy Storage	Listening, e-learning,	Daily assignments, reports, p

		Energy Storage Systems (ESS), the importance of ESS, and a historical overview of ESS.	Systems (ESS), Importance of ESS, Historical Overview of ESS	practical application, PowerPoint use, discussion, Q&A	prescheduled exam, practical exam, homework
2-6	4	Student will be familiar with thermal energy storage systems, their types, and concepts.	Thermal Energy Storage Systems: Types and Concepts	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
7	4	Student will be familiar with Mechanical Energy Storage Systems (MES), an introduction to mechanical energy storage.	Mechanical Energy Storage Systems (MES), Introduction to Mechanical Energy Storage	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
8	4	Student will be familiar with Hydroelectric Energy Storage (HES) systems.	Hydroelectric Energy Storage (HES) Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
9	4	Student will be familiar with Gravity Energy Storage systems.	Gravity Energy Storage Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
10	4	Student will be familiar with Compressed Air Energy Storage (CAES) systems and compressed air laws.	Compressed Air Energy Storage (CAES) Systems and Compressed Air Laws	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
11	4	Student will be familiar with Flywheel Energy Storage (FES) systems.	Compressed Air Energy Storage (CAES) Systems and Compressed Air Laws	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
12-14	4	Student will be	Thermochemical	Listening, e-	Daily assignments

		familiar with various types of Thermochemical Energy Storage systems.	Energy Storage Systems: Types	learning, practical application, PowerPoint use, discussion, Q&A	reports, pre scheduled exam, practical exam, ho
15	4	Student will be familiar with Hydrogen Energy Storage systems.	Hydrogen Energy Storage Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, pre scheduled exam, practical exam, ho
16	4	Student will be familiar with Synthetic Natural Gas (SNG) systems.	Synthetic Natural Gas (SNG) Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, pre scheduled exam, practical exam, ho
17	4	Student will be familiar with Solar Fuel (SF) systems.	Solar Fuel (SF) Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, pre scheduled exam, practical exam, ho
18-22	4	Student will be familiar with electrochemical energy storage systems such as Lead-acid batteries, Metal-ion batteries, Metal-air batteries, Flow batteries, Solid-state batteries, Paper batteries, and Flexible batteries.	Electrochemical Energy Storage Systems such as Lead-acid batteries, Metal-ion batteries, Metal-air batteries, Flow batteries, Solid-state batteries, Paper batteries, and Flexible batteries	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, pre scheduled exam, practical exam, ho
23-24	4	Student will be familiar with electrical energy storage systems such as capacitors and supercapacitors.	Electrical Energy Storage Systems such as Capacitors and Supercapacitors	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, pre scheduled exam, practical exam, ho
25	4	Student will be familiar with	Superconducting Magnetic	Listening, e-learning,	Daily assignments, reports, p

		Superconducting Magnetic Energy Storage systems.	Energy Storage Systems	practical application, PowerPoint use, discussion, Q&A	prescheduled exam, practical exam, homework
26-27	4	Student will be familiar with Hybrid Energy Storage systems.	Hybrid Energy Storage Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
28	4	Student will be familiar with future trends and challenges in renewable energy.	Future Trends and Challenges in Renewable Energy	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
29	4	Student will be familiar with energy conservation in buildings.	Energy Conservation in Buildings	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework
30	4	Student will be familiar with comparing energy storage systems.	Comparison of Energy Storage Systems	Listening, e-learning, practical application, PowerPoint use, discussion, Q&A	Daily assignments, reports, presentations, prescheduled exam, practical exam, homework

23- Course Assessment:

Grade distribution out of 100 according to student assignments such as daily preparation, daily and monthly and written exams, reports, etc.

