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

2024

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.

Academic program description form

University name: Northern Technical University

College/Institute: Engineering Technical College / Mosul

Scientific Department: Power Mechanics Techniques Engineering Department.

Name of the academic or professional program: Bachelor of Power Mechanical Techniques Engineering.

Name of final degree: Bachelor's degree in Power Mechanics Techniques Engineering.

School system: Bologna.

Date of preparing the description: 31/3/2024

Date of form completion: 3/4/2024

Signature:
Assist Prof. Dr. Mohammed S. Jarjees
Dean's Assistant for Scientific Affairs
Date: 3 /4/ 2024

Signature:
Dr. Ammar H. Suhail
Head of Department
Date: 3/4/ 2024

The file was audited by the
Quality Assurance and University Performance Manager

Signature:
Assist. Lecturer Noor Kahtan Younis
Date: 4 /4/2024

Authentication of the Dean

Signature:
Prof. Dr. Majid Kh. Najim
Dean
Date: 7/4/2024

وزارة التعليم العالي والبحث العلمي
الجامعة التقنية الشمالية
الكلية التقنية الهندسية/الموصل

1. View the program

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.

2. Program message

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.

3. Program Goals

The department aims to provide high-quality technical education, by keeping pace with rapid technical developments in the world, and responding to the necessities of change in the curriculum to lay the foundations of human development so that graduates acquire skills and experience that meet the needs of the market with the adoption of quality assurance and assurance. Therefore, the department aspires to graduate applied engineers who are familiar with modern applications and devices in the field of devices for the three branches mentioned above and who are able to:

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.

4. Program accreditation
Program of the Ministry of Higher Education and Scientific Research

5. Other external influences
None

6. Program structure

Program Structure	Number of Courses	Study Unit	Percentage	Notes*
Enterprise requirements	6	18	7.5	Secondary course
College requirements	7	44	18.3	Basic course
Department requirements	26	174	72.5	Basic course
summer training	2	4	1.7	Basic course
Others	None			

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

7. Program description

Level/Semester	course code	Course or course name	Credit hours	
First / First	NTU 100	English Language	Theoretical	2
First / First	PM 100	Engineering Mechanics/ Statics	Theoretical	3
First / First	TEMO 100	Mathematics Principles	Theoretical	3
First / First	TEMO 101	Electrical Technology	Theoretical	2
			Practical	2
First / First	TEMO 102	English Language	Practical	6

First / Second	PM 102	Thermodynamics Principles	Theoretical	3
			Practical	2
First / Second	NTU 101	Computer Principles	Theoretical	2
			Practical	2
First / Second	NTU 102	Human Rights & Democracy	Theoretical	2
First / Second	PM 101	Engineering Mechanics/ Dynamics	Theoretical	3
First / Second	TEMO 103	Engineering Drawing	Theoretical	2
			Practical	2
Second / Third	PM 200	Fluid Mechanics	Theoretical	4
			Practical	2
Second / Third	PM 201	Thermodynamics	Theoretical	4
			Practical	2
Second / Third	TEMO 200	Mathematics	Theoretical	3
Second / Third	NTU 200	Professional Ethics	Theoretical	2
Second / Third	PM 202	Mechanical Drawing	Theoretical	1
			Practical	3
Second / Fourth	PM 203	Strength of Materials	Theoretical	4
			Practical	2
Second / Fourth	PM 204	Engineering Materials	Theoretical	4
			Practical	2
Second / Fourth	PM 205	Refrigeration & Air Conditioning Principles	Theoretical	4
			Practical	2
Second / Fourth	NTU 201	Arabic Language	Theoretical	2
Second / Fourth	PM 206	Occupational Safety	Practical	2
Second / Fourth	TEMO 202	Systematic training	Practical	6
Air conditioning Branch				
Third / Five	RAC 300	Heat Transfer	Theoretical	3
			Practical	2
Third / Five	PM 300	Engineering Analysis	Theoretical	2
			Practical	1
Third / Five	RAC 301	Refrigeration & Air Conditioning	Theoretical	4
			Practical	2
Third / Five	RAC 302	Drawing of Refrigeration & Air	Practical	3

		Conditioning Systems		
Third / Six	PM 301	Machine Design	Theoretical	4
Third / Six	RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	Theoretical	2
			Practical	3
Third / Six	PM 303	Electrical and Electronic Engineering	Theoretical	3
			Practical	2
Third / Six	PM 302	Computer Applications	Theoretical	1
			Practical	3
Third / Six	PM 304	Numerical Analysis	Theoretical	2
			Practical	1
Third / Six	TEMO 300	Systematic training	Practical	6
Fourth / Seven	PM 400	Thermal Power Plants	Theoretical	2
			Practical	2
Fourth / Seven	RAC 401	Refrigeration Systems	Theoretical	3
			Practical	2
Fourth / Seven	RAC 402	Introduction to Renewable Energy	Theoretical	2
			Practical	2
Fourth / Seven	NTU 400	Methodology of Scientific Research	Theoretical	2
Fourth / Seven	RAC 403	Principles of Air Conditioning Systems Design	Theoretical	3
			Practical	2
Fourth / Eight	PM 401	Computer Aided Design	Theoretical	1
			Practical	3
Fourth / Eight	RAC 404	Design of Air Conditioning Systems	Theoretical	3
			Practical	2
Fourth / Eight	PM 402	Control systems	Theoretical	3
			Practical	2
Fourth / Eight	TEMO 400	Engineering and Industrial Management	Theoretical	2
Fourth / Eight	TEMO 401	Project	Theoretical	1
Renewable energy branch				
Third / Five	RE 300	Heat Transfer	Theoretical	3
			Practical	2
Third / Five	PM 300	Engineering	Theoretical	2

		Analysis	Practical	1
Third / Five	RE 301	Introduction to Renewable Energy	Theoretical	2
			Practical	2
Third / Five	RE 302	Gas dynamics	Theoretical	2
			Practical	2
Third / Six	PM 301	Machine Design	Theoretical	4
Third / Six	PM 302	Computer Applications	Theoretical	1
			Practical	3
Third / Six	PM 303	Electrical and Electronic Engineering	Theoretical	3
			Practical	2
Third / Six	RE 303	Biofuel	Theoretical	2
			Practical	2
Third / Six	PM 304	Numerical Analysis	Theoretical	2
			Practical	1
Third / Six	TEMO 300	Systematic training	Practical	6
Fourth / Seven	PM 400	Thermal Power Plants	Theoretical	2
			Practical	2
Fourth / Seven	RE 401	Solar Photovoltaic Conversion	Theoretical	2
			Practical	2
Fourth / Seven	RE 402	Renewable Energy	Theoretical	2
			Practical	2
Fourth / Seven	NTU 400	Methodology of Scientific Research	Theoretical	2
Fourth / Seven	RE 403	Thermal Systems Design	Theoretical	3
Fourth / Eight	PM 401	Computer Aided Design	Theoretical	1
			Practical	3
Fourth / Eight	RE 404	Combustion and Pollution Engineering	Theoretical	3
Fourth / Eight	PM 402	Control systems	Theoretical	3
			Practical	2
Fourth / Eight	TEMO 400	Engineering and Industrial Management	Theoretical	2
Fourth /Eight	TEMO 401	Project	Theoretical	1

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	
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		9	0
Assist Lecturer	Mechanical Eng.	Thermal	None		8	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															
				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
First / first	NTU 100	English Language	Supported			√					√	√		√	
First / first	PM 100	Engineering Mechanics/ Statics	Basic	√	√	√	√	√	√				√		√
First / first	TEMO 100	Mathematics Principles	Basic	√		√	√	√	√		√		√		√
First / first	TEMO 101	Electrical Technology	Basic		√	√	√			√		√	√		
First / first	TEMO 102	Workshop	Basic		√					√			√	√	
First / second	PM 102	Thermodynamics Principles	Basic	√	√	√	√	√		√	√	√	√		√
First / second	NTU 101	Computer Principles	Basic	√	√			√		√					√
First / second	NTU 102	Human Rights & Democracy	Supported									√	√	√	
First / second	PM 101	Engineering Mechanics/ Dynamics	Basic	√	√	√	√	√	√				√		√
First / second	TEMO 103	Engineering Drawing	Basic	√		√	√						√		
Second / third	PM 200	Fluid Mechanics	Basic	√	√	√	√	√		√	√	√	√		√
Second / third	PM 201	Thermodynamics	Basic	√	√	√	√	√		√	√	√	√		√
Second / third	TEMO 200	Mathematics	Basic	√		√	√	√	√		√		√		√
Second / third	NTU 200	Professional Ethics	Supported									√	√	√	

Second / third	PM 202	Mechanical Drawing	Basic	√		√	√						√		
Second /fourth	PM 203	Strength of Materials	Basic	√	√	√		√	√	√			√		
Second / fourth	PM 204	Engineering Materials	Basic	√	√	√		√	√	√			√		
Second / fourth	PM 205	Refrigeration & Air Conditioning Principles	Basic	√	√	√	√	√	√	√	√	√	√		√
Second / fourth	NTU 201	Arabic Language	Supported			√					√	√		√	
Second / fourth	PM 206	Occupational Safety	Basic		√					√			√	√	
Second / fourth	TEMO 202	Systematic training	Basic		√		√		√	√	√	√	√	√	√
Refrigeration & Air-conditioning Branch															
Third / five	RAC 300	Heat Transfer	Basic	√	√	√	√	√		√	√	√	√		√
Third / five	PM 300	Engineering Analysis	Basic	√		√	√	√	√		√		√		√
Third / five	RAC 301	Refrigeration & Air Conditioning	Basic	√	√	√	√	√	√	√	√	√	√		√
Third / five	RAC 302	Drawing of Refrigeration & Air Conditioning Systems	Basic	√	√	√	√	√	√	√	√	√	√		√
Third / six	PM 301	Machine Design	Supported	√	√	√		√	√	√			√		
Third / six	RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	Basic		√	√			√	√	√	√	√	√	√
Third / six	PM 303	Electrical and Electronic Engineering	Basic		√	√	√			√		√	√		
Third / six	PM 302	Computer Applications	Basic	√	√			√		√					√
Third / six	PM 304	Numerical Analysis	Basic	√		√	√	√	√		√		√		√
Third / six	TEMO 300	Systematic training	Basic		√		√		√	√	√	√	√	√	√

