Northern Technical University

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

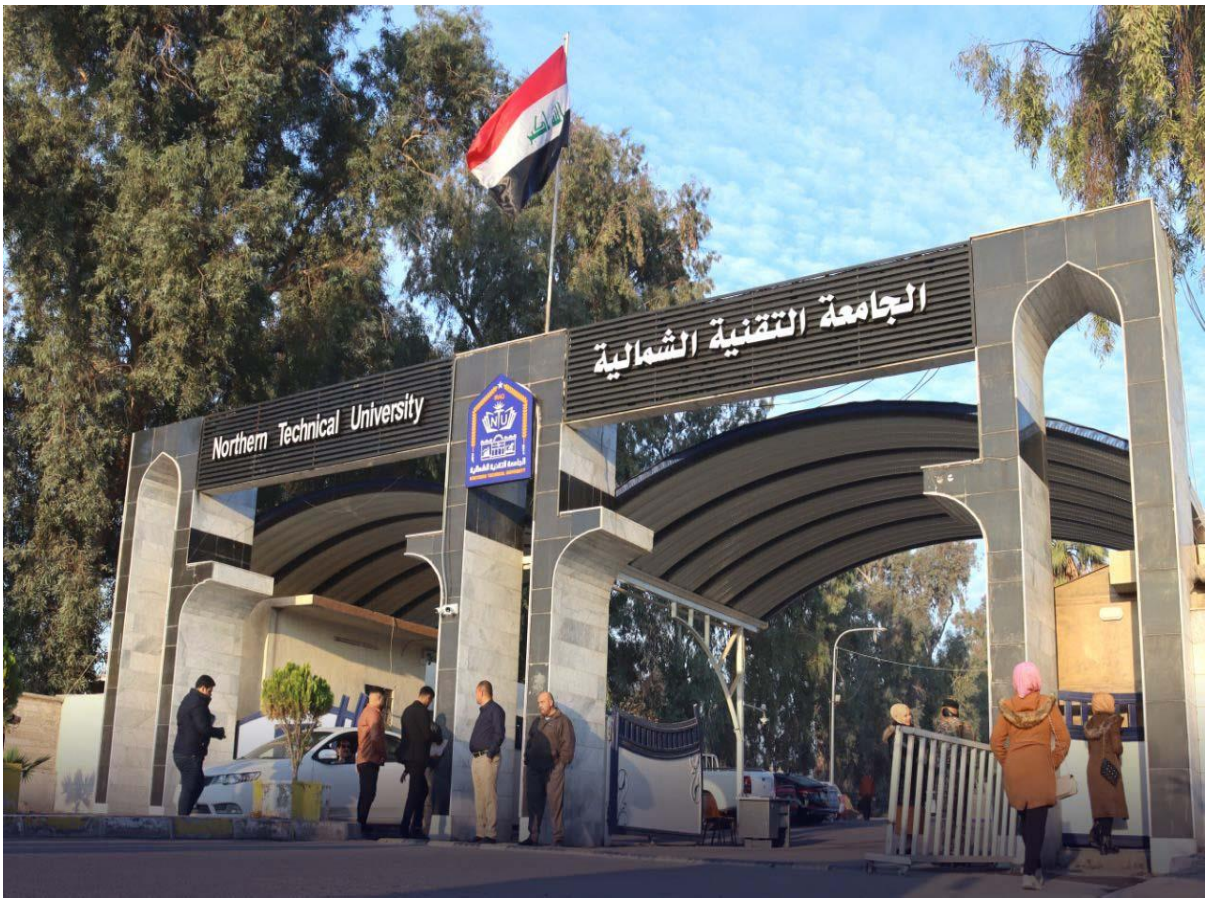
Northern Technical University

Eng. Technical College/ Mosul

Department of Power Mechanics Engineering Technologies

Refrigeration and Air-condition

بكالوريوس –ميكانيك القوى- فرع التبريد والتكييف



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1. Overview

This catalogue is about the courses (modules) given by the program of Power Mechanics Techniques Engineering to gain the Bachelor of Technical Engineering degree. The program delivers (42) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم .يقدم البرنامج (42) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و (٢٤٠) إجمالي وحدات أوروبية .يعتمد تقديم المواد الدراسية على عملية بولونيا.

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
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 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

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
(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.

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