First Semester:				Second Semester:			
Theory:	Practical:	Attendance, Assignments, and Tests:	Total:	Theory:	Practical:	Attendance, Assignments, and Tests:	Total:
10%	10%	5%	25%	10%	10%	5%	25%

24- Learning and Teaching Resources:

Required Textbooks (Curriculum, if any):	Curriculum Textbooks:
Main References (Sources):	إدارة والخزن / أ.م. د. قاسم مهدي وادي د. طالب زيدان الموسوي تخزين الطاقة الكهربائية / د. محمد هاشم أبو الخير د. ياسر دياب
Electronic References, Internet Sites:	"Energy Storage Technology Comparison" / Johanna Gustafsson



**Ministry education High And search Scientific
device Supervision And the calendar Scientific
circle a guarantee the quality And accreditation Academic
to divide Accreditation**

**دليل وصف البرنامج
والمقرر الأكاديمي**

2025

:the introduction

The educational program is considered a coordinated and organized package of academic courses that includes procedures and experiences organized in the form of academic 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

The description of the academic program provides 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 of 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 edition, includes a description of the academic program after updating the vocabulary and paragraphs of the previous guide in light of the latest developments in the educational system in Iraq, which included a description of the academic program in its traditional form (annual, quarterly), in addition to adopting the description of the academic program circulated according to the book of the Department of Studies, T.M.3 /3. 2906 on 5/3/2023 regarding

programs that adopt the Bologna Process as a basis for their
.work

In this area, we can only emphasize the importance of writing
descriptions of academic programs and courses to ensure the
.smooth conduct of the educational process

:Concepts and terminology

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

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

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

explains the objectives and activities **Program message:** It briefly necessary to achieve them, and also identifies the program's .development paths and directions

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

Curriculum structure: All courses/study subjects included in the academic program according to the approved learning system (semester, annual, Bologna track), whether it is a requirement (ministry, university, college, or scientific department), along with the number of .study units

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

and learning strategies : They are the strategies used by a faculty and they are plans , and learning member to develop student teaching that are followed to reach learning goals. That is, it describes all classroom activities and extracurricular to achieve the learning .outcomes of the programme

form Academic program description

..... University name: University
..... College /Institute: College
..... scientific department: to divide
Name of the academic or professional program: Bachelor's
.....degree
.....Name of final degree: Bachelor's in
:School system
:Description preparation date
: File filling date

: التوقيع

: اسم المعاون العلمي

: التاريخ

: التوقيع

: اسم رئيس القسم

: التاريخ

Check the file before

Division of Quality Assurance and University Performance

Name of the Director of the Quality Assurance and

: University Performance Division

the date

the signature

Authentication of the Dean

15. See the program

Remember to see the program as stated in the university prospectus
.and website

16. Program message

State the program's mission as stated in the university's bulletin and
.website

17. Program Goals

General statements that describe what the program or institution
.intends to achieve

18. Program accreditation

?Does the program have program accreditation? From which side

19. Other external influences

?Is there a sponsor for the program

20. Program structure

* comments	percentage	Study unit	Number of courses	Program structure
				Enterprise requirements
				College requirements
				Department requirements
				summer training

				Other
--	--	--	--	-------

.Notes may include whether the course is core or elective *

21. Program description				
Credit hours		Name of the course or course	Course or course code	The year/level
practical	theoretical			

22. Expected learning outcomes of the programme	
_ Knowledge	
Statement of learning outcomes 1	Learning outcomes 1
Skills	
Statement of learning outcomes 2	Learning outcomes 2
Statement of learning outcomes 3	Learning outcomes 3
Value	
Statement of learning outcomes 4	Learning outcomes 4
Statement of learning outcomes 5	Learning outcomes 5

23. Teaching and learning strategies
Teaching and learning strategies and methods adopted in implementing .the program in general

24. Evaluation methods
.Implementing it in all stages of the program in general

25. education institution			
Faculty members			
Preparing the teaching staff	Special requirements/skills (if	Specialization	Scientific rank

		(any			
lecturer	angel		private	general	

Professional development

Orienting new faculty members

Briefly describes the process used to orient new, visiting, full-time, and part-time faculty at the institution and department levels

Professional development for faculty members

Briefly describe the academic and professional development plan and arrangements for faculty members such as teaching and learning strategies, assessment of learning outcomes, professional development, etc

26. Acceptance standard

**Developing regulations related to admission to the college or institute,)
(whether central admission or others mentioned**

