University of Misan

جامعة ميسان

Bachelor's degree (B.Sc.) in Mechanical Engineering

بكالوريوس في الهندسة الميكانيكية

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1. Overview

This catalog is about the courses (modules) given by the Mechanical Engineering degree program. The program delivers (50) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الميكانيكية للحصول على درجة البكلوريوس. حيث يقدم البرنامج (45) مادة دراسية مع (6000) ساعة، اجمالي ساعات حمل الطالب، و(240) اجمالي وحدات اوربية. يعتمد تقديم المواد الدراسية على مسار بولونيا.

2. Undergraduate Modules 2024-2025

Model 1			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ENG122	**Mathematics I**	**5**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	**1**	**63**	**62**
Description			
Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from. Thus, engineering students must be able to apply mathematical knowledge and skills to problem-solving and engineering design tasks. Mathematical or engineering knowledge			

without understanding how to use the learned strategies can limit students' ability to provide correct answers.

Model 2			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ME112	**Mechanical Engineering Static**	**5**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**1**	**78**	**47**
Description			
The module aims are: 1. Preparing and qualifying specialized engineers to meet the requirements of the labor market in its private and public sectors in static mechanics through diversifying the methods of learning, teaching, and training students to apply the acquired knowledge and skills to solve real problems. 2. Providing distinguished academic programs in the field of static mechanics, both theoretical and practical, to comply with international standards of academic quality and meet the needs of the labor market. 3. Encouraging and developing scientific research in the fields of static mechanics in general, and studying and analyzing loads (such as forces, torques and rotations) in physical systems in a state of static equilibrium. 4. Preparing a stimulating environment for faculty members to develop them			

knowledge and educational and research skills.

5. Building and developing partnerships with the governmental and private sectors

Model 3

Code	Course/Module Title	ECTS	Year /Semester
ME113	**Principles of Production Engineering**	**6**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**2**	**93**	**57**

Description

After completing this course, students should be able to do the following:

1- Cite sources of engineering materials.
2- Explain the principles of production processes and how the type of engineering material and the procedure used for making specific products can be selected.
3- Define engineering stress and engineering strain.
4- Define mechanical properties of materials such as tensile strength, ductility, toughness, and hardness.
5- Name and describe hardness testing techniques.
6- Name and describe the two impact fracture testing techniques.
7- Explain the different types of metal production processes and their performance.
8- Describe recrystallization in terms of both the alteration of microstructure and mechanical characteristics of the material.

9- Identify various manufacturing processes and conduct some calculations about finding the force and power of some metal forming processes such as rolling and extrusion.
10- Name and briefly describe some of the important types of welding processes.
11- Name and describe forming operations used to shape polymers and ceramics.

Model 4

Code	Course/Module Title	ECTS	Year /Semester
ENG126	**Chemistry**	**3**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**33**	**42**

Description

After completing this course, students should be able to do the following:

1- Knowledge of Atomic Structure and Bonding: Understand the structure of atoms, electronic configurations, chemical bonding, and hybridization, which form the basis for understanding the behavior of chemical substances.
2- Understanding of Radioactivity and Nuclear Chemistry: Explore the principles of radioactivity, nuclear stability, radioactive decay, and applications of nuclear chemistry in tracers, dating, and power sources.
3- Knowledge of Cement Chemistry: Study the chemistry of cement, including electrochemical corrosion, hydration reactions, and cement weathering.
4- Understanding of Thermal Chemistry and Chemical Kinetics: Learn about exothermic and endothermic reactions, the heat of formation, fuel and water

gas, rocket propulsions, energy, and collision. Study the kinetics of chemical reactions and the factors that influence reaction rates.

5- Knowledge of Acids and Bases: Gain an understanding of the chemistry of acids and bases, including water treatments, dissociation constants, acid and base strength, pH scale, sterilization, clarification, and boiler feed water.
6- Understanding of Petroleum Refining: Explore the chemistry involved in petroleum refining, including boiling point diagrams and processes for separating and processing hydrocarbons.
7- Knowledge of Hydrocarbons and Aromatic Compounds: Study the structure of benzene, homologs of benzene, reactions involving benzene substitution, as well as alcohol synthesis, ester formation, and reactions of phenols.

Overall, these modules aim to provide students with a comprehensive understanding of key concepts and principles in chemistry relevant to mechanical engineering. This knowledge will enable students to apply chemical principles in analyzing and solving engineering problems, understand materials and their properties, and make informed decisions about chemical processes and reactions in mechanical engineering applications.

