

Ministry of Higher Education and Scientific Research

Scientific supervision and evaluation device

**Department of Quality Assurance and Academic
Accreditation**

Department Accreditation



Academic Program and Course Description Guide

Department of Power Mechanics Engineering Technology

2025/2026

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 3/2906. On 5/3/2023 with regard to 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 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 necessary summary of the most important characteristics of the course and the learning outcomes that the student is expected 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.

The program's mission: It briefly explains the goals and activities necessary to achieve them, and also defines 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.

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

1. View the program

The Department of Power Mechanics Engineering Technology aims to be a national leader in engineering education and applied research. It strives to produce skilled, practice-oriented engineers in renewable energy, refrigeration and air conditioning, production and automation at the preliminary study and postgraduate studies. The department is committed to enhancing innovation, promoting sustainability, and aligning its academic programs with global standards. It aspires to contribute to national development by preparing graduates with the competencies needed to advance Iraq's technological progress and meet the evolving demands of society and the labor market.

2. Program message

Creating a distinguished theoretical and practical learning environment for students by delivering high quality scientific lectures in specialized fields, providing modern laboratories, workshops, and hands on training to enhance technical proficiency, and continuously updating curricula and programs to keep pace with technological development.

3. Program Goals

A- Refrigeration and Air Conditioning Branch:

This branch aims to:

- 1.** Graduate engineers capable of performing thermal load calculations and system testing, qualifying them to work on engineering systems and conduct feasibility studies for various specialized projects.
- 2.** Diagnose and repair a wide range of thermal systems—including small, combined, separate, and central units, as well as refrigerated and freezing storage systems and steam systems—serving both industrial and service sectors.

3. Develop refrigeration and freezing systems that are adapted to the country's climatic and environmental conditions, while keeping pace with technological advancements in the field.
4. Install, operate, and manage maintenance and repair facilities related to the branch's specialization.
5. Conduct research and investigations, promote energy rationalization, and explore alternative solutions within the field.

B- Renewable Energy Branch:

This branch aims to meet growing energy needs by:

1. Preparing graduates with the skills necessary to design and analyze alternative energy systems, including solar thermal systems, photovoltaic modules, biofuels, wind energy, and solar power technologies.
2. Providing career pathways in research and development as well as engineering design, fostering scientific and technological advancement across various industrial sectors.
3. Graduating engineers capable of innovating, researching, and designing renewable energy systems that directly contribute to Iraq's sustainable development, energy security, and industrial progress.

4. Program accreditation

Program of the Ministry of Higher Education and Scientific Research

5. Other external influences

None

6. Program structure					
Program Structure	Branch Name	Number of Courses	Number of Units	Percentage	Notes*
Enterprise requirements	Refrigeration and Air Conditioning	11	20	11.8	Secondary course
	Renewable Energy	11	20	12.6	
College requirements	Refrigeration and Air Conditioning	10	21	12.4	Basic course
	Renewable Energy	10	21	13.3	
Department requirements	Refrigeration and Air Conditioning	29	82	48.5	Basic course
	Renewable Energy	29	86	54.4	
Summer training	Refrigeration and Air Conditioning	2	-	-	Basic course
	Renewable Energy	2	-	-	
Others (branch)	Refrigeration and Air Conditioning	12	35	20.7	Basic course
	Renewable Energy	11	34	21.5	