Forth / seven	PM 400	Thermal Power Plants	Basic	√	√	√	√	√		√	√	√	√	√	√
Forth / seven	RAC 401	Refrigeration Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / seven	RAC 402	Introduction to Renewable Energy	Basic	√		√	√	√	√	√	√	√	√	√	√
Forth / seven	NTU 400	Methodology of Scientific Research	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / seven	RAC 403	Principles of Air Conditioning Systems Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / eight	PM 401	Computer Aided Design	Basic	√	√			√		√					√
Forth / eight	RAC 404	Design of Air Conditioning Systems	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / eight	PM 402	Control systems	Basic	√	√	√	√	√		√		√	√		
Forth / eight	TEMO 400	Engineering and Industrial Management	Supported	√		√			√		√	√	√	√	√
Forth / eight	TEMO 401	Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Renewable energy branch																
Third / five	RE 300	Heat Transfer	Basic	√	√	√	√	√		√	√	√	√		√
Third / five	PM 300	Engineering Analysis	Basic	√		√	√	√	√		√		√		√
Third / five	RE 301	Introduction to Renewable Energy	Basic	√		√	√	√	√	√	√	√	√	√	√
Third / five	RE 302	Gas dynamics	Basic	√	√	√	√	√		√	√	√	√		√
Third / six	PM 301	Machine Design	Supported	√	√	√		√	√	√			√		
Third / six	PM 302	Computer Applications	Basic	√	√			√		√					√

Third / six	PM 303	Electrical and Electronic Engineering	Basic		√	√	√			√		√	√		
Third / six	RE 303	Biofuel	Basic	√		√	√	√	√	√	√	√	√	√	√
Third / six	PM 304	Numerical Analysis	Basic	√		√	√	√	√		√		√		√
Third / six	TEMO 300	Systematic training	Basic		√		√		√	√	√	√	√	√	√
Forth / seven	PM 400	Thermal Power Plants	Basic	√	√	√	√	√		√	√	√	√	√	√
Forth / seven	RE 401	Solar Photovoltaic Conversion	Basic	√		√	√	√	√	√	√	√	√	√	√
Forth / seven	RE 402	Renewable Energy	Basic	√		√	√	√	√	√	√	√	√	√	√
Forth / seven	NTU 400	Methodology of Scientific Research	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / eight	RE 403	Thermal Systems Design	Basic	√	√	√	√	√	√	√	√	√	√	√	√
Forth / eight	PM 401	Computer Aided Design	Basic	√	√			√		√					√
Forth / eight	RE 404	Combustion and Pollution Engineering	Basic			√	√		√	√	√	√	√	√	√
Forth / eight	PM 402	Control systems	Basic	√	√	√	√	√		√		√	√		
Forth / eight	TEMO 400	Engineering and Industrial Management	Basic	√		√			√		√	√	√	√	√
Forth / eight	TEMO 401	Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√

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

Northern Technical University

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

Northern Technical University

Eng. Technical College/ Mosul

Department of Power Mechanics Engineering Technologies

Refrigeration and Air-condition

بكالوريوس –ميكانيك القوى- فرع التبريد والتكييف

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
NTU 100	English Language Principles	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18
Description			
This module will be used to develop problem solving skills mainly speaking, reading, writing and listening skills and to understand English language as a foreign language through the application of many techniques. It is also important to understand the general principles of English language. This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. It is mainly the basic subject for writing and speaking English well. The module is to understand how to build a correct English sentence. It contains various grammatical rules and different vocabularies with using typical examples to explain the structure and the meaning of any word or expression. The module is valid and reliable to deal with many recognisable situations and how to use English in different contexts associating with life experiences.			

Module 2

Code	Course/Module Title	ECTS	Semester
PM 100	Mechanics Engineering / Static	8	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	107

Description

Statics, is a fundamental branch of Engineering Mechanics that deals with the analysis . and prediction of the behavior of objects at rest or in equilibrium. It provides the foundation for understanding the principles of forces, moments, and their effects on structures and systems. This branch of engineering mechanics is primarily concerned with .the study of particles and rigid bodies under the action of forces and moments

One of the main objectives of Engineering Mechanics/Statics is to enable engineers to calculate and predict the behavior of structures and systems under different loading conditions. This includes understanding the concepts of force vectors, moments, and couples, as well as the methods for resolving and combining these forces to determine their .resultant effects

Through theoretical study, problem-solving, and practical applications, students of Engineering Mechanics/Statics develop critical skills in analyzing and solving engineering problems. They learn to apply mathematical principles, physics, and engineering concepts to determine the forces and moments in structures and systems, and to ensure their stability .and safety

Module 3

Code	Course/Module Title	ECTS	Semester
TEMO 100	Mathematics Principles	8	One
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	122

Description

Mathematics offers a potent and common language. When presenting mathematical ideas, arguments, and conclusions both orally and in writing, students are expected to employ acceptable mathematical terminology and a variety of representational techniques.

Students should be able to:

1. employ proper mathematical language (notation, symbols, and terminology) in both spoken and written explanations in order to achieve the goals of mathematics.
2. Present information using the proper mathematical representations.
3. choose between various mathematical representational styles.
4. Express thorough, clear, and simple mathematical arguments.
5. utilizes a logical structure to arrange information.

Module 4

Code	Course/Module Title	ECTS	Semester
TEMO 101	Electrical technology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72
Description			
Electrical technology encompasses the study of electrical systems, circuits, devices, and their applications. It focuses on understanding the principles and theories behind electricity, electrical power generation, transmission, and distribution. This field involves the design, installation, maintenance, and troubleshooting of electrical systems in various industries, such as power generation, manufacturing, telecommunications, and transportation. Electrical technology professionals work with electrical equipment, control systems, and renewable energy technologies. They are skilled in analyzing electrical circuits, performing measurements, and ensuring safety and compliance with electrical codes and standards. A strong foundation in electrical technology enables individuals to contribute to the development and advancement of electrical systems, energy efficiency, and the integration of new technologies in the field.			

Module 5

Code	Course/Module Title	ECTS	Semester
TEMO 102	WORKSHOP	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
0	6	93	57
The workshop in an engineering college provides students with a valuable opportunity to acquire knowledge and practical skills in specific engineering fields. The workshop aims to enhance the application of theoretical concepts learned in classrooms and provides an interactive learning environment. It includes instructional sessions, hands-on exercises, problem-solving, and practical application projects. Students collaborate in teams to achieve specific goals and develop effective projects. The workshop promotes communication and collaboration among students, encourages critical thinking, and problem-solving in an engineering simulation environment. The workshop is a valuable chance for students to develop their technical and practical skills and enhance their engineering capabilities for the future.			

Module 6

Code	Course/Module Title	ECTS	Semester
PM 102	Thermodynamics principles	8	2
(Class (hr/w	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	5	108	92
Description			
In this thermodynamics module, students will explore the foundational concepts that form the basis of this field of study. They will examine energy interactions in thermal systems and measure relevant properties. Key concepts covered include force, energy, work, thermal equilibrium, and temperature. The workshop aims to develop a clear understanding of thermodynamics and its application in engineering. Students will also learn about the practical implications of thermodynamics, such as the laws of heat transfer and their applications in engine cycles. Additionally, they will explore the functioning of refrigerators and heat pumps based on the reversed Carnot cycle, which requires external work to transfer heat from a lower temperature body to a higher temperature body.			

Module 7

Code	Course/Module Title	ECTS	Semester
NTU 101	COMPUTER PRINCIPLES	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Computer Principles is an introductory course that provides a comprehensive understanding of the fundamental concepts and principles of computer science. The course covers topics such as computer architecture, data representation, algorithms, programming languages, operating systems, and computer networks. Students will learn about the basic components of a computer system, how data is stored and processed, and the principles behind efficient and reliable computer operations. The course also explores the role of computers in society, ethical considerations in computing, and emerging trends in the field. Through this course, students will develop a solid foundation in computer principles and gain the necessary skills to pursue further studies or careers in computer science			

Module 8

Code	Course/Module Title	ECTS	Semester
NTU 102	Human Rights & Democracy	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	32	18
Description			

The Human Rights and Democracy course provides a comprehensive understanding of the basic concepts and principles of human rights and democratic systems. The course focuses on studying the values and principles that govern and protect human rights, in addition to understanding the importance of democracy in organizing governance and ensuring citizens' participation in decision-making. The course addresses topics such as equality, freedom of expression, women's and children's rights, minority rights, workers' and refugees' rights, and the foundations and institutions of democracy. The course aims to enhance legal and ethical awareness among students, and enable them to understand the importance of human rights and democratic participation in building a just society.

Module 9

Code	Course/Module Title	ECTS	Semester
PM 101	Eng. Mechanics/ Dynamics	8	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	107

Dynamics is a branch of Engineering Mechanics that focuses on the study of objects in motion and the forces that cause that motion. It builds upon the principles of statics and expands them to analyze the behavior of objects subjected to acceleration, velocity, and displacement. This field is concerned with understanding and predicting the motion of .particles and rigid bodies, as well as the forces and energy associated with their motion

The primary goal of Engineering Mechanics/Dynamics is to provide engineers with a comprehensive understanding of how objects move and interact under the influence of forces and moments. By studying dynamics, engineers can design and analyze systems such as machines, vehicles, and structures to ensure their optimal performance, efficiency, .and safety

In this subject, students explore various topics, including the kinematics and kinetics of particles and rigid bodies. Kinematics deals with the description of motion, focusing on concepts such as displacement, velocity, and acceleration. Kinetics, on the other hand, .focuses on the forces and torques acting on objects, leading to their motion

Module 10

Code	Course/Module Title	ECTS	Semester
TEMO 103	ENGINEERING DRAWING	6	2
Class (hr/w)	) Lect/Lab./Prac./Tutor	SSWL (hr/sem	USWL (hr/sem)
2	2	63	87
DESCRIPTION			

This course description provides a necessary summary of the most important characteristics :of the course as follows

Definition of engineering drawing orders and its uses - the concept of engineering programs in engineering drawing and their fields - engineering drawing tools. Types of engineering lines and their uses, exercises + function. Drawing geometric shapes on computer) rectangular, parallelepiped, square, the circle (exercises + function. Dimensions and how to put them on the drawing. Principles of projection in engineering drawing (simple shapes). Cartesian projection on three levels. uncomplicated shapes, medium complexity, Complex geometric shapes

Module 11

Code	Course/Module Title	ECTS	Semester
PM 200	Fluid Mechanics	8	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	3	108	92

Description
Fluid Mechanics, the branch of science that deals with the study of fluids (liquids and gasses) in a state of rest or motion, is an important subject of Civil, Mechanical and Chemical Engineering. Its various branches are fluid statics, fluid kinematics and fluid dynamics. A substance that flows is called a fluid. All liquid and gaseous substances are considered to be fluids. Water, oil, and others are very important in our day-to-day life as they are used for various applications. For instance, water is used for generation of electricity in hydroelectric power plants and thermal power plants, water is also used as the coolant in nuclear power plants, oil is used for the lubrication of automobiles etc. Fluid Mechanics is the branch of science that studies the behavior of fluids when they are in state of motion or rest. Whether the fluid is at rest or motion, it is subjected to different forces and different climatic conditions and it behaves in these conditions as per its physical properties. Fluid mechanics deals with three aspects of the fluid: static, kinematics, and dynamics aspects.