27. The most important sources of information about the program

.Remember briefly

28. Program development plan

Program skills chart															
Learning outcomes required from the programme															
Value				Skills				_ Knowledge				Essential or ?optional	Course Name	Course Code	Year/level
C4	C3	C2	C1	B4	B3	B2	B 1	A4	A3	A2	A1				

- Please check the boxes corresponding to the individual learning outcomes from the program subject to evaluation

Course description form

49. Course name	
Baath regime crimes in Iraq	
50. Course Code	
51. Semester/ year	
Annual system	
52. The date this description was prepared is	
2025/5/4	
53. Available forms of attendance for the second stage	
weekly	
54. Number of study hours / Number of units (total)	
1 units 30 hours	
55. Name of the course administrator (if more than one name is mentioned)	
Talal Muzaffar Ghazi	
56. objectives Course	
1- Enabling students to understand the crimes of the Ba'ath regime, as documented by the Iraqi Supreme Court in 2005. 2- Enabling students to understand the types of international crimes. 3- Enabling students to understand violations of Iraqi laws.	Objectives of the study subject
57. Teaching and learning strategies	
1_ Explanation	The strategy

2_ Brainstorming	
3_ Dialogue and Discussion	
4_ Using References and Sources	
5_ Using Modern Teaching Methods	

58. Course structure

Evaluation method	Learning method	Name of the unit or topic	Required learning outcomes	hours	the week
oral test	a lecture	Concept Crimes . And its sections	knowledge And meaning And what it is Crimes And her relationship With others from Threads What are the crime ?sections throw lecture And a question Students on the topic knowledge And inquiry on to understand Students For the topic	1	1
oral test	a lecture	identification the crime language And . terminologically	knowledge And meaning And what it is identification the crime language And terminologically Independently throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic	1	2
oral test A written test	a lecture discussion	. Sections Crimes Sections and types of crimes of the Baath regime	knowledge And all what Regard with it The crimes of the Baath regime in Iraq throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And	1 1	3 4

			inquiries on the topic with to request Preparation from Students		
oral test	a lecture	crimes System Resurrection according to documentation Law The court Criminal Iraqi Supreme 2005 _ ... AD	knowledge And all what Regard with it The crimes of the Baath regime in Iraq and what are their types throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	5
oral test	a lecture	Crimes . International	crimes knowledge System Resurrection according to documentation Law The court Criminal _ Iraqi Supreme 2005 lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	6
oral test	a lecture	Species Crimes . International	knowledge International crimes throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	7
oral test	a lecture	Decisions Outgoing from The court Criminal The upper . one	Decisions knowledge Outgoing from The court Criminal The . upper one throw lecture And a question Students on the topic	1	8

			Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students		
oral test	a lecture	Crimes Mental And social And its effects, And highlighted Violations the system Baathist in Iraq	knowledge crimes Relationship In Mental And social Iraq, throwing lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	9
A written test	discussion	Crimes Mental	knowledge Mechanisms Crimes Psychological effects Crimes Mental throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	10
oral test	a lecture	Mechanisms . Crimes Mental	Identify on factors Militarization Society and position the system Baathist from Debt throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	11
oral test	discussion	antiquities Crimes Mental	Violations Identify on rights Human throw	1	12

			lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students		
oral test	a lecture	Crimes Social	Political And Identify the military For system throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	13
oral test	a lecture	Militarization the society	Places Identify on Prisons And detention For system Resurrection crimes Cemeteries throwing Collective lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	14
oral test	a lecture	position the system Baathist from Debt	Crimes Identify Environmental lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	15
A written test	discussion	Violations Laws . Iraqi	pollution knowledge The warlike And radiological And an explosion Mine	1	16

			throw lecture And a question Students on the topic knowledge And inquiry on to understand Students For the topic		
oral test	a lecture	photo Violations rights Human And . crimes Authority	knowledge And meaning And what it is Crimes And her relationship With others from Threads What are the crime ?sections throw lecture And a question Students on the topic knowledge And inquiry on to understand Students For the topic	1	17
oral test	discussion	some decisions Violations Political And the military For system . Resurrection	knowledge And meaning And what it is identification the crime language And terminologically Independently throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic	1	18
oral test	a lecture	Places Prisons And detention For system Resurrection	knowledge And all what Regard with it The crimes of the Baath regime in Iraq throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	19
oral test	a lecture	Crimes Environmental For system Resurrection in Iraq	knowledge And all what Regard with it The crimes of the Baath regime in Iraq and what are their types throw lecture And a question	1	20

			Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students		
oral test	a lecture	pollution The warlike And radiological And an . explosion Mines	crimes knowledge System Resurrection according to documentation Law The court Criminal _ Iraqi Supreme 2005 lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	21
A written test	discussion	destruction the cities And the villages Policy the . earth Scorched	knowledge International crimes throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	22
oral test	a lecture	. drying Marshes	drying knowledge Marshes lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	23
oral test	discussion	Scrapping Orchards Palm And trees . And crops	Economic In Iraq, throwing lecture And a question Students on the topic Subtract questions on Students and give the time For students To	1	24

			subtract questions And inquiries on the topic with to request Preparation from Students		
oral test	a lecture	crimes Cemeteries . Collective	The knowledge regime's crimes against the people are shed lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	25
oral test	a lecture	events Cemeteries Extermination Collective committed from the system Baathist in Iraq	Identify on factors Militarization the throw society lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	26
oral test	a lecture	Category Timeline For graves Extermination Collective in Iraq For the period 1963 AD - 2003 AD	Violations Identify on rights Human throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	27
oral test	discussion	Cemetery sites in Iraq	Cemetery Identify sites For system throw lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request	1	28

			Preparation from Students		
A written test	a lecture	Preparing and distributing cemeteries in Iraq	Places Identify on Cemeteries and detention For system Resurrection crimes Cemeteries throwing Collective lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	29
oral test	a lecture	Mass graves martyrs database	Martyrs Identify cemeteries lecture And a question Students on the topic Subtract questions on Students and give the time For students To subtract questions And inquiries on the topic with to request Preparation from Students	1	30

59. Course evaluation

Distribution of the grade out of 100 according to the tasks assigned to the student, such as daily .preparation, daily, oral, monthly, written exams, reports, etc

marks monthly exam 40

marks for daily and oral preparation and report writing 10

final exam score 50

60. Learning and teaching resources

Ihsan Hindi, Military Occupation	Required textbooks (methodology, if any)
undi Abdul Malik, Criminal Encyclopedia	Main references (sources)
Mass Graves in Iraq by Human Rights	Recommended supporting books and references (scientific journals, reports....)

Watch	
The Book: The Cognitive Foundation for Studying Baath Party Crimes in Iraq, by Dr. Qais Nasser and Professor Abdul Hadi Maatouq	Electronic references, Internet sites

Course Description Form

Course Description: Control and Measurement

This course describes the study of the performance and properties of various power electronics elements. It also includes how to use them in building various electronic circuits as a means of converting power from A.C to D.C and vice versa, as well as controlling the voltage and frequency of the power source, battery charging circuits, and

uninterruptible power devices. After training, the trainee or student will be able to learn the uses of various electronic circuits with the aim of controlling machines and electrical forces. This is achieved through theoretical explanation supported by practical experiments of power electronics circuits with the help of drawing diagrams and incoming and outgoing signals.

Educational institution	Al-Furat Al-Awsat Technical University / Karbala Technical Institute
Scientific department/center	Renewable Energy technique - second stage
10- Course name/code	Control and Measurement
11- Instructor's name	Lect. Dr. Mohammed Omar Ali
12- Email	mohammad.ali@atu.edu.iq
13- Academic title	Lecturer
14- Attendance forms available	Attendance
15- Semester / year	Annual
16- Number of study hours (total)	120 hours (60 theoretical hours + 60 practical hours)
17- Date this description was prepared	01/10/2025
18- Course objectives:	
This course aims to provide the trainee with the cognitive skills related to the elements of power electrons, their properties, how to operate them, and their uses in power circuits and electrical machines, such as controlled and uncontrolled unit circuits, direct current interrupters, alternating voltage governors, and inverters, in	

addition to how to use these circuits in the field of industry. One of the objectives of this course in the educational institutions attended by students is:

- 6- Preparing the student to recognize electronic components manufactured from semiconductor materials.
- 7- Preparing the student to learn about the analysis of electronic circuits for power electronics systems.
- 8- Identify the applied circuits of power electronics systems.
- 9- Preparing human cadres who possess technical qualifications that enable them to enter the labor market efficiently.
- 10- Preparing qualified technical personnel to study and design electronic circuits as required by the labor market, build electrical circuits, control and control the operation and manufacture of electronic devices, and convert electrical energy from one type to another according to the required study.
- 11- Meeting the requirements of the labor market with modern, technical methods.
- 12- The specialty aims to graduate competent personnel equipped with all electrical and electronic information enabling them to carry out maintenance work and operate electrical circuits based on electronic designs.

11- Definition of student

- Introducing the student to the various electronic switches made from semiconductor materials such as (silicon, germanium).
- Teaching the student how to build power electronics systems.
- Teaching the student to analyze electronic circuits and their applications.

- Teach the student to use mathematical equations to make mathematical conclusions.
- Teaching the student how to find and derive mathematical equations from signals entering and leaving electronic circuits.
- Teach the student how to build, operate and use laboratory equipment.
- Teaching and training the student to read the values of incoming and outgoing current and voltages.
- Learning about the waves coming out and entering electronic circuits and how to convert them from one form to another by controlling and changing some electronic elements.
- Teaching the student to use electronic devices accurately and how to use means and methods of protection for the devices and the student.

12- Course outcomes and teaching, learning and evaluation methods

E- Cognitive objectives:

7. Preparing the student to study the various calculations in electronic circuits with alternating current and direct current and identifying several types of phases and different connections to study these calculations.
8. The student will be able to identify electronic components, how they work, and their outputs. He is able to determine the needs required to design or build some electronic circuits.
9. Studying the subject Power Electronics enables the student to control and transform the types and values of electrical energy.
10. The student will be able to build electronic circuits and

manufacture devices and methods for controlling and protecting various loads.

11. The student will be able to become familiar with electronic components manufactured from semiconductor materials of their various types, composition, properties, uses and applications.
12. The student will be able to present a clear and comprehensive picture of occupational safety and protection methods.

F- Course-specific skills objectives

- Applying theoretical topics through experiments on direct and alternating current circuits and training the student to use laboratory equipment for various measurements.
- Know the specifications, characteristics and features of electronic elements.
- Determine the basic devices to implement the experiment according to the components and measurements required in the circuit design.
- The student acquires manual skills in using tools and laboratory equipment.
- Training the student to read results from laboratory devices accurately.
- The student gains self-confidence in implementing and practicing electrical technical work.
- Enabling the student to link and apply designs to laboratory boards and how to choose appropriate devices to carry out the experiment.

G- Emotional and value goals

- Guiding students in group work
- Activating the holding of workshops and seminars and activating the role of the Educational Guidance Committee
- Providing students with practical skills in laboratories and laboratories
- Providing students with the ability to think about solving practical problems
- Directing students to take care and maintain the property of the laboratory, department, and institute

- Developing students' Internet research skills
- Operating and maintaining electronic devices and control devices of all types. Maintaining, assembling and operating measuring devices and high-power devices of all types

H- Transferable general and qualifying skills (other skills related to employability and personal development).

- Applied skills within laboratories, workshops and laboratories.
- Working in the field of maintenance and repair of electrical appliances.
- Skills in using electronic switches in electronic circuits.
- Electronic circuit analysis skills.
- Designing applied circuits for some electronic components.
- Computerized electrical mapping.
- Practical visits.
- summer training

Teaching and learning methods.