Model 5

Code	Course/Module Title	ECTS	Year /Semester
ENG128	**Engineering Drawing**	**7**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**4**	**93**	**82**

Description

After completing this course, students should be able to do the following:

1- To learn the rules and fundamentals of engineering drawing.

2- Knowledge of engineering drawing tools and how to use them.
3- Learn to read and write notes on engineering drawings.
4- To learn how to create 2D projections from 3D drawings.
5- To be able to read and write drawing measurements.
6- The ability to draw 3D shapes.
7- The ability to draw engineering sections.

Model 7

Code	Course/Module Title	ECTS	Year /Semester
UOM121	**Democracy and Human Rights**	**2**	**1/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**17**	**50**

Description

After completing this course, students should be able to do the following:

1- Students understand the principles of democracy and its importance in achieving justice and sustainable development.
2- Students gain basic knowledge of international charters and conventions related to human rights and become familiar with their fundamental rights as well as the rights of others.
3- Students learn how to think critically and analytically about issues of democracy and human rights and how to evaluate evidence and positions related to these issues.
4- Students learn to actively participate in political and social life by voting in elections, participating in peaceful demonstrations, or working in non-governmental organizations.
5- Students learn the values of coexistence and mutual respect among individuals, regardless of their cultural, religious, or gender differences.

They also acquire the ability to empathize and interact positively with others.

6- Students learn how to contribute to social change and combat discrimination, injustice, and oppression, whether locally or globally.

7- Students become familiar with legal procedures related to human rights protection and relevant legal issues and acquire the ability to apply legal knowledge in their daily lives.

Model 8

Code	Course/Module Title	ECTS	Year /Semester
ENG124	**Mathematics II**	**5**	**1/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**63**	**62**

Description

After completing this course, students should be able to do the following:

Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from. Thus, engineering students must have the ability to apply mathematical knowledge and skills to problem-solving and engineering design tasks. Simply having mathematical or engineering knowledge without understanding how to use the learned strategies can limit a student's ability to provide correct answers.

Model 8

Code	Course/Module Title	ECTS	Year /Semester
ENG124	**Mathematics II**	**5**	**1/2**

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62

Description

After completing this course, students should be able to do the following:

Mathematics contributes to the core of engineering and serves as a source of knowledge from which engineering students can draw from. Thus, engineering students must have the ability to apply mathematical knowledge and skills to problem-solving and engineering design tasks. Simply having mathematical or engineering knowledge without understanding of how to apply the learned strategies can limit a student's ability to provide correct answer.

Model 9

Code	Course/Module Title	ECTS	Year /Semester
ME122	Mechanical Engineering Dynamic	9	1/2

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
6	2	123	102

Description

After completing this course, students should be able to do the following:

The theoretical foundations of Engineering Mechanics Dynamics have expanded substantially in recent years. This course aims to introduce students to this fundamental area of Engineering Mechanics Dynamic, which enables students to focus on the Kinematics of Particles. The course exposes students to the concepts of position, velocity, and acceleration and helps them determine the motion of particles, several particles, and dependent motions. The course introduces the basics of Newton's Second Law in Rectangular Components and

Tangential and Normal Components, Energy and Momentum Methods, and PRINCIPLE OF WORK AND ENERGY, ENERGY, and CONSERVATION OF ENERGY. Upon completion of this course, the students are expected to become proficient in Engineering Mechanics Dynamic and to have the opportunity to explore the current topics in this area.

Model 10

Code	Course/Module Title	ECTS	Year /Semester
ENG123	**Workshop Technology**	**2**	**1/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
	2	**17**	**50**

Description

After completing this course, students should be able to do the following:

1- Identify some of the reasons why machining is commercially and technologically important.
2- Name the three most common machining processes.
3- Cite the two basic categories of cutting tools in machining.
4- List the various operations which may be performed on a center lathe.
5- Describe some methods of taper-turning on a center lathe.
6- Describe the various kinds of drilling machines.
7- Describe a horizontal milling machine.
8- Explain the difference between peripheral milling and face milling.
9- Describe the cylindrical grinding operation and give an idea of the grinding wheel and work speeds recommended.
10- Describe the surface grinding operations with the disc as well as cup-type wheels.
11- Distinguish between fusion and pressure welding processes.
12- Describe the arc welding process.

13- Describe the principle of oxyacetylene gas welding.
14- Distinguish between welding, brazing, and soldering.
15- Cite the requisite properties in a good foundry sand.
16- Describe the procedure of making a mold with a two piece split pattern.
17- Enumerate some common casting defects and explain the reasons which cause these defects.
18- Explain the difference between open and closed die forging techniques.

