Modules Catalogue | 2025-2026 | دليل المواد الدراسية

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 Engineering Technology (AM)

بكالوريوس –هندسة تقنيات الميكانيك التطبيقي

Modules Catalogue Form

University Name: .Northern Technical University.....

Faculty/Institute: .Technical Engineering College Mosul.....

Scientific Department: Applied Mechanics Techniques Engineering

Academic or Professional Program Name: Bachelor of Applied Mechanics Techniques Engineering

Final Certificate Name: Bachelor of Applied Mechanics Techniques Engineering

Academic System: Bologna Process.....

Description Preparation Date: 2/9/2025

File Completion Date: 2/9/2025

Signature:

Head of Department Name:

Dr. Ayad S. Abdullah

الكلية التقنية الهندسية / الموصل
قسم هندسة
تقنيات الميكانيك التطبيقي

Date: 2/9/2025

Signature:

Scientific Associate Name:

Prof. Dr. Mohammed Sabah Jarjees

Date: 25/9/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

Department: Assist. Lect. Warqaa Hashim Mahmood

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Approval of the Dean



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1. Overview

This catalogue presents the courses (modules) offered by the Applied Mechanics Engineering Technology program at the Engineering Technical College – Mosul (TEMO), Northern Technical University (NTU), leading to the Bachelor of Science degree (B.Sc.). The program comprises 41 modules across 8 semesters, with a total student workload of 6,000 hours and 240 ECTS credits in total. The module delivery is structured in accordance with the Bologna Process framework.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها قسم هندسة تقنيات الميكانيك التطبيقي في الكلية التقنية الهندسية بالموصل (TEMO)، الجامعة التقنية الشمالية (NTU)، للحصول على درجة بكالوريوس العلوم. يشتمل البرنامج على ٤١ مادة دراسية موزعة على ٨ فصول دراسية، بإجمالي ٦٠٠٠ ساعة من حمل الطالب و٢٤٠ وحدة أوروبية (ECTS). يُقدَّم البرنامج وفق إطار عملية بولونيا.

2. **Undergraduate Courses 2025-2026**

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			
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 2

Code	Course/Module Title	ECTS	Semester
NTU 102	**COMPUTER PRINCIPLES**	**3**	**2**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	**1**	**33**	**42**

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 3

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

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 4

Code	Course/Module Title	ECTS	Semester
AM 104	**Mathematics Principles**	**7**	**1**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
4	0	63	112

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 5

Code	Course/Module Title	ECTS	Semester
AM 105	Electrical technology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	82

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 6

Code	Course/Module Title	ECTS	Semester
AM 106	WORKSHOP	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
0	7	108	42

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 7

Code	Course/Module Title	ECTS	Semester
AM 107	ENGINEERING DRAWING	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
0	4	63	112
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			

Module 8

Code	Course/Module Title	ECTS	Semester
AM 100	Mechanics Engineering / Static 1	7	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	112

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 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

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Module 10

Code	Course/Module Title	ECTS	Semester
AM 102	Thermodynamics principles	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
2	3	78	97
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 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			
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 جزءًا أساسيًا من الإدارة الفعالة للمخاطر وتساهم في تحسين الأداء العام والجودة ورفاهية العاملين في بيئة العمل.			

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

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 13

Code	Course/Module Title	ECTS	Semester
NTU 200	Crimes of the Baath Regime in Iraq	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	(SSWL (hr/sem	(USWL (hr/sem
2	0	32	18

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 14

Code	Course/Module Title	ECTS	Semester
AM 205	Mathematics	7	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0	63	**112**

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 15

Code	Course/Module Title	ECTS	Semester
AM 206	Electrical and Electronic Engineering	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	97

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 16

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

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 17

Code	Course/Module Title	ECTS	Semester
AM 204	Eng. Mechanics/ Dynamics 1	7	3
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 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			
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.			

