

Northern Technical University



First Cycle – Bachelor's Degree (B.Sc.) – Applied Mechanics Techniques Engineering

Northern Technical University(NTU)/
Eng. Technical College- Mosul (TEMO) –
Department of Applied Mechanics Techniques Engineering
(AM)

بكالوريوس – هندسة تقنيات الميكانيك التطبيقي



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1. Overview

This catalogue is about the courses (modules) given by the program of applied mechanics techniques engineering to gain the Bachelor of Science 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.

نظرة عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٢) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.



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2. Undergraduate Courses 2023-2024

Level 1

Module 1

Code	Course/Module Title	ECTS	Semester
NTU 100	Democracy & Human Rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	32	18
Description			
<p>مادة حقوق الإنسان والديمقراطية تقدم فهماً 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.</p>			



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Module 2

Code	Course/Module Title	ECTS	Semester
NTU 101	English Language	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	17
Description			
<p>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.</p>			



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Module 3

Code	Course/Module Title	ECTS	Semester
TEMO 100	Principles of Mathematics	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0	63	112
Description			
<p>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.</p> <p>Students should be able to:</p> <ol style="list-style-type: none"> 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. 			

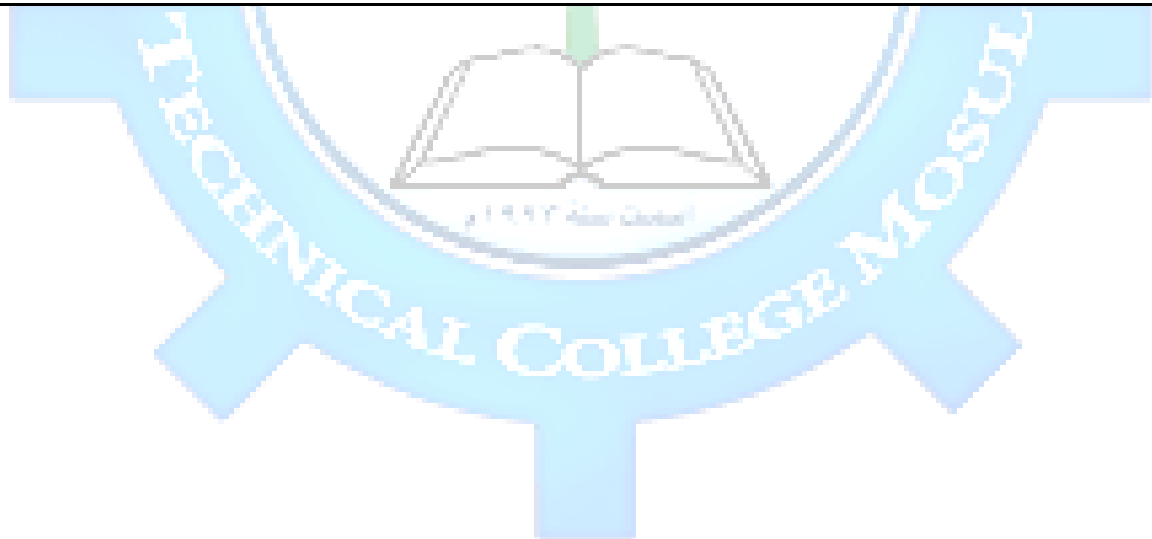


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Module 4

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)
4	2	93	57
Description			
<p>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.</p>			





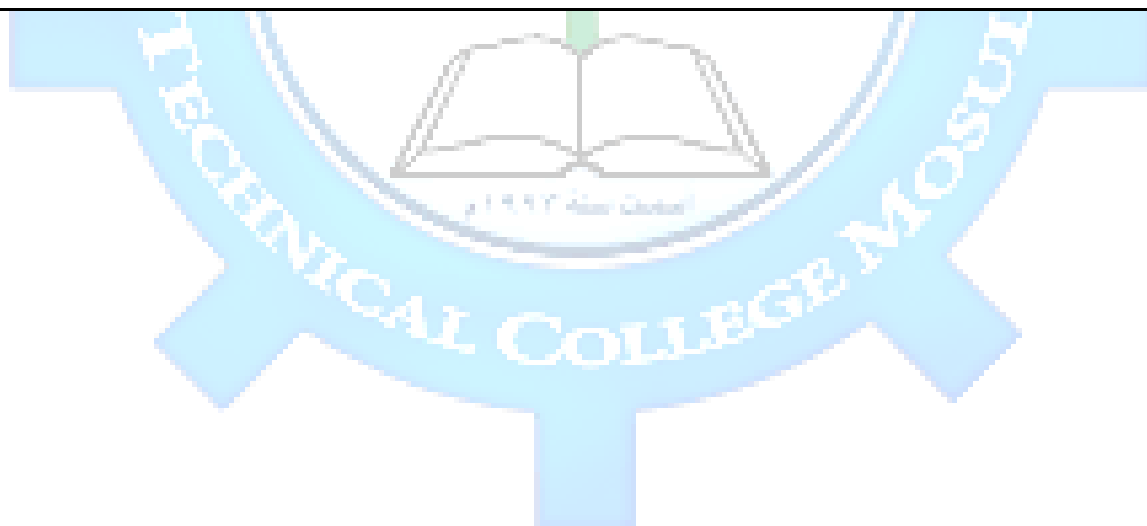
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Module 5

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.