Module 12

Code	Course/Module Title	ECTS	Semester
PM 201	Thermodynamics	8	3
(Class (hr/w	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
4	4	123	5
Description			
Thermodynamics is a branch of physics that deals with the study of energy and its transformations in various systems. It focuses on understanding the behavior of heat, work, and energy flow. Thermodynamics encompasses fundamental principles such as the laws of thermodynamics, which describe the relationships between energy, heat, and work. It explores concepts like temperature, pressure, entropy, and equilibrium. Thermodynamic principles find applications in various fields, including engineering, chemistry, and environmental science. By analyzing thermodynamic processes and systems, scientists and engineers can optimize energy utilization, design efficient engines and power plants, and understand the behavior of substances under different conditions.			

Module 13

Code	Course/Module Title	ECTS	Semester
TEMO 200	Mathematics	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	1	63	87

Description

The proficiencies of Understanding, Fluency, Problem Solving and Reasoning are fundamental to learning mathematics and working mathematically and are applied across all three strands Number and Algebra, Measurement and Geometry, and Statistics and Probability.

Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures. Students make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they:

- connect related ideas
- represent concepts in different ways
- identify commonalities and differences between aspects of content
- describe their thinking mathematically
- interpret mathematical information

Module 14

Code	Course/Module Title	ECTS	Semester
NTU 200	Professional Ethics	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18
الوصف			
The professional ethics subject is concerned with studying the ethical concepts and principles that are related to the practice of different professions. Students are guided to understand ethics and core values in the business environment and apply them in real-life situations. The curriculum includes analyzing ethical issues and identifying different ethical frameworks that can be used to make sound ethical decisions. Relevant professional laws and codes and their role in guiding the behavior of professionals are also explored. Enhances the skills necessary for ethical communication and building sound professional relationships. Social and environmental responsibility and technology challenges and innovations in the context of careers are also highlighted different. The course aims to develop ethical awareness and the ability to make sound ethical decisions in the field of the profession.			

Module 15

Code	Course/Module Title	ECTS	Semester
PM 202	Mechanical drawing	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	87
Description			
The course on Mechanical Drafting provides comprehensive training on various aspects of drafting and design in mechanical engineering. It covers topics such as the use of AutoCAD system for mechanical drafting, screw threads, bolts, nuts, keys, pin and cotter joints, riveting joints, welding symbols, gear drawings, assembly drawings, detail drawings, and coupling, bearing, and pipe joints. The course includes practical examples and exercises that allow students to gain hands-on experience in drawing each component. By completing this course, students can enhance their knowledge and skills in mechanical engineering drafting, enabling them to create accurate and detailed drawings for various mechanical components and systems.			

Module 16

Code	Course/Module Title	ECTS	Semester
PM 203	Strength of Materials	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	92
Description			
The field of strength of materials, also known as mechanics of materials, focuses on analyzing the stresses and strains experienced by structural components like beams, columns, and shafts. Engineers use different techniques to determine how these structures will respond to loads and potential failure modes. This analysis takes into consideration material properties, including yield strength, ultimate strength, Young's modulus, and Poisson's ratio. By understanding these properties, engineers can predict the behavior of a structure and design it to withstand the expected forces and stresses. Strength of materials is essential in ensuring the structural integrity and safety of engineering projects.			

Module 17

Code	Course/Module Title	ECTS	Semester
PM 204	Eng. Materials	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	107

Description
Engineering materials are vital substances used in various engineering applications. They possess specific physical and chemical properties that make them suitable for specific purposes. These materials can be classified into metals, ceramics, polymers, composites, and specialized materials. Metals are versatile with excellent strength, ductility, and conductivity. Steel, aluminum, copper, and titanium are commonly used metals in engineering. Ceramics are hard, brittle materials with high melting points. They exhibit resistance to heat, wear, and corrosion. Alumina, silicon carbide, and porcelain are examples of ceramics. Polymers, also known as plastics, are lightweight materials with flexibility and corrosion resistance. They can be easily molded into various shapes. Polyethylene, polystyrene, and PVC are commonly used polymers. Composites are engineered materials made from different constituent materials, providing enhanced properties such as high strength and low weight. Fiberglass and carbon fiber reinforced polymers are examples of composites. Specialized materials include semiconductors for electronic devices, superconductors for energy applications, and biomaterials for medical implants. Each material type has unique characteristics and is selected based on specific engineering requirements. Overall, understanding engineering materials is essential for selecting the right materials for various applications and ensuring optimal performance in engineering projects.

Module 18

Code	Course/Module Title	ECTS	Semester
PM 205	Refrigeration & Air Conditioning Principles	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	92
Description			
The Refrigeration and Air Conditioning Principles module provides students with a comprehensive understanding of the principles, components, and applications of refrigeration and air conditioning systems. This module combines theoretical knowledge with practical skills. Throughout the module, students delve into the fundamental principles of thermodynamics, heat transfer, and psychrometrics, which form the basis of refrigeration and air conditioning processes. They learn about the various components involved in these systems, including compressors, condensers, evaporators, expansion devices, and controls, and understand their functions and interactions. Hands-on activities and laboratory sessions enable students to calculate and analyze different air conditioning processes and refrigeration systems. The module encourages the students to communicate effectively and work collaboratively in teams, simulating real-world scenarios they may encounter in the field.			

Module 19

Code	Course/Module Title	ECTS	Semester
NTU 201	Arabic language	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18
الوصف			
The description for the Arabic language is: Arabic is a rich and diverse language spoken by millions of people around the world. It is the official language of over 20 countries and holds great cultural and historical significance. With its unique alphabet, intricate grammar, and beautiful calligraphy, Arabic offers a fascinating linguistic journey. Whether you are interested in exploring the language for academic, professional, or personal reasons, learning Arabic opens doors to understanding Arab culture, literature, and society. From basic greetings to advanced conversational skills, mastering Arabic provides opportunities for communication, travel, and career prospects. Embrace the beauty of Arabic as you embark on a journey of language discovery and cultural immersion.			

Module 20

Code	Course/Module Title	ECTS	Semester
PM 206	Occupational Safety	4	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	2	32	68

الوصف

Occupational safety is a field of study that focuses on achieving a safe and healthy work environment for workers in all industries and sectors. Scientists and researchers in this field aim to analyze and evaluate potential risks in the workplace and develop and implement strategies.

And systems to prevent and control these risks. Areas of study in occupational safety include hazard identification, risk assessment, design and implementation of safety and prevention procedures, training and education, accident and emergency management, and safety legislation and standards. Scientists and professionals in this field aim to promote a culture of safety and raise awareness of the importance of occupational safety among employees and the business industry in general. Occupational safety is an essential part of effective risk management and contributes to improving...

Module 21

Code	Course/Module Title	ECTS	Semester
(RAC 300)	Heat Transfer	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	7	107	93

Description

Heat transfer describes the flow of heat (thermal energy) due to temperature differences and the subsequent temperature distribution and changes. The study of transport phenomena concerns the exchange of momentum, energy, and mass in the form of conduction, convection, and radiation. These processes can be described via mathematical formulas. The fundamentals for these formulas are found in the laws for conservation of momentum, energy, and mass in combination with constitutive laws, relations that describe not only the conservation but also the flux of quantities involved in these phenomena. For that purpose, differential equations are used to describe the mentioned laws and constitutive relations in the best way possible. Solving these equations is an effective way to investigate systems and predict their behavior.

Heat transfer science is important in engineering application to determination of the rate of heat transfer at specified temperature difference .To estimate the cost ,the feasibility ,and the size of equipment necessary to transfer a specified amount of heat in a given time a detailed heat transfer analysis must be made .The dimensions of boilers, heaters ,refrigerators ,and heat exchangers depend not only on amount of heat to be transmitted but also on the rate at which the heat is to be transferred under given conditions .The successful operation of equipment components such as turbine blades or the walls of combustion chambers depends on the possibility of cooling certain metal parts by continuously removing heat from surface at rapid rate .A heat transfer analysis must also be made in the design of electric machines ,transformers and bearings to avoid conditions that will cause overheating and damage the equipment .These examples show the importance to understand the basic modes of heat transfer . It is necessary to know the three modes of heat transfer: conduction, convection, and radiation, and to qualitatively understand the mechanism of these modes .

Module 22

Code	Course/Module Title	ECTS	Semester
PM 300	Engineering Analysis	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/ sem)
2	2	63	87

Description

Engineering Analysis is a field of study that focuses on the application of mathematical and computational methods to solve complex engineering problems. It involves the use of various mathematical techniques, numerical methods, and computer simulations to analyze and interpret data, make informed decisions, and optimize engineering designs and processes.

In Engineering Analysis, students learn fundamental principles and concepts of mathematics, including calculus, linear algebra, and differential equations. They develop skills in using numerical methods, such as interpolation, numerical integration, and numerical solution of differential equations, to solve engineering problems.