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

7. Program description

Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
First / First	NTU 100	Human Rights	1	0
First / First	NTU 101	English Language 1	2	0
First / First	NTU 102	Computer Principles 1	1	2
First / First	NTU 106	Democracy	1	0
First / First	TEMO 100	Electrical Technology	2	2
First / First	TEMO 101	Mathematics 1,2	6	0
First / First	PM100	Thermodynamics 1,2	2	2
First / First	PM 102	Engineering Mechanics-Statics	3	0
First / First	PM 104	Occupational Safety Principles	1	3
First / First	PM 105	Workshops	0	4
First / Second	NTU 103	Computer Principles 2	1	2
First / Second	NTU 104	Arabic Language	2	0
First / Second	TEMO 103	Engineering Drawing	1	2
First / Second	TEMO 104	Engineering Workshop	0	2
First / Second	TEMO 105	Chemistry	2	1
First / Second	TEMO 106	Physics	4	2
First / Second	PM 103	Engineering Mechanics-Dynamics	3	0
Second / First	TEMO 200	Mathematics 3	3	0
Second / First	PM 200	Thermodynamics 3	2	2
Second / First	PM 202	Fluid Mechanics 1	2	2
Second / First	PM 204	Strength of Materials 1	2	2
Second / First	PM 206	Engineering Materials 1	2	2
Second / First	PM 209	Refrigeration & Air Conditioning 1	2	2
Second / First	PM 210	Mechanical Drawing	1	3
Second / Second	NTU 201	Professional Ethics	2	0
Second / Second	NTU 200	English Language 2	2	0
Second / Second	TEMO 201	Mathematics 4	3	0

7. Program description				
Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
Second / Second	TEMO 202	Summer Training 1	0	6
Second / Second	PM 203	Fluid Mechanics 2	2	2
Second / Second	PM 205	Strength of Materials 2	2	2
Second / Second	PM 207	Engineering Materials 2	2	2
Second / Second	PM 208	Theory of Machines 1	2	2
Second / Second	PM 201	Thermodynamics 4	2	2
Air conditioning Branch				
Third / Five	NTU 300	English Language 3	2	0
Third / Five	PM 300	Computer Applications	1	2
Third / Five	PM 301	Engineering Analysis	3	0
Third / Five	RAC 300	Heat & Mass Transfer 1	2	2
Third / Five	RAC 302	Refrigeration & Air Conditioning 2	2	2
Third / Five	RAC 304	Drawing of Refrigeration & Air Conditioning Systems	1	3
Third / Five	RAC 305	Maintenance of Refrigeration & Air Conditioning Systems	2	3
Third / Six	TEMO 300	Summer Training 2	0	6
Third / Six	PM 302	Numerical Analysis	3	0
Third / Six	PM 303	Electrical & Electronic Engineering	2	2
Third / Six	PM 304	Machine Design	2	2
Third / Six	PM 305	Vibration	2	2
Third / Six	RAC 301	Heat & Mass Transfer 2	2	2
Third / Six	RAC 303	Refrigeration & Air Conditioning 3	2	2
Fourth / Seven	NTU 410	Methodology of Scientific Research	2	0
Fourth / Seven	TEMO 400	Engineering Management	2	0
Fourth / Seven	PM 400	Engineering Measurement Systems	2	2
Fourth / Seven	RAC 401	Air Conditioning Systems Design 1	2	2
Fourth / Seven	RAC 403	Refrigeration Systems Design 1	2	2

7. Program description				
Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
Fourth / Seven	RAC 405	Thermal Power Plants	2	2
Fourth / Eight	NTU 400	English Language 4	2	0
Fourth / Eight	TEMO 401	Project	0	8
Fourth / Eight	PM 401	Automatic Control Systems	2	2
Fourth / Eight	PM 402	Computer Aided Design	1	3
Fourth / Eight	RAC 402	Air Conditioning Systems Design 2	2	2
Fourth / Eight	RAC 404	Refrigeration Systems Design 2	2	2
Fourth / Eight	RAC 400	Renewable Energy	2	2
Renewable energy branch				
Third / Five	NTU 300	English Language 3	2	0
Third / Five	PM 300	Computer Applications	1	2
Third / Five	PM 301	Engineering Analysis	3	0
Third / Five	RE 300	Heat and Mass Transfer 1	2	2
Third / Five	RE 302	Introduction to Renewable Energy	2	2
Third / Five	RE 304	Biofuels	2	0
Third / Six	TEMO 300	Summer Training 2	0	6
Third / Six	PM 302	Numerical Analysis	3	0
Third / Six	PM 303	Electrical & Electronic Engineering	2	2
Third / Six	PM 304	Machine Design	2	2
Third / Six	PM 305	Vibration	2	2
Third / Six	RE 301	Heat and Mass Transfer 2	2	2
Third / Six	RE 303	Gas Dynamics	2	0
Fourth / Seven	NTU 410	Methodology of Scientific Research	2	0
Fourth / Seven	TEMO 400	Engineering Management	2	0
Fourth / Seven	PM 400	Engineering Measurement Systems	2	2
Fourth / Seven	RE 400	Renewable Energy 1	3	2
Fourth / Seven	RE 402	Combustion Engineering	2	0