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Module 6

Code	Course/Module Title	ECTS	Semester
AM 100	Engineering Mechanics\Statics1	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	48	127
DESCRIPTION			
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			





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Module 7

Code	Course/Module Title	ECTS	Semester
TEMO 103	Engineering Drawing\Autocad 2D	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
0	4	63	112
DESCRIPTION			
<p>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</p>			





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Module 8

Code	Course/Module Title	ECTS	Semester
NTU 102	Computer	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
<p>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</p>			





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Module 9

Code	Course/Module Title	ECTS	Semester
AM 101	Mechanics Engineering / Static 2	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	112
Description			
<p>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.</p> <p>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.</p> <p>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.</p>			



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Module 10

Code	Course/Module Title	ECTS	Semester
AM 102	principles of Thermodynamics	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
2	3	78	97
Description			
<p>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.</p>			



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Module 11

Code	Course/Module Title	ECTS	Semester
AM 103	Occupational Safety	4	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	67
Description			
<p>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 والمهنيين في هذا المجال إلى تعزيز ثقافة السلامة ورفع الوعي بأهمية السلامة المهنية بين العاملين وصناعة الأعمال بشكل عام. تعد السلامة المهنية جزءاً أساسياً من الإدارة الفعالة للمخاطر وتساهم في تحسين الأداء العام والجودة ورفاهية العاملين في بيئة العمل.</p>			



Module 12

Code	Course/Module Title	ECTS	Semester
NTU 103	Arabic language	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	17
Description			
<p>The description for the Arabic language is:</p> <p>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.</p> <p style="text-align: center;">الوصف الأكاديمي لمادة اللغة العربية</p> <p>اللغة العربية هي لغة غنية ومتنوعة يتحدثها الملايين من الأشخاص حول العالم. إنها اللغة الرسمية في أكثر من ٢٠ 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 أبواباً لفهم الثقافة العربية والأدب والمجتمع. من التحية الأساسية إلى مهارات المحادثة المتقدمة، يوفر إتقان العربية فرصاً للتواصل والسفر وفرص العمل.</p>			



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Level 2

Module 13

Code	Course/Module Title	ECTS	Semester
NTU 200	Crimes of the Former Ba'ath Party	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
2	0	32	18
Description			
<p>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.</p>			



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Module 14

Code	Course/Module Title	ECTS	Semester
TEMO 200	Mathematics	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0	63	112
Description			
<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • connect related ideas • represent concepts in different ways • identify commonalities and differences between aspects of content • describe their thinking mathematically • interpret mathematical information 			



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Module 15

Code	Course/Module Title	ECTS	Semester
AM 200	Engineering Materials	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	82
Description			
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Overall, understanding engineering materials is essential for selecting the right materials for various applications and ensuring optimal performance in engineering projects.</p>			

Module 16

Code	Course/Module Title	ECTS	Semester
AM 201	Fluid Mechanics	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	2	93	82
Description			
<p>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.</p> <p>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.</p> <p>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.</p>			



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Module 17

Code	Course/Module Title	ECTS	Semester
NTU 201	English Language	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	17
Description			
<p>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.</p>			



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Module 18

Code	Course/Module Title	ECTS	Semester
AM 202	Mechanical Drawing	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	4	63	112
Description			
<p>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 3D system for mechanical drafting. 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.</p>			



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Module 19

Code	Course/Module Title	ECTS	Semester
TEMO 201	Electrical and Electronic Engineering	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	97
Description			
<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>			



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Module 20

Code	Course/Module Title	ECTS	Semester
AM 203	Strength of Materials	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	2	93	82
Description			
<p>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.</p>			





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Module 21

Code	Course/Module Title	ECTS	Semester
AM 204	Eng. Mechanics/ Dynamics 1	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	112

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 22

Code	Course/Module Title	ECTS	Semester
NTU 203	Arabic language	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	17
Description			
<p>The description for the Arabic language is:</p> <p>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.</p> <p style="text-align: center;">الوصف الأكاديمي لمادة اللغة العربية</p> <p>اللغة العربية هي لغة غنية ومتنوعة يتحدثها الملايين من الأشخاص حول العالم. إنها اللغة الرسمية في أكثر من ٢٠ 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 أبواباً لفهم الثقافة العربية والأدب والمجتمع. من التحية الأساسية إلى مهارات المحادثة المتقدمة، يوفر إتقان العربية فرصاً للتواصل والسفر وفرص العمل.</p>			



الجامعة التقنية الشمالية
الكلية التقنية الهندسية/الموصل
قسم هندسة تقنيات الميكانيك التطبيقي



Module 23

Code	Course/Module Title	ECTS	Semester
NTU 202	Computer	3	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
<p>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</p>			

