

Northern Technical University



الجامعة التقنية الشمالية

First Cycle – Bachelor's degree (B.Sc.) – Power Mechanics

Techniques Engineering –

Renewable Energy + Refrigeration and Air Conditioning

بكالوريوس - هندسة تقنيات ميكانيك القوى

فرع الطاقة المتجددة + فرع التبريد والتكييف

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1. Mission & Vision Statement

Vision Statement

The Department of Power Mechanics Engineering seeks excellence and leadership in the field of engineering sciences by educating students and providing them with experience, skills, capabilities and scientific foundations in the specializations of renewable energy engineering and refrigeration and air conditioning engineering at the level of preliminary studies for the aforementioned specializations and postgraduate studies for the specialization of thermal technology engineering by adopting international quality standards to qualify them to be engineers. Applicants to support the wheel of development in our country with the necessary competencies to advance the Iraqi reality in a way that keeps pace with the rapid developments in technology, the renewed requirements of Iraqi society, and competition, given the work field's urgent need for these specializations.

Mission Statement

Creating a distinguished theoretical and practical academic atmosphere for students by giving valuable scientific lectures in the specialty, conducting laboratory experiments, creative scientific research, workshops, seminars, courses, and discussion panels, and interacting with the local and global environment that serves the community in the field of work on devices in the department's laboratories.

2. Program Specification

Programme code:	BSc-BIO	ECTS	240
Duration:	4 levels, 8 Semesters	Method of Attendance:	Full Time

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.

3. Program Objectives

1. Installing and operating devices and equipment for the refrigeration and air conditioning branches and all types of renewable energy.
2. Contributing and supervising the maintenance of various related devices and units for the refrigeration and air conditioning and renewable energy branches.
3. Design and implement maps for installing and operating modern equipment for the refrigeration and air conditioning and renewable energy branches.
4. Research, develop and find replacement parts for broken units.

5. Student Learning Outcomes

Student learning outcomes state what students are expected to know or be able to do upon completion of a course or program. Course learning outcomes may contribute, or map to, program learning outcomes, and are required in group instruction course syllabi.

At both the course and program level, student learning outcomes should be clear, observable and measurable, and reflect what will be included in the course or program requirements (assignments, exams, projects, etc.).

To let the students have the theoretical information as well as practical information in the Air-Conditioning, Production and Automation and in the Renewable Energy.

Outcome 1

Identification of Complex Relationships

Learning to communicate complex relationships effectively is key to data analytics. Effective data visualization is imperative to understanding different data types and to communicate the presented complex relationships between the data.

Outcome 2

Oral and Written Communication

The outcomes were designed to incorporate overarching skills of critical thinking, quantitative reasoning, effective communication, and the understanding of historical, social and cultural diversity.

The student accurately observes and describes the elements of written communication.

The student recognizes the importance of context in written communication

The student describes diverse ways of constructing and delivering effective written communication.

Outcome 3

Laboratory and Field Studies

Field studies involve collecting data outside in the natural world.

Laboratory studies involve working inside, usually in a controlled environment.

Outcome 4

Scientific Knowledge

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

Outcome 5

Data Analyses

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

Outcome 6

Critical Thinking

1. Developing students' abilities to participate in idea sharing.
2. Enhancing the fundamental skills necessary for designing, implementing, and maintaining systems and laboratory projects.
3. Providing a broad appreciation for problems that may arise in professional practice, including teamwork, leadership, occupational safety, communication, professional ethics, and economic feasibility.
4. Ability to analyze, deduce, and solve problems in an engineering manner according to required standards.

6. Academic Staff

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7. Credits, Grading and GPA

Credits

Northern Technical University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 hrs student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

GRADING SCHEME مخطط الدرجات				
Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX – Fail	راسب - قيد المعالجة	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
Number Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.				