7. Program description

Level/Semester	course code	Course or course name	Credit hours	
			Theoretical	Optical
Fourth / Seven	RE 404	Photovoltaic Energy	2	2
Fourth / Seven	RE 405	Thermal Power Plants	2	2
Fourth / Eight	NTU 400	English Language 4	2	0
Fourth / Eight	TEMO 401	Project	0	8
Fourth / Eight	PM 401	Automatic Control Systems	2	2
Fourth / Eight	PM 402	Computer Aided Design	1	3
Fourth / Eight	RE 401	Renewable Energy 2	3	2
Fourth / Eight	RE 406	Air Pollution	2	0
Fourth / Eight	RE 403	Thermal System Design	3	0

8. Expected learning outcomes of the program

Knowledge

1. A. Performing mathematical calculations and designing mechanical components using computers, and studying the economic feasibility of various projects in the specialization field.
2. A. Diagnosing faults and performing maintenance and repair work on mechanical systems for industrial and service purposes.
3. A. Conducting research, studies, and searching for alternatives in the field of specialization using the latest technologies.
4. A. Designing systems operating on renewable energies and cooling systems using various manufacturing methods to achieve maximum efficiency.

Skills

1. B. Performing mathematical calculations and designing mechanical components.
2. B. Conducting non-destructive analyses and inspections for mechanical parts.
3. B. Conducting experiments and failure tests for parts.
4. B. Ability to draw conclusions and analyze data.

Value

- | | |
|--|--|
| <ol style="list-style-type: none">1. C. Developing students' abilities to participate in idea sharing.2. C. Enhancing the fundamental skills necessary for designing, implementing, and maintaining systems and laboratory projects.3. C. Providing a broad appreciation for problems that may arise in professional practice, including teamwork, leadership, occupational safety, communication, professional ethics, and economic feasibility.4. C. Ability to analyze, deduce, and solve problems in an engineering manner according to required standards. | Summer and vocational training, laboratories, scientific films and videos (electronic and in-person) blended learning, and graduation projects |
|--|--|

9. Teaching and learning strategies

- Explaining the scientific material to students in detail.
- Participation of students in solving mathematical problems.
- Discussion and dialogue about vocabulary related to the topic.
- Daily tests, mid-term exams, final exams, weekly reports within the subject, descriptive homework assignments.

10. Evaluation methods

Daily tests, mid-term exams, final exams, weekly reports within the subject, descriptive homework assignments.

11. Education institution

Faculty members

Scientific rank	Specialization		Special requirements /skills (if any)	Preparing the teaching staff	
	General	Private		Permanent staff	Lecturer
Assist Prof	Mechanical Eng.	Thermal	None	7	0
Lecturer	Mechanical Eng.	Thermal	None	8	0
Lecturer	Architecture Eng.	Architecture	None	1	0
Lecturer	Mechanical Eng.	Vibrations	None	1	0
Assist Lecturer	Mechanical Eng.	Thermal	None	8	0
Assist Lecturer	Mathematical sciences	Applied mathematics	None	1	0
Assist Lecturer	Computer technology engineering	Computer	None	1	0

Professional development

Orienting new faculty members

Teamwork skills.
Computer and Internet skills.
Communication skills such as English and presentation.
Leadership skills and taking responsibility.
Self-education and lifelong learning skills.