- Theoretical lecture
- Practical lecture
- Discussion with students and students among themselves
- Preparing reports and projects related to the scientific material of the lecture
- Summer training in the private and public sectors
- E-Learning
- Using modern methods in teaching and training students
- Forming discussion circles during lectures to discuss study topics
- Assigning students to class duties

Evaluation methods:

- Daily exams
- Monthly and final exams
- Ask exercises and questions
- Assigning homework
- Weekly reports of practical experiments in laboratories

- Extracurricular duties and volunteer work

12- Course structure

the week	hours	Required learning outcomes	Name of the unit or topic	Teaching method	Evaluation method
1	5	Identify the basic components of power electronics circuits	Power electronic, electronic componts which used in high power control (power diodes, thyristor and power transistors) pevison of single-phase rectifier circuits by using diodes.	Lectures + Practical applications	Daily, monthly, and annual exams
2	5	Identify three-phase rectifier circuits	Three phase rectifier circuits by using diodes, output voltage waveform, diode current waveform, output voltage equation in case of resistance lode.	Lectures + Practical applications	Daily, monthly, and annual exams
3	5	Learn about the use of a transistor as a switch	Using the transistor as switch, regions of operation, transistor as a switch (cut off and saturation).	Lectures + Practical applications	Daily, monthly, and annual exams
4	5	Learn about	Power transistor in	Lectures	Daily,

		improving the opening and closing of a transistor	(off)and (on) state, improvement of (off) and (on) time by using speed up capacitance, practical problems.	+ Practical applications	monthly, and annual exams
5	5	Identify the bipolar transistor	Uniplolor junction transistor, construction, theoretical operation, using the transistor as relaxation oscillator practical example.	Lectures + Practical applications	Daily, monthly, and annual exams
6	5	Learn how to use an operational amplifier	operational amplifier, description of operational amplifier (op-amp) as asparate components, zero detector, comparator.	Lectures + Practical applications	Daily, monthly, and annual exams
7	5	Learn how to use an operational amplifier	The use of op-amp as actable multivibrator and a monostable multivibrator, photo conduction cells, photo diodes.	Lectures + Practical applications	Daily, monthly, and annual exams
8	5	Learn about the use of the LED electronic element	Light – emitting diodes (LED), photo transistors, the use	Lectures + Practical	Daily, monthly, and

			of optical comparator in power electronic circuits.	applications	annual exams
9	5	Learn about the use of thyristor properties	Thyristor, construction, characteristic, curves for a thyristor, thyristor conduction in forward biasing, thyristor family, thyristor representation as a double transistor circuit.	Lectures + Practical applications	Daily, monthly, and annual exams
10	5	Learn about ways to connect thyristors	Thyristor conduction methods, conduction through the gate minimum gate current causing conduction, conduction time, conduction due to high forward voltage rectifier (dv/dt)	Lectures + Practical applications	Daily, monthly, and annual exams
11	5	Learn about Diac and Triac	DIAC, TRIAC characteristics, practical applications, thyristor, triggering methods, triggering on DC and AC current, pulse triggering types	Lectures + Practical applications	Daily, monthly, and annual exams

12	5	Learn about the methods of thyristor switching	thyristor triggering circuit, DC and AC triggering circuits.	Lectures + Practical applications	Daily, monthly, and annual exams
13	5	Learn about mug pulse circuits	Pulse current triggering circuit, relaxation oscillator, zero detector, comparator with a stable and monostable multivibrators (operational amplifiers and timer).	Lectures + Practical applications	Daily, monthly, and annual exams
14	5	Learn about thyristor applications	Thyristor general application introductory, AC to DC inverter DC to AC inverter, DC to DC inverter, AC to AC inverter, phase controlled halfwave rectifier with resistance and inductance load output current and voltage waveform , output voltage equations	Lectures + Practical applications	Daily, monthly, and annual exams
15	5	Identify the semi-controlled thyristor rectifier	Half controller full wave rectifier fully	Lectures +	Daily, monthly,

			controlled, resistance and inductance load , generated wave forms, output voltage equation for free wheeling diode.	Practical applications	and annual exams
16	5	Identify the fully controlled thyristor rectifier	Regenerating fully controlled inverters, examples, DC motor speed control.	Lectures + Practical applications	Daily, monthly, and annual exams
17	5	Identify the three-phase thyristor inverter	Three face inverters, out put voltage wave form with, triggering pulses and equations.	Lectures + Practical applications	Daily, monthly, and annual exams
18	5	Identify thyristor protection circuits	Thyristor protection from the high-rate change in current and voltage, protection from the transient change in source voltage, fully protection circuit from all possible faults due to current and voltage.	Lectures + Practical applications	Daily, monthly, and annual exams
19	5	Identify thyristor suppression circuits	DC to AC inverters methods of forcing the thyristor to get off.	Lectures + Practical applications	Daily, monthly, and annual exams