Students also gain proficiency in using computational tools and software, such as MATLAB, to perform mathematical modeling, data analysis, and simulations. They learn to analyze and interpret the results obtained from numerical calculations and simulations, and apply these findings to real-world engineering applications.

Engineering Analysis plays a crucial role in various engineering disciplines, including mechanical engineering, civil engineering, electrical engineering, and aerospace engineering. It provides engineers with the tools and techniques to analyze and optimize designs, predict system behavior, and make informed engineering decisions.

By studying Engineering Analysis, students develop critical thinking skills, problem-solving abilities, and a strong foundation in mathematical and computational methods, which are essential for success in the field of engineering.

Module 23

Code	Course/Module Title	ECTS	Semester
RAC 301	Refrigeration & Air Conditioning	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	92

Description
This subject focuses on HVAC & Refrigeration Systems, covering equipment like piping, ducting, fans, pumps, etc. It includes thermal load estimation and food preservation. By the end of the course, students will: Review refrigeration storage considerations. Understand heat transfer for maintaining comfortable conditions in heating systems. Understand heat transfer for maintaining comfortable conditions in cooling systems. Estimate cooling capacity for rooms, buildings, and cooling coils. Describe the functions of an Air Handling Unit (AHU). Discuss the importance of studying air transmission in air conditioning. Learn about airflow, fan laws, and the interaction between fans and ducts. Understand balance points and general rules for duct design. Classify duct and pipe systems. Familiarize with duct and pipe design methods. This course equips students with the necessary knowledge to comprehend and work with HVAC & Refrigeration Systems, enabling them to analyze and design systems effectively.

Module 24

Code	Course/Module Title	ECTS	Semester
RAC 302	Drawing of Refrigeration & Air Conditioning Systems	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	3	48	152

Description
The course "Drawing of Refrigeration & Air Conditioning Systems" focuses on providing students with the necessary skills to effectively create technical drawings and diagrams related to refrigeration and air conditioning systems. Through this course, students will learn the principles of drawing, including projection methods, dimensioning, and annotations. The course covers various topics such as drawing components of refrigeration and air conditioning systems, including compressors, condensers, evaporators, and refrigerant lines. Students will also learn about drawing ventilation systems, ductwork, and air distribution components. Additionally, the course emphasizes the use of computer-aided design (CAD) software and tools for creating accurate and professional drawings. Students will gain practical experience in creating detailed and precise drawings that adhere to industry standards and practices. By the end of the course, students will be equipped with the necessary skills to produce clear and comprehensive drawings of refrigeration and air conditioning systems, enabling them to effectively communicate design ideas and contribute to the field of HVAC engineering.

Module 25

Code	Course/Module Title	ECTS	Semester
RAC 303	Maintenance of Refrigeration & Air Conditioning Systems	8	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	122
Description			
A course on Maintenance of Refrigeration & Air Conditioning Systems s the following sections: 1. Introducing students to defined the tools, materials and instruments 2. To understand the Maintenance of domestic refrigerator 3. To help the student to maintenance Windows air-conditioner 4. To explain to maintenance disassembly compressor of automobile air conditioning equipment 5. To maintenance Remote Split units 6 To maintenance fans of motors 7. Maintenance of water pumps 8 To explain the student to clean and Maintenance of cooling towers			

Module 26

Code	Course/Module Title	ECTS	Semester
PM 301	Machine Design	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	72

Description

Machine design is a complex and intricate process that involves carefully selecting the appropriate materials, shapes, sizes, and arrangements of mechanical components to ensure optimal performance of the intended machine. It encompasses both the creation of innovative new machines and the improvement of existing ones.

In this comprehensive module, students will delve into the world of machine design, acquiring a deep understanding of the mathematical and scientific principles underlying mechanics, materials science, manufacturing techniques, and design processes. They will explore various topics and gain the ability to apply their knowledge and skills in practical scenarios.

Through this course, students will develop a strong foundation in conceptualizing, modeling, and analyzing machines, enabling them to tackle real-world challenges in the field. They will gain proficiency in identifying suitable materials, designing robust and efficient mechanical elements, and ensuring the machine meets the required specifications. By honing their expertise in machine design, students will be equipped to contribute to technological advancements and innovation in diverse industries.

Module 27

Code	Course/Module Title	ECTS	Semester
PM 303	Electrical and Electronic Engineering	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	5	78	72

Description
Electrical and Electronic Engineering is a dynamic and rapidly evolving field that focuses on the study, design, and application of electrical systems, devices, and technologies. This discipline plays a critical role in shaping the modern world, as it encompasses a wide range of areas, including power generation and distribution, communication systems, electronics, control systems, and renewable energy. In Electrical and Electronic Engineering, students delve into the fundamental principles of electricity, circuits, and electromagnetism. They learn how to analyze and design electrical systems, apply mathematical and scientific principles to solve complex problems, and utilize advanced tools and software for simulation and modeling. The field emphasizes hands-on experience through laboratory work, where students gain practical skills in building, testing, and troubleshooting electrical circuits and devices. They also explore emerging technologies, such as renewable energy sources and sustainable power systems, to address the growing demand for cleaner and more efficient energy solutions. Through their studies, students develop a strong foundation in engineering principles, critical thinking, problem-solving, and project management. They become adept at designing, implementing, and maintaining electrical and electronic systems that are safe, reliable, and sustainable. Graduates of Electrical and Electronic Engineering programs find diverse career opportunities in industries such as power generation, telecommunications, electronics, automation, and research and development.

Module 28

Code	Course/Module Title	ECTS	Semester
PM 302	Computer Applications	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	37
Description			
The Computer Applications in this level provides students with a comprehensive fundamental knowledge for modeling the mechanical different parts in 2D & 3D. And make them understanding the definition, significance, calculation, analysis, create, design and inert of [Fasteners {Nuts, Screws, Washer}; {Shaft generators: Cylinder, Wrench, thread, gear, chamfer and fillet}; {Shaft Component: Roller Bearing, (Key: Parallel and Woodruff Key), Seals}; {Drill Bushing: Assembly Drawing}; { Springs: Compression, Extension and Torsion}; {Deflection Line}; {moment of inertia}]. As well as identifying and description the icons components of a typical insertion of different mechanical parts into different mechanical structures. Also enhancing and developing the students capability for following the right steps in mechanical design and analysis the different mechanical parts into different mechanical structures with simulating the strength of material important parameters for accurate design performing.			

Module 29

Code	Course/Module Title	ECTS	Semester
PM 304	Numerical Analysis	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/ sem)
2	2	63	87
Description			
rical Analysis is a field of study that focuses on developing and analyzing algorithms for solving mathematical problems using numerical methods. It involves the use of computational techniques to approximate solutions to complex mathematical equations and problems that are difficult or impossible to solve analytically. s course, students will learn fundamental numerical algorithms and techniques such as interpolation, numerical integration, numerical solution of differential equations, and numerical linear algebra. They will gain a solid understanding of the theoretical principles behind these methods and develop practical skills in implementing them using programming languages such as MATLAB. gh theoretical lectures, practical exercises, and computer-based assignments, students will learn how to analyze the accuracy and efficiency of numerical methods, and how to choose appropriate algorithms for specific problem scenarios. This course will equip students with the necessary tools to solve a wide range of engineering and scientific problems that involve complex mathematical computations.			

Module 30

Code	Course/Module Title	ECTS	Semester
PM 400	Thermal Power Plants	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	97

Description

A course on Thermal Power Plants . Includes the following sections:

Introducing students to thermodynamics by studying thermal systems in terms of energy interactions with its immediate surroundings. and measure differences in the appropriate properties of both the system and its surroundings and applications in engineering fields

2. To understand the fuel and combustion, show the combustion is perfect or in perfect

3. To study the steam turbine. By using the single or double blade and calculation the efficiency of blades

4. To explain steam condenser explain the types of condenser

5. To study the types of pumps by state the law that use in pumps and the advantage and disadvantage of pumps

6. To study the water treatment, explain the method of water treatment (thermal, chemical, mechanical)

7. How to use the steam tables to find the properties (enthalpy, entropy, ect.)

8. How to use the combustion charts.

Module 31

Code	Course/Module Title	ECTS	Semester
RAC 401	Refrigeration Systems	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	82
Description			
This model aims to enhance the student's knowledge of the principles of vapor compression refrigeration systems and their analysis, also studying types of refrigeration units and cryogenic refrigeration. As well as the refrigeration system is a group of components used for cooling and sometimes heating. In most cases, it involves the use of a thermodynamic cycle in which there is a flow of heat from one place to another. In simpler terms, it's a system that can cool and maintain temperatures within a given range. It's usually mechanical but can also be achieved by using simple means such as using water or any other liquid to lower the temperature. In this course, we will learn about different types of refrigeration systems and their functions. This will teach us how refrigerators work.			

Module 32

Code	Course/Module Title	ECTS	Semester
RAC 402	Introduction to Renewable Energy	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	87

Description
A course on Introduction to renewable energy . Includes the following sections: 1. demonstrate an ability to use critical thinking and problem-solving skills to evaluate business energy use and how and when to apply renewable energy solutions 2. demonstrate an understanding of, and assess the obstacles associated with implementation of renewable energy systems 3. evaluate the advantages, limitations and potential of various clean energy sources for buildings and businesses 4. demonstrate an understanding and familiarity with engineering and financial aspects of projects 5. demonstrate an understanding and familiarity with the regulatory aspects of renewable energy projects 6. demonstrate an understanding and familiarity with the State policies, financing and utility-led programs in CT.

Module 33

Code	Course/Module Title	ECTS	Semester
NTU 400	Methodology of Scientific Research	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	68

Description

The description for the Methodology of Scientific Research is:

The Methodology of Scientific Research refers to the systematic and rigorous approach employed in conducting scientific investigations and acquiring knowledge. It encompasses the principles, techniques, and procedures used to design, implement, and analyze scientific studies. This field of study focuses on the various methods and tools employed in gathering and interpreting data, ensuring the reliability and validity of research findings. Methodology of Scientific Research involves making informed decisions regarding research design, selecting appropriate data collection methods, and applying statistical techniques for data analysis. It also includes ethical considerations in research, such as protecting participants' rights and ensuring research integrity. A solid understanding of the Methodology of Scientific Research is essential for researchers and scientists to generate credible and reliable results, contribute to the advancement of knowledge, and address complex research questions in diverse disciplines.