Professional development for faculty members

- Training courses within the institution.
- Training courses outside the institution.
- Scientific research
- Seminars and scientific symposiums.
- Self education

12. Acceptance standard

- Scientific section
- Professional study
- The grade

13. The most important sources of information about the program

- Methodological books.
- Help resources (Internet).
- Scientific research and its latest developments.

14. Program development plan

- Learn about the experiences of Arab and foreign counterpart universities and colleges and benefit from the development taking place with them.

Program skills chart															
Level / semester	Course Code	Course Name	Essential or optional	Learning outcomes required from the program											
				Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
First / First	NTU 100	Human Rights	Supported												
First / First	NTU 101	English Language 1	Supported												
First / First	NTU 102	Computer Principles 1	Supported					√	√		√		√		
First / First	NTU 106	Democracy	Supported												
First / First	TEMO 100	Electrical Technology	Basic	√		√	√	√	√	√	√	√	√	√	√
First / First	TEMO 101	Mathematics 1,2	Basic	√				√				√			
First / First	PM100	Thermodynamics 1,2	Basic	√	√	√	√	√			√	√	√	√	√
First / First	PM 102	Engineering Mechanics-Statics	Basic	√	√	√	√	√			√				√
First / First	PM 104	Occupational Safety Principles	Supported		√									√	
First / First	PM 105	Workshops	Basic		√					√		√	√	√	√
First / Second	NTU 103	Computer Principles 2	Supported										√		
First / Second	NTU 104	Arabic Language	Supported												
First / Second	TEMO 103	Engineering Drawing	Basic		√		√						√	√	√
First / Second	TEMO 104	Engineering Workshop	Basic		√		√						√	√	√
First / Second	TEMO 105	Chemistry	Basic										√		
First / Second	TEMO 106	Physics	Basic										√		
First / Second	PM 103	Engineering Mechanics-Dynamics	Basic	√	√	√	√	√					√		
Second / First	TEMO 200	Mathematics 3	Basic	√				√					√		
Second / First	PM 200	Thermodynamics 3	Basic					√	√	√	√	√	√	√	√
Second / First	PM 202	Fluid Mechanics 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second / First	PM 204	Strength of Materials 1	Basic	√		√		√	√	√	√	√	√	√	√

Program skills chart															
Level / semester	Course Code	Course Name	Essential or optional	Learning outcomes required from the program											
				Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Second / First	PM 206	Engineering Materials 1	Basic	√		√	√	√	√	√	√	√	√	√	√
Second / First	PM 209	Refrigeration & Air Conditioning 1	Basic	√		√		√	√	√	√	√	√	√	√
Second / First	PM 210	Mechanical Drawing	Basic	√		√						√	√	√	√
Second / Second	NTU 201	Professional Ethics	Supported											√	
Second / Second	NTU 200	English Language 2	Supported												
Second / Second	TEMO 201	Mathematics 4	Basic	√				√					√		
Second / Second	TEMO 202	Summer Training 1	Basic	√	√		√					√	√	√	√
Second / Second	PM 203	Fluid Mechanics 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Second / Second	PM 205	Strength of Materials 2	Basic	√		√		√	√	√	√	√	√	√	√
Second / Second	PM 207	Engineering Materials 2	Basic	√		√		√	√	√	√	√	√	√	√
Second / Second	PM 208	Theory of Machines 1	Basic	√		√		√	√	√	√	√	√	√	√
Second / Second	PM 201	Thermodynamics 4	Basic	√		√		√	√	√	√	√	√	√	√
Refrigeration & Air-conditioning Branch															
Third / Five	NTU 300	English Language 3	Supported												
Third / Five	PM 300	Computer Applications	Supported										√		
Third / Five	PM 301	Engineering Analysis	Basic	√				√					√		
Third / Five	RAC 300	Heat & Mass Transfer 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RAC 302	Refrigeration & Air Conditioning 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RAC 304	Drawing of Refrigeration & Air Conditioning Systems	Basic	√		√		√				√	√	√	√