Module 19

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	**3**	**108**	**67**

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 20

Code	Course/Module Title	ECTS	Semester
AM 201	**Fluid Mechanics**	**7**	**4**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
4	**3**	**108**	**67**

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 21

Code	Course/Module Title	ECTS	Semester
NTU 202	COMPUTER APPLICATION 1	7	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	3	63	112

This module introduces the student to 3-D CAD modelling using SolidWorks software. The aim of the module is to give the student a comprehensive understanding of the key features and techniques involved in 3-D parametric modelling. The fundamental concept of this module is to develop techniques to create parts, assemblies, simple model dynamics and detailed 2-D drawings using the 3-D modelling software. The tasks will be carried out using best practice procedures and international drawing standards

Level 3

Module 22

Code	Course/Module Title	ECTS	Semester
AM 300	**Numerical & Engineering Analysis**	**6**	**5**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/ sem)**
4	**0**	**63**	**87**

Description

Numerical & 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
AM 301	**Computer application 2**	**6**	**5**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	**4**	**78**	**72**
Description			
Studying ANSYS applications provides students with essential skills for engineering analysis, 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 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 24

Code	Course/Module Title	ECTS	Semester
AM 302	**Vibration**	**6**	**5**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**3**	**78**	**72**

Description

The Vibration Principles module offers students a thorough comprehension of the principles, components, and applications of vibration systems. This module integrates theoretical knowledge with practical skills to provide a well-rounded learning experience. Students explore the foundational principles of dynamics, including equations of motion, which serve as the building blocks for understanding vibration processes.

The module emphasizes hands-on activities and laboratory sessions, allowing students to calculate and analyze various vibration systems and processes. By engaging in these practical exercises, students develop a deeper understanding of the subject matter and enhance their problem-solving abilities.

Furthermore, the module promotes effective communication and teamwork, as students collaborate in simulated real-world scenarios commonly encountered in the field. This encourages the development of important skills required for successful professional practice.

By the end of the module, students will have acquired a comprehensive understanding of vibration principles, along with the ability to apply their knowledge to analyze and address vibration-related challenges in practical settings.

Module 25

Code	Course/Module Title	ECTS	Semester
AM 303	Metal forming	**6**	**5**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**2**	**63**	**87**

Description

The course "Understanding Heat Treatments in Engineering Materials" is designed to provide engineering students with a comprehensive understanding of the principles, processes, and applications of heat treatments in various materials. Heat treatment is a critical aspect of materials engineering, influencing the mechanical, thermal, and electrical properties of metals and alloys. Through this course, students will delve into the theoretical foundations and practical applications of heat treatments, essential knowledge for engineers working in fields such as manufacturing, aerospace, automotive, and materials science.

Assessment Methods:

- Laboratory Reports: Assessing students' ability to conduct experiments, analyze results, and draw conclusions.
- Quizzes and Examinations: Evaluating theoretical knowledge, including principles, processes, and phase diagrams.
- Assignments and Case Studies: Applying heat treatment methods to real-world scenarios, encouraging problem-solving skills.
- Group Projects and Presentations: Collaborative projects simulating engineering challenges, fostering teamwork and communication skills.
- Final Examination: Comprehensive assessment covering all aspects of the course, ensuring a thorough understanding of heat treatments in engineering materials.

By the end of this course, engineering students will possess a strong theoretical foundation, practical skills, and problem-solving abilities, enabling them to make informed decisions regarding material selection and heat treatment processes in their future engineering careers.

Module 26

Code	Course/Module Title	ECTS	Semester
AM 304	**Technology of Materials**	**6**	**5**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**2**	**63**	**87**

Description

This module is designed for a third course in applied mechanics. The field that covers this area of the engineering profession has come to be known as “materials technology.” this label serves important functions.it is an accurate description of the balance between scientific principles and practical engineering that is required in selecting the proper materials for modern technology. After a short introductory on “The Fundamentals.” The module covers various topics in applied physics and chemistry. These are the foundation for understanding the principles of “materials science.” The words “materials technology” gives us a label for Part II of the module that deals with “Materials and Their Applications.” First, we discuss the categories of *structural materials*: metals, ceramics, and polymers and composites, and we give examples of each type of structural material and describe their processing, the techniques used to produce the materials, and finally we discuss the environmental and sustainability issues in materials and the latest trends in materials science.

Module 27

Code	Course/Module Title	ECTS	Semester
AM 305	**Machine Design**	**6**	**6**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**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.

Module 28

Code	Course/Module Title	ECTS	Semester
AM 306	Manufacturing Processes	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	2	63	87

Description

Manufacturing Processes is a course that provides students with an in-depth understanding of various processes involved in the production of goods and products. The course explores the fundamental principles and techniques used in manufacturing, including material selection, forming, machining, joining, and finishing. Students will learn about different manufacturing methods such as casting, molding, machining, welding, and additive manufacturing. Emphasis is placed on process selection, optimization, and quality control to ensure efficient and cost-effective production. Through theoretical knowledge and practical applications, students will gain a comprehensive understanding of how raw materials are transformed into finished products. Additionally, the course covers topics such as process planning, automation, and sustainability in manufacturing. By the end of the course, students will have the skills and knowledge to analyze, evaluate, and improve manufacturing processes in various industrial settings.