Module 34

Code	Course/Module Title	ECTS	Semester
RAC 403	Principles of Air Conditioning Systems Design	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	72
Description			
The Principles of Air Conditioning Systems Design course provides a comprehensive understanding of the design principles and methodologies involved in creating efficient and effective air conditioning systems. Students will learn about the fundamentals of thermodynamics, heat transfer, psychrometrics, and fluid mechanics as they relate to air conditioning. The course covers topics such as load calculations, equipment selection, duct design, refrigeration cycles, system components, and control strategies. Students will gain practical experience through hands-on design projects, simulations, and analysis of real-world case studies. The course also emphasizes energy efficiency, sustainability, indoor air quality, and environmental considerations in air conditioning design. By the end of the course, students will have the knowledge and skills to design air conditioning systems that meet the comfort requirements of various applications while minimizing energy consumption and environmental impact. This course prepares students for careers in HVAC engineering, building design, and sustainable construction.			

Module 35

Code	Course/Module Title	ECTS	Semester
PM 401	Computer Aided Design	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	87
Description			
Studying AutoCAD and ANSYS applications provides students with essential skills for computer-aided design (CAD) and engineering analysis. AutoCAD, a leading CAD software, enables students to create precise 2D and 3D models, facilitating the design process for various industries such as architecture, engineering, and manufacturing. Through AutoCAD, students learn to transform conceptual ideas into detailed and accurate digital representations, enhancing their spatial visualization and technical drawing abilities. On the other hand, ANSYS, a powerful simulation software suite, equips students with the tools to analyze and optimize engineering designs. By studying ANSYS, students can perform structural, thermal, fluid dynamics, and electromagnetics analyses, enabling them to evaluate design performance, predict behavior, and make informed engineering decisions. Together, mastering AutoCAD and ANSYS empowers students to effectively design and analyze complex systems, enhancing their problem-solving skills and preparing them for careers in engineering and related fields.			

Module 36

Code	Course/Module Title	ECTS	Semester
RAC 404	Design of Air Conditioning Systems	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	72
Description			
The Design of Air Conditioning Systems course offers a comprehensive exploration of designing efficient and effective air conditioning systems for various applications. Students will learn about the principles of thermodynamics, heat transfer, and psychrometrics to understand the fundamental concepts underlying air conditioning. The course covers topics such as load calculations, equipment selection, duct design, refrigeration cycles, and control systems. Students will gain hands-on experience through design projects and simulations, allowing them to apply their knowledge to real-world scenarios. The course also addresses energy efficiency, sustainability, indoor air quality, and environmental considerations in air conditioning design. Upon completion, students will possess the skills and knowledge necessary to design and optimize air conditioning systems that provide optimal comfort, energy efficiency, and environmental sustainability. This course prepares students for careers in HVAC engineering, building design, and energy management.			

Module 37

Code	Course/Module Title	ECTS	Semester
PM 402	Control systems	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72

Description

Control systems involve the application of various techniques and technologies to measure, monitor, and control physical variables and processes in industrial, engineering, and scientific applications. This field encompasses the design, implementation, and optimization of systems that ensure accurate and reliable measurements, as well as effective control of processes.

Measurement and Control Systems play a crucial role in industries such as manufacturing, power generation, automation, and instrumentation. They involve sensors, transducers, data acquisition systems, signal processing techniques, and control algorithms. These systems enable precise measurement of variables like temperature, pressure, flow rate, and level, and utilize control strategies to regulate and optimize processes.

Understanding Measurement and Control Systems requires knowledge of sensors, data acquisition methods, signal conditioning, measurement principles, control theory, and instrumentation. Professionals in this field need to analyze system behavior, design control algorithms, implement hardware and software components, and troubleshoot issues.

This field is constantly evolving with advancements in technology, such as the integration of Internet of Things (IoT), machine learning, and cloud computing. Measurement and Control Systems are vital for ensuring efficiency, safety, and reliability in various industries, making it a critical area of study for engineers and scientists.

Module 38

Code	Course/Module Title	ECTS	Semester
TEMO 400	Engineering and Industrial Management	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	102

Description

The subject aims to encourage students' participation in the management exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple assumptions involving some sampling activities that are interesting to the students.

The results of this module study will leads to:

1. Enable the student to use knowledge to manage the different purposes organizations.
2. Enable engineers to layout the administrative and production organization of industrial enterprises.
3. Enable engineers to layout the network planning for the different engineering processes and finding the typical path of the minimum duration that offers the best quality of the production.
4. Enable engineers to study the feasibility of the industrial processes which leads to successful of the production.
5. Enhance the student skills in management by giving the typical solution on the assumed problem.

Modules Catalogue | 2023-2024 | دليل المواد الدراسية

Northern Technical University

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

Northern Technical University
Eng. Technical College/ Mosul
Department of Power Mechanics Engineering Technologies
Renewable Energy

بكالوريوس ـ ميكانيك القوى ـ فرع الطاقة المتجددة

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
NTU 100	English Language Principles	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18

Description
This module will be used to develop problem solving skills mainly speaking, reading, writing and listening skills and to understand English language as a foreign language through the application of many techniques. It is also important to understand the general principles of English language. This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. It is mainly the basic subject for writing and speaking English well. The module is to understand how to build a correct English sentence. It contains various grammatical rules and different vocabularies with using typical examples to explain the structure and the meaning of any word or expression. The module is valid and reliable to deal with many recognizable situations and how to use English in different contexts associating with life experiences.

Module 2

Code	Course/Module Title	ECTS	Semester
PM 100	Mechanics Engineering / Static	8	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	107

Description

Statics, is a fundamental branch of Engineering Mechanics that deals with the analysis . and prediction of the behavior of objects at rest or in equilibrium. It provides the foundation for understanding the principles of forces, moments, and their effects on structures and systems. This branch of engineering mechanics is primarily concerned with .the study of particles and rigid bodies under the action of forces and moments

One of the main objectives of Engineering Mechanics/Statics is to enable engineers to calculate and predict the behavior of structures and systems under different loading conditions. This includes understanding the concepts of force vectors, moments, and couples, as well as the methods for resolving and combining these forces to determine their .resultant effects

Through theoretical study, problem-solving, and practical applications, students of Engineering Mechanics/Statics develop critical skills in analyzing and solving engineering problems. They learn to apply mathematical principles, physics, and engineering concepts to determine the forces and moments in structures and systems, and to ensure their stability .and safety

Module 3

Code	Course/Module Title	ECTS	Semester
TEMO 100	Mathematics Principles	8	One
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	122

Description
Mathematics offers a potent and common language. When presenting mathematical ideas, arguments, and conclusions both orally and in writing, students are expected to employ acceptable mathematical terminology and a variety of representational techniques. Students should be able to: 1. employ proper mathematical language (notation, symbols, and terminology) in both spoken and written explanations in order to achieve the goals of mathematics. 2. Present information using the proper mathematical representations. 3. choose between various mathematical representational styles. 4. Express thorough, clear, and simple mathematical arguments. 5. utilizes a logical structure to arrange information.

Module 4

Code	Course/Module Title	ECTS	Semester
TEMO 101	Electrical technology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72
Description			
Electrical technology encompasses the study of electrical systems, circuits, devices, and their applications. It focuses on understanding the principles and theories behind electricity, electrical power generation, transmission, and distribution. This field involves the design, installation, maintenance, and troubleshooting of electrical systems in various industries, such as power generation, manufacturing, telecommunications, and transportation. Electrical technology professionals work with electrical equipment, control systems, and renewable energy technologies. They are skilled in analyzing electrical circuits, performing measurements, and ensuring safety and compliance with electrical codes and standards. A strong foundation in electrical technology enables individuals to contribute to the development and advancement of electrical systems, energy efficiency, and the integration of new technologies in the field.			

Module 5

Code	Course/Module Title	ECTS	Semester
TEMO 102	WORKSHOP	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
0	6	93	57
The workshop in an engineering college provides students with a valuable opportunity to acquire knowledge and practical skills in specific engineering fields. The workshop aims to enhance the application of theoretical concepts learned in classrooms and provides an interactive learning environment. It includes instructional sessions, hands-on exercises, problem-solving, and practical application projects. Students collaborate in teams to achieve specific goals and develop effective projects. The workshop promotes communication and collaboration among students, encourages critical thinking, and problem-solving in an engineering simulation environment. The workshop is a valuable chance for students to develop their technical and practical skills and enhance their engineering capabilities for the future.			

Module 6

Code	Course/Module Title	ECTS	Semester
PM 102	Thermodynamics principles	8	2
(Class (hr/w	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	5	108	92

Description
In this thermodynamics module, students will explore the foundational concepts that form the basis of this field of study. They will examine energy interactions in thermal systems and measure relevant properties. Key concepts covered include force, energy, work, thermal equilibrium, and temperature. The workshop aims to develop a clear understanding of thermodynamics and its application in engineering. Students will also learn about the practical implications of thermodynamics, such as the laws of heat transfer and their applications in engine cycles. Additionally, they will explore the functioning of refrigerators and heat pumps based on the reversed Carnot cycle, which requires external work to transfer heat from a lower temperature body to a higher temperature body.

Module 7

Code	Course/Module Title	ECTS	Semester
NTU 101	COMPUTER PRINCIPLES	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Computer Principles is an introductory course that provides a comprehensive understanding of the fundamental concepts and principles of computer science. The course covers topics such as computer architecture, data representation, algorithms, programming languages, operating systems, and computer networks. Students will learn about the basic components of a computer system, how data is stored and processed, and the principles behind efficient and reliable computer operations. The course also explores the role of computers in society, ethical considerations in computing, and emerging trends in the field. Through this course, students will develop a solid foundation in computer principles and gain the necessary skills to pursue further studies or careers in computer science			

Module 8

Code	Course/Module Title	ECTS	Semester
NTU 102	Human Rights & Democracy	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	32	18

Description
مادة حقوق الإنسان والديمقراطية تقدم فهمًا شاملاً للمفاهيم والمبادئ الأساسية لحقوق الإنسان والنظم الديمقراطية. تركز المادة على دراسة القيم والمبادئ التي تحكم حقوق الإنسان وحمايتها، بالإضافة إلى فهم أهمية الديمقراطية في تنظيم الحكم وضمان مشاركة المواطنين في صنع القرارات. يتناول المقرر مواضيع مثل المساواة، وحرية التعبير، وحقوق المرأة والطفل، وحقوق الأقليات، وحقوق العمال واللاجئين، وأسس ومؤسسات الديمقراطية. تهدف المادة إلى تعزيز الوعي القانوني والأخلاقي بين الطلاب، وتمكينهم من فهم أهمية حقوق الإنسان والمشاركة الديمقراطية في بناء مجتمع عادل ومتقدم.