Program skills chart															
Level / semester	Course Code	Course Name	Essential or optional	Learning outcomes required from the program											
				Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Third / Five	RAC 305	Maintenance of Refrigeration & Air Conditioning Systems	Basic		√			√					√	√	√
Third / sex	TEMO 300	Summer Training 2	Basic	√	√		√					√	√	√	√
Third / sex	PM 302	Numerical Analysis	Basic	√				√					√		
Third / sex	PM 303	Electrical & Electronic Engineering	Basic	√		√	√	√	√	√	√	√	√	√	√
Third / sex	PM 304	Machine Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	PM 305	Vibration	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RAC 301	Heat & Mass Transfer 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / sex	RAC 303	Refrigeration & Air Conditioning 3	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / seven	NTU 400	Methodology of Scientific Research	Basic			√									
Fourth / Seven	TEMO 400	Engineering Management	Basic												
Fourth / Seven	PM 400	Engineering Measurement Systems	Basic	√	√		√	√	√	√	√	√	√	√	√
Fourth / Seven	RAC 401	Air Conditioning Systems Design 1	Basic	√	√	√	√	√		√	√	√	√	√	√
Fourth / Seven	RAC 403	Refrigeration Systems Design 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Seven	RAC 405	Thermal Power Plants	Basic	√		√	√	√	√	√	√	√	√	√	√
Fourth / Eighth	NTU 400	English Language 4	Supported												
Fourth / Eighth	TEMO 401	Project	Basic	√	√	√	√					√	√	√	√
Fourth / Eighth	PM 401	Automatic Control Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eighth	PM 402	Computer Aided Design	Basic				√		√			√	√	√	√
Fourth / Eighth	RAC 402	Air Conditioning Systems Design 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	RAC 404	Refrigeration Systems Design 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Fourth / Eight	RAC 400	Renewable Energy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Renewable energy branch															
Third / Five	NTU 300	English Language 3	Supported												
Third / Five	PM 300	Computer Applications	Supported					√		√	√	√	√	√	√
Third / Five	PM 301	Engineering Analysis	Basic	√				√				√			
Third / Five	RE 300	Heat and Mass Transfer 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RE 302	Introduction to Renewable Energy	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Five	RE 304	Biofuels	Basic	√				√					√		
Third / Six	TEMO 300	Summer Training 2	Basic	√	√	√	√	√				√	√	√	√
Third / Six	PM 302	Numerical Analysis	Basic	√				√					√		
Third / Six	PM 303	Electrical & Electronic Engineering	Basic	√	√		√	√	√	√	√	√	√	√	√
Third / Six	PM 304	Machine Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Six	PM 305	Vibration	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Six	RE 301	Heat and Mass Transfer 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Third / Six	RE 303	Gas Dynamics	Basic	√	√	√	√	√				√	√		
Fourth / Seven	NTU 410	Methodology of Scientific Research	Supported			√									
Fourth /seven	TEMO 400	Engineering Management	Supported												
Fourth / Seven	PM 400	Engineering Measurement Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Seven	RE 400	Renewable Energy 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Seven	RE 402	Combustion Engineering	Basic	√		√	√	√		√	√				

Program skills chart															
				Learning outcomes required from the program											
Level / semester	Course Code	Course Name	Essential or optional	Knowledge				Skills				Values			
				1A	2A	3A	4A	B1	B2	B3	B4	C1	C2	C3	C4
Fourth / Seven	RE 404	Photovoltaic Energy	Basic	√			√	√	√	√		√	√	√	√
Fourth / Seven	RE 405	Thermal Power Plants	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	NTU 400	English Language 4	Supported												
Fourth / Eight	TEMO 401	Project	Basic	√	√	√	√	√				√	√	√	√
Fourth / Eight	PM 401	Automatic Control Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	PM 402	Computer Aided Design	Supported				√	√	√			√	√	√	√
Fourth / Eight	RE 401	Renewable Energy 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Fourth / Eight	RE 406	Air Pollution	Basic	√		√	√	√		√	√		√		
Fourth / Eight	RE 403	Thermal System Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√