20	5	Identify series and parallel thyristor inverter circuits	Parallel and series inverter, single and three phase, control methods in charging frequency and voltage, output wave forms.	Lectures + Practical applications	Daily, monthly, and annual exams
21	5	Identify series and parallel thyristor inverter circuits	Inverter application, emergency power supply, single phase DC motor speed control.	Lectures + Practical applications	Daily, monthly, and annual exams
22	5	Learn about ways to control motors	Three phase motor control by using a constant ratio of variation frequency and voltage.	Lectures + Practical applications	Daily, monthly, and annual exams
23	5	Identify thyristor circuits	Choppers, DC to DC inverter frequency constant, line constant	Lectures + Practical applications	Daily, monthly, and annual exams
24	5	Identify the types of clips	Types of choppers, DC motor speed control.	Lectures + Practical applications	Daily, monthly, and annual exams
25	5	Learn about voltage regulators	AC to AC inverter, single phase voltage regulator, three phase voltage regulator	Lectures + Practical applications	Daily, monthly, and annual exams

26	5	Learn about methods of controlling single-phase and three-phase motors	General application on single and three induction motor speed control due to the change in stat or voltage, using the closed loop feedback circuit to control the slippery rings of AC motor.	Lectures + Practical applications	Daily, monthly, and annual exams
27	5	Learn about frequency modulator circuits	Cyclic inverter, AC to DC cyclic inverter, DC to DC cyclic inverter.	Lectures + Practical applications	Daily, monthly, and annual exams
28	5	Identify circuits of inverters, structure diagrams	AC to AC cyclic inverter control block diagram.	Lectures + Practical applications	Daily, monthly, and annual exams
29	5	Learn about PWM	Using amplitude modulation for speed control.	Lectures + Practical applications	Daily, monthly, and annual exams
30	5	Identify the unipolar transistor	Using polar transistor for AC motor speed control .	Lectures + Practical applications	Daily, monthly, and annual exams

14- Course structure	
4- Main references (sources)	• Electrical Technology (Edward Hughes) • Basic Circuits (A.M.F Brooks) Pergaman Press. • Introduction to Electric circuits (M. Romanwitz) John Willy • Basic Electrical Engineering (Fitzgerald & Rlginborthan) Mc – Graw – Hill • المصدر للمادة العملية • Electrical Technology (Edward Huges) • Basic Electrical Engineering • الكترونيات في خدمة التطبيقات الكهربائية ترجمة الدكتور سمير رستم • Power electronics handbook, Third edition, Muhammad H. Rashid, Elsevier, 2011. • دليل المهندس والفني في العناصر الكهربائية والالكترونية، محمد قاسم، شعاع للنشر والعلوم، 2012. • Power Electronics Basics, YuriyRozanov, Sergey E. Ryvkin, EvgenyChaplygin, Pavel Voronin, CRC Press, 2015 • Introduction to Power Electronics, Paul H. Chappell, Artech House, 2014.
5- Electronic references and websites	• Various Internet sources

6- Recommended books and references (scientific journals, reports)	• مشروع كتاب الدوائر والقياسات • مبادئ علم الهندسة الكهربائية / دكتور محمد زكي – دكتور مظفر النعمة • ملزمة الدوائر والقياسات العملي • Advanced industrial electronics by morris • Thyristor engineering by B.B. berde • الكترونيات القدرة (تأليف الدكتور مظفر أنور النعمة)
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15- Course development plan

- Forming committees of subject teachers at Al-Furat Al-Awsat Technical University to update the curriculum
- Matching vocabulary with the labor market and the private sector
- Preparing courses for trainers in the laboratory so that they can train students more efficiently
- Providing laboratories with modern equipment that keeps pace with scientific development in developed countries