Module 9

Code	Course/Module Title	ECTS	Semester
PM 101	Eng. Mechanics/ Dynamics	8	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	107

Dynamics is a branch of Engineering Mechanics that focuses on the study of objects in motion and the forces that cause that motion. It builds upon the principles of statics and expands them to analyze the behavior of objects subjected to acceleration, velocity, and displacement. This field is concerned with understanding and predicting the motion of .particles and rigid bodies, as well as the forces and energy associated with their motion

The primary goal of Engineering Mechanics/Dynamics is to provide engineers with a comprehensive understanding of how objects move and interact under the influence of forces and moments. By studying dynamics, engineers can design and analyze systems such as machines, vehicles, and structures to ensure their optimal performance, efficiency, .and safety

In this subject, students explore various topics, including the kinematics and kinetics of particles and rigid bodies. Kinematics deals with the description of motion, focusing on concepts such as displacement, velocity, and acceleration. Kinetics, on the other hand, .focuses on the forces and torques acting on objects, leading to their motion

Module 10

Code	Course/Module Title	ECTS	Semester
TEMO 103	ENGINEERING DRAWING	6	2
Class (hr/w)	) Lect/Lab./Prac./Tutor	SSWL (hr/sem	USWL (hr/sem)
2	2	63	87
DESCRIPTION			

This course description provides a necessary summary of the most important characteristics :of the course as follows

Definition of engineering drawing orders and its uses - the concept of engineering programs in engineering drawing and their fields - engineering drawing tools. Types of engineering lines and their uses, exercises + function. Drawing geometric shapes on computer) rectangular, parallelepiped, square, the circle (exercises + function. Dimensions and how to put them on the drawing. Principles of projection in engineering drawing (simple shapes). Cartesian projection on three levels. uncomplicated shapes, medium complexity, Complex geometric shapes

Module 11

Code	Course/Module Title	ECTS	Semester
PM 200	Fluid Mechanics	8	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	3	108	92

Description

Fluid Mechanics, the branch of science that deals with the study of fluids (liquids and gasses) in a state of rest or motion, is an important subject of Civil, Mechanical and Chemical Engineering. Its various branches are fluid statics, fluid kinematics and fluid dynamics.

A substance that flows is called a fluid. All liquid and gaseous substances are considered to be fluids. Water, oil, and others are very important in our day-to-day life as they are used for various applications. For instance, water is used for generation of electricity in hydroelectric power plants and thermal power plants, water is also used as the coolant in nuclear power plants, oil is used for the lubrication of automobiles etc.

Fluid Mechanics is the branch of science that studies the behavior of fluids when they are in state of motion or rest. Whether the fluid is at rest or motion, it is subjected to different forces and different climatic conditions and it behaves in these conditions as per its physical properties. Fluid mechanics deals with three aspects of the fluid: static, kinematics, and dynamics aspects.

Module 12

Code	Course/Module Title	ECTS	Semester
PM 201	Thermodynamics	8	3
(Class (hr/w	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
4	4	123	5
Description			
Thermodynamics is a branch of physics that deals with the study of energy and its transformations in various systems. It focuses on understanding the behavior of heat, work, and energy flow. Thermodynamics encompasses fundamental principles such as the laws of thermodynamics, which describe the relationships between energy, heat, and work. It explores concepts like temperature, pressure, entropy, and equilibrium. Thermodynamic principles find applications in various fields, including engineering, chemistry, and environmental science. By analyzing thermodynamic processes and systems, scientists and engineers can optimize energy utilization, design efficient engines and power plants, and .understand the behavior of substances under different conditions			

Module 13

Code	Course/Module Title	ECTS	Semester
TEMO 200	Mathematics	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	1	63	87

Description

The proficiencies of Understanding, Fluency, Problem Solving and Reasoning are fundamental to learning mathematics and working mathematically and are applied across all three strands Number and Algebra, Measurement and Geometry, and Statistics and Probability.

Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures. Students make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they:

- connect related ideas
- represent concepts in different ways
- identify commonalities and differences between aspects of content
- describe their thinking mathematically
- interpret mathematical information

Module 14

Code	Course/Module Title	ECTS	Semester
NTU 200	Professional Ethics	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18

Description
مادة أخلاقيات المهنة تعنى بدراسة المفاهيم والمبادئ الأخلاقية التي ترتبط بممارسة المهن المختلفة. يتم توجيه الطلاب لفهم الأخلاقيات والقيم الأساسية في بيئة العمل وتطبيقها في مواقف واقعية. يشمل المنهج تحليل القضايا الأخلاقية والتعرف على الأطر الأخلاقية المختلفة التي يمكن أن تستخدم لاتخاذ قرارات أخلاقية صائبة. كما يتم استكشاف القوانين والقوانين المهنية ذات الصلة ودورها في توجيه سلوك المهنيين. تُعزز المهارات اللازمة للتواصل الأخلاقي وبناء العلاقات المهنية الصحيحة. يتم تسليط الضوء أيضًا على المسؤولية الاجتماعية والبيئية وتحديات التكنولوجيا وابتكاراتها في سياق المهن المختلفة. تهدف المادة إلى تطوير الوعي الأخلاقي والقدرة على اتخاذ قرارات أخلاقية صائبة في مجال المهنة.

Module 15

Code	Course/Module Title	ECTS	Semester
PM 202	Mechanical drawing	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	87

Description
The course on Mechanical Drafting provides comprehensive training on various aspects of drafting and design in mechanical engineering. It covers topics such as the use of AutoCAD system for mechanical drafting, screw threads, bolts, nuts, keys, pin and cotter joints, riveting joints, welding symbols, gear drawings, assembly drawings, detail drawings, and coupling, bearing, and pipe joints. The course includes practical examples and exercises that allow students to gain hands-on experience in drawing each component. By completing this course, students can enhance their knowledge and skills in mechanical engineering drafting, enabling them to create accurate and detailed drawings for various mechanical components and systems.

Module 16

Code	Course/Module Title	ECTS	Semester
PM 203	Strength of Materials	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	92
Description			
The field of strength of materials, also known as mechanics of materials, focuses on analyzing the stresses and strains experienced by structural components like beams, columns, and shafts. Engineers use different techniques to determine how these structures will respond to loads and potential failure modes. This analysis takes into consideration material properties, including yield strength, ultimate strength, Young's modulus, and Poisson's ratio. By understanding these properties, engineers can predict the behavior of a structure and design it to withstand the expected forces and stresses. Strength of materials is essential in ensuring the structural integrity and safety of engineering projects.			

Module 17

Code	Course/Module Title	ECTS	Semester
PM 204	Eng. Materials	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	107

Description

Engineering materials are vital substances used in various engineering applications. They possess specific physical and chemical properties that make them suitable for specific purposes. These materials can be classified into metals, ceramics, polymers, composites, and specialized materials.

Metals are versatile with excellent strength, ductility, and conductivity. Steel, aluminum, copper, and titanium are commonly used metals in engineering. Ceramics are hard, brittle materials with high melting points. They exhibit resistance to heat, wear, and corrosion. Alumina, silicon carbide, and porcelain are examples of ceramics.

Polymers, also known as plastics, are lightweight materials with flexibility and corrosion resistance. They can be easily molded into various shapes. Polyethylene, polystyrene, and PVC are commonly used polymers. Composites are engineered materials made from different constituent materials, providing enhanced properties such as high strength and low weight. Fiberglass and carbon fiber reinforced polymers are examples of composites.

Specialized materials include semiconductors for electronic devices, superconductors for energy applications, and biomaterials for medical implants. Each material type has unique characteristics and is selected based on specific engineering requirements.

Overall, understanding engineering materials is essential for selecting the right materials for various applications and ensuring optimal performance in engineering projects.

Module 18

Code	Course/Module Title	ECTS	Semester
PM 205	Refrigeration & Air Conditioning Principles	8	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	92

Description
The Refrigeration and Air Conditioning Principles module provides students with a comprehensive understanding of the principles, components, and applications of refrigeration and air conditioning systems. This module combines theoretical knowledge with practical skills. Throughout the module, students delve into the fundamental principles of thermodynamics, heat transfer, and psychometrics, which form the basis of refrigeration and air conditioning processes. They learn about the various components involved in these systems, including compressors, condensers, evaporators, expansion devices, and controls, and understand their functions and interactions. Hands-on activities and laboratory sessions enable students to calculate and analyze different air conditioning processes and refrigeration systems. The module encourages the students to communicate effectively and work collaboratively in teams, simulating real-world scenarios they may encounter in the field.

Module 19

Code	Course/Module Title	ECTS	Semester
NTU 201	Arabic language	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	18

Description

The description for the Arabic language is:

Arabic is a rich and diverse language spoken by millions of people around the world. It is the official language of over 20 countries and holds great cultural and historical significance. With its unique alphabet, intricate grammar, and beautiful calligraphy, Arabic offers a fascinating linguistic journey. Whether you are interested in exploring the language for academic, professional, or personal reasons, learning Arabic opens doors to understanding Arab culture, literature, and society. From basic greetings to advanced conversational skills, mastering Arabic provides opportunities for communication, travel, and career prospects. Embrace the beauty of Arabic as you embark on a journey of language discovery and cultural immersion.