Module 29

Code	Course/Module Title	ECTS	Semester
NTU 201	English Language	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0	33	17
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 30

Code	Course/Module Title	ECTS	Semester
AM 308	**Theory of Machine**	**6**	**6**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	**3**	**93**	**57**

Description

The Theory of Machine Principles module provides students with a comprehensive understanding of the principles, components, and applications of Mechanics of machines. This module combines theoretical knowledge with practical skills. Throughout the module, students delve into the fundamental principles of Dynamics, and Mechanics of machines, which form the basis of machines processes. Hands-on activities and laboratory sessions enable students to calculate and analyze different processes machines 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 31

Code	Course/Module Title	ECTS	Semester
AM 309	Computer Applications 3	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	4	78	72

Description

This course teaches computer programming to those with little to no previous experience. It uses the programming system and language called MATLAB to do so because it is easy to learn, versatile and very useful for engineers and other professionals. MATLAB is a special-purpose language that is an excellent choice for writing moderate-size programs that solve problems involving the manipulation of numbers. The design of the language makes it possible to write a powerful program in a few lines. The problems may be relatively complex, while the MATLAB programs that solve them are relatively simple: relative, that is, to the equivalent program written in a general-purpose language, such as C++ or Java. As a result, MATLAB is being used in a wide variety of domains from the natural sciences, through all disciplines of engineering, to finance, and beyond, and it is heavily used in industry. Hence, a solid background in MATLAB is an indispensable skill in today's job market. Nevertheless, this course is not a MATLAB tutorial. It is an introductory programming course that uses MATLAB to illustrate general concepts in computer science and programming. Students who successfully complete this course will become familiar with general concepts in computer science, gain an understanding of the general concepts of programming, and obtain a solid foundation in the use of MATLAB.

Level 4

Module 32

Code	Course/Module Title	ECTS	Semester
TEMO 400	**Project 1**	**2**	**7**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	**2**	**47**	**3**
Description			
The subject aims to encourage students' participation in his project , 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.			

Module 33

Code	Course/Module Title	ECTS	Semester
TEMO 401	**Project 1**	**2**	**8**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	**2**	**47**	**3**
Description			
The subject aims to encourage students' participation in his project , 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.			

Module 34

Code	Course/Module Title	ECTS	Semester
AM 407	**Engineering and Industrial Management**	**7**	**8**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**127**

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.

Module 35

Code	Course/Module Title	ECTS	Semester
AM 400	**Control systems**	**7**	**7**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**4**	**93**	**82**

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 36

Code	Course/Module Title	ECTS	Semester
AM 401	**Programming Language**	**7**	**7**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	**4**	**78**	**97**
Description			
This course aims to teach everyone the basics of programming computers using Python. We cover the basics of how one constructs a program from a series of simple instructions in Python. The course has no pre-requisites and avoids all but the simplest mathematics. Anyone with moderate computer experience should be able to master the materials in this course. Once a student completes this course, they will be ready to take more advanced programming courses.			

Module 37

Code	Course/Module Title	ECTS	Semester
AM 402	**Industrial Automation**	**7**	**7**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	**3**	**78**	**97**

Description

The course on Automated Assembly Systems provides students with a comprehensive understanding of the concepts, principles, and relationships related to various automated manufacturing technologies. Topics covered include computer-aided drafting/design (CADD), computer-aided manufacturing (CAM), industrial robots, numerical control (NC), industrial lasers, programmable logic controllers (PLCs), automated guided vehicles (AGVs), flexible manufacturing systems (FMS), and computer-integrated manufacturing (CIM). Students will learn how these technologies work, their applications in industrial settings, and the principles behind their design and operation.

The course also focuses on control systems, where students will learn how to mathematically model a control system, analyze its behavior, design a suitable controller, and evaluate the performance of the controlled system. The prerequisite for this course is consent from the instructor. Through practical exercises, simulations, and case studies, students will gain hands-on experience in applying control theory to automated assembly systems. This course is essential for students pursuing careers in manufacturing engineering, industrial automation, and advanced manufacturing technologies.