Calculation of the Cumulative Grade Point Average (CGPA)

1. The CGPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

CGPA of a 4-year B.Sc. degree:

$$\text{CGPA} = [(1^{\text{st}} \text{ module score} \times \text{ECTS}) + (2^{\text{nd}} \text{ module score} \times \text{ECTS}) + \dots] / 240$$

8. Curriculum/Modules

General

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 100	Democracy and Human Rights	33	17	2	B	
NTU 101	English Language Principles	33	17	2	B	
TEMO 100	Mathematics Principles	63	112	7	B	
TEMO 101	Electrotechnology	78	72	6	B	
TEMO 102	Workshop	93	57	6	C	
PM 100	Mechanics Engineering / Static	78	97	7	C	

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 102	Computer	63	12	3	B	
NTU 103	Arabic Language	48	2	2	B	
TEMO 103	Engineering Drawing	63	112	7	C	
PM 101	Engineering Mechanics/ Dynamics	93	107	8	C	
PM 102	Thermodynamics Principles	81	119	8	C	PM 201
PM 206	Occupational Safety	32	18	2	B	

General

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 200	Professional Ethics	32	18	2	S	
NTU 201	Computer Principles	48	27	3	B	
TEMO 200	Mathematics II	48	52	4	B	
PM 200	Fluid Mechanics Principles	78	72	6	C	
PM 202	Thermodynamics Laws	78	47	5	C	
PM 204	Refrigeration & Air Conditioning Principles	78	72	6	C	
PM 205	Strength of Materials	63	37	4	C	

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 202	Baath Party crimes	32	18	2	B	
NTU 203	English Language	32	18	2	B	
TEMO 201	Deveratives and Integrals	63	62	5	B	
PM 201	Dynamic Fluid Mechanics	78	72	6	C	
PM 203	Thermodynamics Cycles	78	72	6	C	
PM 206	Engineering Materials	48	77	4	C	
PM 209	Mechanical Drawing	63	37	5	C	

Renewable Energy

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 300	Engineering Analysis	63	87	6	B	
RE 300	Heat Transfer	93	107	8	C	
RE 301	Introduction to Renewable Energy	63	137	8	C	
RE 302	Gas dynamics	63	137	8	C	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 301	Machine Design	78	72	6.00	S	
PM 302	Computer Applications	63	37	4.00	B	
PM 303	Electrical and Electronic Engineering	78	72	6.00	B	
PM 304	Numerical Analysis	63	87	6.00	C	
RE 303	Biofuel	63	137	8.00	C	

Renewable Energy

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 400	Methodology of Scientific Research	32	68	4.00	B	
PM 400	Thermal Power Plants	78	97	7.00	C	
RE 401	Solar Photovoltaic Conversion	78	97	7.00	C	
RE 402	Renewable Energy	78	72	6.00	C	
RE 403	Thermal Systems Design	63	87	6.00	C	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
TEMO 400	Engineering and Industrial Management	48	102	6.00	S	
TEMO 401	Project	62	88	6.00	C	
PM 401	Computer Aided Design	63	87	6.00	C	
PM 402	Control systems	78	72	6.00	C	
RE 404	Combustion and Pollution Engineering	78	72	6.00	C	

Refrigeration and Air Conditioning

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
PM 300	Engineering Analysis	63	87	6.00	B	
RAC 300	Heat Transfer	93	107	8.00	C	
RAC 301	Refrigeration & Air Conditioning	108	92	8.00	C	
RAC 302	Drawing of Refrigeration & Air Conditioning Systems	48	152	8.00	C	

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	78	122	8.00	C	
PM 301	Machine Design	78	72	6.00	S	
PM 303	Electrical and Electronic Engineering	78	72	6.00	B	
PM 302	Computer Applications	63	37	4.00	B	
PM 304	Numerical Analysis	63	87	6.00	C	

Refrigeration and Air Conditioning

Semester 7 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
NTU 400	Methodology of Scientific Research	32	68	4.00	B	
PM 400	Thermal Power Plants	78	97	7.00	C	
RAC 401	Refrigeration Systems	93	82	7.00	C	
RAC 402	Introduction to Renewable Energy	63	87	6.00	C	
RAC 403	Principles of Air Conditioning Systems Design	78	72	6.00	C	

Semester 8 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
TEMO 400	Engineering and Industrial Management	48	102	6.00	S	
TEMO 401	Project	62	88	6.00	C	
PM 401	Computer Aided Design	63	87	6.00	C	
PM 402	Control systems	78	72	6.00	C	
RAC 404	Design of Air Conditioning Systems	78	72	6.00	C	

9. Contact

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