الوصف الاكاديمي لمادة اللغة العربية

اللغة العربية هي لغة غنية ومتنوعة يتحدثها الملايين من الأشخاص حول العالم. إنها اللغة الرسمية في أكثر من 20 دولة وتحمل أهمية ثقافية وتاريخية كبيرة. بفضل أبجديتها الفريدة، وقواعدها المعقدة، والخط الجميل، تقدم اللغة العربية رحلة لغوية مثيرة. سواء كنت مهتمًا باستكشاف اللغة لأسباب أكاديمية، مهنية أو شخصية، فإن تعلم العربية يفتح أبوابا لفهم الثقافة العربية والأدب والمجتمع. من التحية الأساسية إلى مهارات المحادثة المتقدمة، يوفر اتقان العربية فرصًا للتواصل والسفر وفرص العمل

Module 20

Code	Course/Module Title	ECTS	Semester
PM 206	Occupational Safety	4	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	2	32	68
Description			
السلامة المهنية هي مجال دراسة يركز على تحقيق بيئة عمل آمنة وصحية للعاملين في جميع الصناعات والقطاعات. يهدف العلماء والباحثون في هذا المجال إلى تحليل وتقييم المخاطر المحتملة في مكان العمل وتطوير وتنفيذ استراتيجيات وأنظمة للوقاية والتحكم في هذه المخاطر. تشمل مجالات الدراسة في السلامة المهنية تحديد المخاطر، وتقييم المخاطر، وتصميم وتنفيذ إجراءات السلامة والوقاية، والتدريب والتثقيف، وإدارة الحوادث والطوارئ، والتشريعات والمعايير الخاصة بالسلامة. يهدف العلماء والمهنيون في هذا المجال إلى تعزيز ثقافة السلامة ورفع الوعي بأهمية السلامة المهنية بين العاملين وصناعة الأعمال بشكل عام. تعد السلامة المهنية جزءًا أساسيًا من الإدارة الفعالة للمخاطر وتساهم في تحسين الأداء العام والجودة ورفاهية العاملين في بيئة العمل.			

Module 21

Code	Course/Module Title	ECTS	Semester
(RE 300)	Heat Transfer	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	107	93

Description

Knowing the students, the main scientific principle in the field of heat transfer and its application in the Refrigeration, Cooling, and air conditioning fields.
After this course the students will be able to:

1. Knowing the student, the main scientific principle in the field of heat transfer and its mechanisms
2. Study the heat conduction through a large plane wall and cylinder as one-dimension steady state case. This chapter deals with the theoretical and mathematical aspects of heat conduction.
3. Investigate the steady state one dimensional heat conduction in a cylinder and sphere, and estimate the critical radius of insulation for them.
4. Studying the effect of thermal resistance to heat conduction through multilayer at the interface of two layers.
5. Studying the transient heat conduction
6. Studying numerically the two-dimensional steady heat conduction
7. Study the mechanism of heat transfer through a fluid in the presence of bulk fluid motion.
8. Study the Non-Dimensional Group Numbers which are in used in the convection heat transfer.
9. External and internal forced convection heat transfer introduced with the used of empirical equation instead of the complicity of the analytical solution.
10. Natural convection heat transfer introduced as empirical equations.
11. Studding the methods of the exchange heat between two fluids that are at different temperatures while keeping them from mixing with each other.
12. Studding the effect of conduction, convection and radiation heat transfer within the heat exchangers collected in one overall heat transfer coefficient, and studding the effect of fouling.
13. Studding the effect of radiation heat transfer, which is involves the emission of the internal energy of the object.
14. Studding the principle of radiation heat transfer.
15. Studding the radiation heat transfer between two black surfaces, and radiation heat transfer between two gray surfaces

Module 22

Code	Course/Module Title	ECTS	Semester
PM 300	Engineering Analysis	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/ sem)
2	2	63	87

Description

Engineering Analysis is a field of study that focuses on the application of mathematical and computational methods to solve complex engineering problems. It involves the use of various mathematical techniques, numerical methods, and computer simulations to analyze and interpret data, make informed decisions, and optimize engineering designs and processes.

In Engineering Analysis, students learn fundamental principles and concepts of mathematics, including calculus, linear algebra, and differential equations. They develop skills in using numerical methods, such as interpolation, numerical integration, and numerical solution of differential equations, to solve engineering problems.

Students also gain proficiency in using computational tools and software, such as MATLAB, to perform mathematical modeling, data analysis, and simulations. They learn to analyze and interpret the results obtained from numerical calculations and simulations, and apply these findings to real-world engineering applications.

Engineering Analysis plays a crucial role in various engineering disciplines, including mechanical engineering, civil engineering, electrical engineering, and aerospace engineering. It provides engineers with the tools and techniques to analyze and optimize designs, predict system behavior, and make informed engineering decisions.

By studying Engineering Analysis, students develop critical thinking skills, problem-solving abilities, and a strong foundation in mathematical and computational methods, which are essential for success in the field of engineering.

Module 23

Code	Course/Module Title	ECTS	Semester
RE 301	Introduction to Renewable Energy	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	137

Description
A course on Thermal Power Plants . Includes the following sections: 1. demonstrate an ability to use critical thinking and problem-solving skills to evaluate business energy use and how and when to apply renewable energy solutions 2. demonstrate an understanding of, and assess the obstacles associated with implementation of renewable energy systems 3. evaluate the advantages, limitations and potential of various clean energy sources for buildings and businesses 4. demonstrate an understanding and familiarity with engineering and financial aspects of projects 5. demonstrate an understanding and familiarity with the regulatory aspects of renewable energy projects 6. demonstrate an understanding and familiarity with the State policies, financing and utility-led programs in CT.

Module 24

Code	Course/Module Title	ECTS	Semester
RE 302	Gas Dynamics	8	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	137

Description
The course on Thermal Power Plants covers various sections to provide students with a comprehensive understanding. It begins by introducing thermodynamics and studying thermal systems in terms of energy interactions with their surroundings. Students will learn how to measure differences in the relevant properties of the system and its surroundings, emphasizing their engineering applications. The course also delves into one-dimensional compressible flows, covering essential concepts such as isentropic flow, normal and oblique shock waves, and flows with heat transfer, friction, and mass addition. Additionally, students will explore topics like simple waves, small perturbation theory for linearized and steady flows, and the method of characteristics for two-dimensional steady flow and one-dimensional unsteady flow. By the end of the course, students will have gained a solid foundation in thermodynamics, with a specific focus on thermal power plants. They will be equipped with the knowledge and skills to analyze and comprehend the complex dynamics involved in these systems.

Module 25

Code	Course/Module Title	ECTS	Semester
PM 301	Machine Design	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	1	78	72

Description

Machine design is a complex and intricate process that involves carefully selecting the appropriate materials, shapes, sizes, and arrangements of mechanical components to ensure optimal performance of the intended machine. It encompasses both the creation of innovative new machines and the improvement of existing ones.

In this comprehensive module, students will delve into the world of machine design, acquiring a deep understanding of the mathematical and scientific principles underlying mechanics, materials science, manufacturing techniques, and design processes. They will explore various topics and gain the ability to apply their knowledge and skills in practical scenarios.

Through this course, students will develop a strong foundation in conceptualizing, modeling, and analyzing machines, enabling them to tackle real-world challenges in the field. They will gain proficiency in identifying suitable materials, designing robust and efficient mechanical elements, and ensuring the machine meets the required specifications. By honing their expertise in machine design, students will be equipped to contribute to technological advancements and innovation in diverse industries.

Module 26

Code	Course/Module Title	ECTS	Semester
PM 302	Computer Applications	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	37

Description
The Computer Applications in this level provides students with a comprehensive fundamental knowledge for modeling the mechanical different parts in 2D & 3D. And make them understanding the definition, significance, calculation, analysis, create, design and inert of [Fasteners {Nuts, Screws, Washer}; {Shaft generators: Cylinder, Wrench, thread, gear, chamfer and fillet}; {Shaft Component: Roller Bearing, (Key: Parallel and Woodruff Key), Seals}; {Drill Bushing: Assembly Drawing}; { Springs: Compression, Extension and Torsion}; {Deflection Line}; {moment of inertia}]. As well as identifying and description the icons components of a typical insertion of different mechanical parts into different mechanical structures. Also enhancing and developing the student's capability for following the right steps in mechanical design and analysis the different mechanical parts into different mechanical structures with simulating the strength of material important parameters for accurate design performing.

Module 27

Code	Course/Module Title	ECTS	Semester
PM 303	Electrical and Electronic Engineering	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	72

Description
Electrical and Electronic Engineering is a dynamic and rapidly evolving field that focuses on the study, design, and application of electrical systems, devices, and technologies. This discipline plays a critical role in shaping the modern world, as it encompasses a wide range of areas, including power generation and distribution, communication systems, electronics, control systems, and renewable energy. In Electrical and Electronic Engineering, students delve into the fundamental principles of electricity, circuits, and electromagnetism. They learn how to analyze and design electrical systems, apply mathematical and scientific principles to solve complex problems, and utilize advanced tools and software for simulation and modeling. The field emphasizes hands-on experience through laboratory work, where students gain practical skills in building, testing, and troubleshooting electrical circuits and devices. They also explore emerging technologies, such as renewable energy sources and sustainable power systems, to address the growing demand for cleaner and more efficient energy solutions. Through their studies, students develop a strong foundation in engineering principles, critical thinking, problem-solving, and project management. They become adept at designing, implementing, and maintaining electrical and electronic systems that are safe, reliable, and sustainable. Graduates of Electrical and Electronic Engineering programs find diverse career opportunities in industries such as power generation, telecommunications, electronics, automation, and research and development.

Module 28

Code	Course/Module Title	ECTS	Semester
RE 303	Biofuel	8	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	63	137

Description

Biofuels encompass a range of transportation fuels derived from biomass feedstock. These fuels include ethanol, methanol, butanol, biodiesel, hydrogen, and methane, all obtained through different processes. The combustion of biofuels results in reduced greenhouse gas emissions, minimal acid rain components, no oxygen depletion, and decreased environmental pollution.

Manufacturing biofuels involves various methods, including direct thermal, thermochemical, electrochemical, and biological approaches. These methods allow for the conversion of biomass feedstock into usable fuels, contributing to a more sustainable and environmentally friendly energy sector.

By utilizing biofuels, society can mitigate the impact of fossil fuel consumption on climate change and environmental degradation. The development and utilization of biofuels play a vital role in promoting renewable energy sources and reducing reliance on non-renewable fossil fuels.