Module 38

Code	Course/Module Title	ECTS	Semester
AM 403	**Hydraulic and Pneumatic systems**	**7**	**7**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**97**

Description

The study of hydraulic and pneumatic systems involves understanding the fundamental principles of fluid mechanics, as well as the components and circuits used in these systems. Students learn about fluid properties, flow characteristics, pressure, and force calculations. They also explore topics such as pumps, valves, filters, reservoirs, pipelines, and actuators specific to hydraulic and pneumatic systems

By studying hydraulic and pneumatic systems, engineers gain the knowledge and skills to design, analyze, and troubleshoot these systems. They learn how to select appropriate components, determine system specifications, and optimize performance. Additionally, they understand the importance of safety considerations, maintenance, and efficient energy usage in fluid power applications.

Hydraulic and pneumatic systems offer several advantages in engineering applications. They provide high power density, precise control, and the ability to transmit forces over long distances. They are also known for their flexibility, as the fluid power can be easily routed and distributed throughout a system. Furthermore, these systems are generally reliable, durable, and resistant to harsh environmental conditions

Module 39

Code	Course/Module Title	ECTS	Semester
AM 404	**Design of Robot Arms**	**7**	**8**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
3	**2**	**78**	**97**
Description			
The study of robotics concerns itself with the desire to synthesize some aspects of human function by the use of mechanisms, sensors, actuators, and computers. This module introduces the science and engineering of mechanical manipulation. This subdiscipline of robotics has its foundations in several classical fields. The major relevant fields are mechanics, control theory, and computer science. In this module we cover topics from mechanical engineering and mathematics, control-theoretical material, it is helpful if the student has had one basic course in statics and dynamics and control and a course in linear algebra. this module is appropriate for a fourth course graduate level.			

Module 40

Code	Course/Module Title	ECTS	Semester
AM 405	**CAD/CAM**	**7**	**8**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	**4**	**78**	**97**

Description

This course is to introduce computer-aided design (CAD) and computer-aided manufacturing (CAM) theory and applications. The course subjects include CAD/CAM systems, Geometric modeling, data exchange and integration, mechanical assembly, mechanical tolerancing, process planning and Tool path generation, integration of CAD/CAM with the production machine, and Computer control of machines and processes in manufacturing systems. Projects will focus on sold modeling for design and manufacturing applications and the use of commercial CAD/CAM software for automating the production cycle. Applications include NC machining, design of (optimum) cutting tools and modeling and design of fixtures for dies and molds.

Module 41

Code	Course/Module Title	ECTS	Semester
AM 406	Systems modeling and simulation	7	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
1	0	63	112

Description

Systems modeling and simulation is a discipline that involves the development and analysis of mathematical models to simulate the behavior of complex systems. It provides a powerful tool for understanding, predicting, and optimizing the performance of various systems, ranging from mechanical and electrical systems to biological and social systems. This course aims to introduce students to the fundamentals of systems modeling and simulation and equip them with the necessary knowledge and skills to apply these techniques in real-world engineering problems.

The course covers topics such as mathematical modeling techniques, simulation algorithms, system dynamics, discrete event simulation, and validation and verification of simulation models. Students will learn how to translate real-world systems into mathematical models, analyze the behavior of the models using simulation software, and interpret the simulation results to make informed decisions. Practical examples and case studies will be used to illustrate the application of systems modeling and simulation in different engineering domains. By the end of the course, students will have a solid understanding of systems modeling and simulation principles and will be able to apply these techniques to solve complex engineering problems.

Code	Course/Module Title	ECTS	Semester
NTU 400	Research Methodology	2	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/sem)**
2	2	63	50

Description

This module introduces students to the principles and practical techniques of modeling and simulating dynamic mechanical and engineering systems, covering the formulation of mathematical models (differential equations) that represent physical systems such as mass-spring-damper assemblies, vibrating structures, and mechanisms; students learn to translate real-world systems into block diagrams, state-space representations, or transfer functions, and then use numerical and computational tools (such as MATLAB, Simulink, Excel, or Python) to simulate system behavior under various initial conditions, inputs, and disturbances, analyzing outputs like displacement, velocity, frequency response, and stability; through hands-on exercises and case studies drawn from mechanical engineering applications (vibration analysis, control systems, and dynamic response of structures), students develop the ability to validate models against theoretical or experimental data, interpret simulation results, and apply these skills to solve practical engineering design and analysis problems.

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