Module 29

Code	Course/Module Title	ECTS	Semester
PM 304	Numerical Analysis	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/ sem)
2	2	63	87

Description

rical Analysis is a field of study that focuses on developing and analyzing algorithms for solving mathematical problems using numerical methods. It involves the use of computational techniques to approximate solutions to complex mathematical equations and problems that are difficult or impossible to solve analytically.

s course, students will learn fundamental numerical algorithms and techniques such as interpolation, numerical integration, numerical solution of differential equations, and numerical linear algebra. They will gain a solid understanding of the theoretical principles behind these methods and develop practical skills in implementing them using programming languages such as MATLAB.

gh theoretical lectures, practical exercises, and computer-based assignments, students will learn how to analyze the accuracy and efficiency of numerical methods, and how to choose appropriate algorithms for specific problem scenarios. This course will equip students with the necessary tools to solve a wide range of engineering and scientific problems that involve complex mathematical computations.

Module 30

Code	Course/Module Title	ECTS	Semester
PM 400	Thermal Power Plants	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	97

Description

A course on Thermal Power Plants . Includes the following sections:

Introducing students to thermodynamics by studying thermal systems in terms of energy interactions with its immediate surroundings. and measure differences in the appropriate properties of both the system and its surroundings and applications in engineering fields

2. To understand the fuel and combustion, show the combustion is perfect or in perfect

3. To study the steam turbine. By using the single or double blade and calculation the efficiency of blades

4. To explain steam condenser explain the types of condensers

5. To study the types of pumps by state the law that use in pumps and the advantage and disadvantage of pumps

6. To study the water treatment, explain the method of water treatment (thermal, chemical, mechanical)

7. How to use the steam tables to find the properties (enthalpy, entropy, ect.)

8. How to use the combustion charts.

Module 31

Code	Course/Module Title	ECTS	Semester
RE 401	Solar Photovoltaic Conversion	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	97

Description

The Solar Photovoltaic Conversion course offers a comprehensive study of the principles and technologies involved in converting solar energy into electricity using photovoltaic (PV) systems. This course explores the design, operation, and optimization of PV systems for various applications.

Students will delve into the physics of solar energy conversion, including the behavior of semiconductor materials and the working principles of solar cells. They will learn about the different types of PV technologies, such as crystalline silicon, thin-film, and emerging solar cell technologies. The course will cover topics including PV system components, system sizing, performance analysis, and integration into the electrical grid.

Students will gain hands-on experience through laboratory exercises and simulations, enabling them to design and evaluate PV systems for residential, commercial, and utility-scale applications. They will also explore topics like solar resource assessment, system economics, and the environmental impacts of PV systems.

By the end of the course, students will have a solid understanding of solar photovoltaic conversion and the ability to design, analyze, and optimize PV systems. They will be well-prepared for careers in the renewable energy industry, as PV system designers, project managers, or researchers in the field of solar energy.

Module 32

Code	Course/Module Title	ECTS	Semester
RE 402	Renewable Energy	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	4	78	72

Description

A course on Renewable energy . Includes the following sections:

Worldwide, increased focus on sustainable development has led to sharp rise in development of solar power projects. As solar power is a clean and renewable energy option, countries are promoting its large-scale usage wherever possible. Technology improvements, mass manufacturing and innovative financing mechanisms have made solar power achieve grid parity in many countries. Thus, with reduced solar power prices and dependable electricity storage options, large-scale integration of solar power to the grid has been planned. This has opened up numerous job opportunities worldwide. In this course, students will be engaged to help them acquire technical and commercial knowledge and skills associated with solar power development and management. Classroom activities will be designed to encourage students to play an active role in the construction of their own knowledge and in the design of their own learning strategies. We will combine traditional lectures with other active teaching methodologies, such as group discussions, cooperative group solving problems, quizzes, presentations, etc. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation. Students will be expected to interact with media resources, such as, web sites, YouTube videos, blogs, and newspapers articles.

Module 33

Code	Course/Module Title	ECTS	Semester
NTU 400	Methodology of Scientific Research	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	32	68

Description

The description for the Methodology of Scientific Research is:

The Methodology of Scientific Research refers to the systematic and rigorous approach employed in conducting scientific investigations and acquiring knowledge. It encompasses the principles, techniques, and procedures used to design, implement, and analyze scientific studies. This field of study focuses on the various methods and tools employed in gathering and interpreting data, ensuring the reliability and validity of research findings. Methodology of Scientific Research involves making informed decisions regarding research design, selecting appropriate data collection methods, and applying statistical techniques for data analysis. It also includes ethical considerations in research, such as protecting participants' rights and ensuring research integrity. A solid understanding of the Methodology of Scientific Research is essential for researchers and scientists to generate credible and reliable results, contribute to the advancement of knowledge, and address complex research questions in diverse disciplines.

Module 34

Code	Course/Module Title	ECTS	Semester
RE 403	Thermal Systems Design	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	1	63	87

The Design of Thermal Systems course is a comprehensive exploration of the principles and practices involved in creating efficient and effective thermal systems. This course delves into the design considerations and methodologies necessary for designing systems that involve heat transfer, thermodynamics, fluid mechanics, and energy conversion.

Students will learn how to analyze and optimize thermal systems by examining factors such as heat generation, heat transfer mechanisms, and energy efficiency. They will study the design of components like heat exchangers, boilers, turbines, compressors, and refrigeration systems. Through case studies, simulations, and hands-on projects, students will gain practical experience in sizing, performance analysis, and material selection for thermal systems.

Furthermore, the course will cover system integration, control strategies, and the assessment of environmental impacts. Students will develop the skills to address real-world challenges in various industries, including power generation, HVAC, automotive, and aerospace.

By the end of the course, students will possess the knowledge and tools needed to design and optimize thermal systems, making them well-equipped for careers as thermal system engineers, energy consultants, or researchers in the field of thermal sciences

Module 35

Code	Course/Module Title	ECTS	Semester
PM 401	Computer Aided Design	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	87

Description
Studying AutoCAD and ANSYS applications provides students with essential skills for computer-aided design (CAD) and engineering analysis. AutoCAD, a leading CAD software, enables students to create precise 2D and 3D models, facilitating the design process for various industries such as architecture, engineering, and manufacturing. Through AutoCAD, students learn to transform conceptual ideas into detailed and accurate digital representations, enhancing their spatial visualization and technical drawing abilities. On the other hand, ANSYS, a powerful simulation software suite, equips students with the tools to analyze and optimize engineering designs. By studying ANSYS, students can perform structural, thermal, fluid dynamics, and electromagnetics analyses, enabling them to evaluate design performance, predict behavior, and make informed engineering decisions. Together, mastering AutoCAD and ANSYS empowers students to effectively design and analyze complex systems, enhancing their problem-solving skills and preparing them for careers in engineering and related fields.

Module 36

Code	Course/Module Title	ECTS	Semester
RE 404	Combustion & Pollution Engineering	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	72

Description

The main focus of combustion is the application of the engineering sciences, especially the thermal sciences, to internal combustion engines. The goals are to familiarize Basic Concepts of Thermodynamics of combustion , stoichiometric combustion , incomplete combustion , complete combustion with engine nomenclature, describe how internal combustion engines work, . An internal combustion engine is defined as an engine in which the chemical energy of the fuel is released inside the engine and used directly for mechanical work, as opposed to an external combustion engine in which a separate combustor is used to burn the fuel. the overall performance of internal combustion engines. Major engine cycles, configurations, they will apply the principles of thermodynamics, combustion, fluid flow, friction, and heat transfer to determine an internal combustion engine's temperature and pressure profiles, work, thermal efficiency, and exhaust emissions.

Also, the main objectives of pollution are to Introduce Basic Concepts of air pollution, physical and chemical fundamentals and Introducing Ambient air quality standards for criteria pollutants , Air pollution standards , Air pollution regulation. To understand Air pollutants classification , Transport and air pollution , causes of air pollution from Transportation and Introducing the Strategies for control of emissions in SI engines.

Module 37

Code	Course/Module Title	ECTS	Semester
PM402	Control systems	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	72

Description

Control systems involve the application of various techniques and technologies to measure, monitor, and control physical variables and processes in industrial, engineering, and scientific applications. This field encompasses the design, implementation, and optimization of systems that ensure accurate and reliable measurements, as well as effective control of processes.

Measurement and Control Systems play a crucial role in industries such as manufacturing, power generation, automation, and instrumentation. They involve sensors, transducers, data acquisition systems, signal processing techniques, and control algorithms. These systems enable precise measurement of variables like temperature, pressure, flow rate, and level, and utilize control strategies to regulate and optimize processes.

Understanding Measurement and Control Systems requires knowledge of sensors, data acquisition methods, signal conditioning, measurement principles, control theory, and instrumentation. Professionals in this field need to analyze system behavior, design control algorithms, implement hardware and software components, and troubleshoot issues.

This field is constantly evolving with advancements in technology, such as the integration of Internet of Things (IoT), machine learning, and cloud computing. Measurement and Control Systems are vital for ensuring efficiency, safety, and reliability in various industries, making it a critical area of study for engineers and scientists.

Module 38

Code	Course/Module Title	ECTS	Semester
TEMO 400	Engineering and Industrial Management	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	102

Description

The subject aims to encourage students' participation in the management exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple assumptions involving some sampling activities that are interesting to the students.

The results of this module study will lead to:

1. Enable the student to use knowledge to manage the different purposes organizations.
2. Enable engineers to layout the administrative and production organization of industrial enterprises.
3. Enable engineers to layout the network planning for the different engineering processes and finding the typical path of the minimum duration that offers the best quality of the production.
4. Enable engineers to study the feasibility of the industrial processes which leads to successful of the production.
5. Enhance the student skills in management by giving the typical solution on the assumed problem.

Contact

Program Manager:
Dr. Ammar Hassan Suhail | Ph.D. in Thermal Technical Engineering | Lecturer.
Email: ammarsuhail@ntu.edu.iq
Mobile no.: 07736973363

Program Coordinator:
Bahjat Hassan Alyas | M.Sc. in Mechanical Engineering | Lecturer.
Email: bahjat.me@ntu.edu.iq
Mobile no.: 07714411586