Model 11

Code	Course/Module Title	ECTS	Year /Semester
ENG125	**Physics**	**3**	**1/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**33**	**42**

Description

After completing this course, students should be able to do the following:

1- To provide an understanding of the behavior of fluids at rest, including topics such as liquid pressure, pressure measurement, surface tension, Bernoulli's equation, viscosity, and the effects of turbulence. Students will learn how to apply these concepts to practical engineering applications.
2- To introduce students to the properties of solids, including crystalline structures, stress and strain analysis, elasticity and plasticity, and the behavior of materials under different loading conditions. Students will learn about concepts such as elasticity modulus, Poisson's ratio, and the energy stored in stressed bodies. Acquire knowledge and skills in the measurement and analysis of physical quantities, including the use of appropriate instruments and units.

3- To familiarize students with temperature measurement techniques and the thermal properties of materials. Topics covered may include different types of thermometers, thermal expansion of materials, thermal impedance, and phase transformations in materials due to temperature changes.
4- Focuses on the study of motion, including the equations of motion, simple harmonic motion (such as pendulums), damped motion, forced motion, and wave motion. Students will learn how to analyze and solve problems related to these types of motion.
5- To provide an understanding of sound waves, including their power and intensity, the relationship between sound and temperature, and the Doppler phenomenon. Students will learn about the properties and behavior of sound waves in different media.

Model 11

Code	Course/Module Title	ECTS	Year /Semester
ME125	**Electrical Engineering**	**7**	**1/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**47**

Description

After completing this course, students should be able to do the following:

A-The module aims are:

1- - Identify the basic symbols and terminology of electrical engineering.
2- - Learn the basics of DC circuits.
3- - Know how to use analysis methods.
4- - Knowledge of electrical network theories.

5- - Learn to solve electrical circuits using analysis methods and network theories.

B- Skill objectives of the course

6- - Learn to solve problems related to electrical circuits.
7- - Learn about the use of advanced scientific computers.
8- - Learn how to use the shortest solutions in electrical engineering.
9- Learn how to find solutions to engineering problems using analysis methods.

Model 12

Code	Course/Module Title	ECTS	Year /Semester
ENG127	**Computer Fundamental and Programming**	**4**	**1/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**4**	**123**	**52**

Description

After completing this course, students should be able to do the following:

1- Introduces the student to the principles of programming language using C++ through knowing the Features of C++, C++ Program parts, Contents of C++, Symbols, Reserved words, Identifiers, Library Functions, Constants, Arithmetic operators, logical tools, Priority of arithmetic and logic operations, other expressions in C++, Exercises and solved problems.
2- Students will also understand the concepts of data types, variables, assignments, Input and output instructions, Conditional and Loop Statements, arrays, and functions.

3- It enables students to gain a basic background in computer programming so that they can use it to solve problems (issues) that they encountered in their specialties.
4- Create programs using C++ programming language.

Model 13

Code	Course/Module Title	ECTS	Year /Semester
ENG201	**Mathematics III**	**4**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	**1**	**63**	**37**

Description

After completing this course, students should be able to do the following:

1- Be educated on Mathematics methods.
2- Know the procedure of calculations.
3- Develop students' understanding of useful Mathematics methods in engineering calculations.
4- Studying and solving applications using Mathematics.

Model 14

Code	Course/Module Title	ECTS	Year /Semester
ME212	**Fluid Statics**	**4**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	**1**	**48**	**77**

Description

After completing this course, students should be able to do the following:

The overall objectives of a fluid mechanics course are to give students a solid foundation in the fundamentals of fluid mechanics, problem-solving skills, practical knowledge, and a mindset for further learning and using fluid mechanics in diverse engineering situations.

Model 15

Code	Course/Module Title	ECTS	Year /Semester
ME213	**Thermodynamics I**	**4**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**52**

Description

After completing this course, students should be able to do the following:

1- To provide students with the ability to integrate the principles of classical thermodynamics and fluid mechanics to provide a foundation for the subsequent analysis of industrial plants and process equipment.
2- To ensure all students can approach thermodynamic analysis of systems logically and methodologically.
3- To know thermodynamics's fundamentals, concepts, and terminologies.
4- To understand the laws of thermodynamics and appreciate their consequences.
5- To develop elementary analysis skills using thermodynamics' first and second laws.

Model 16

Code	Course/Module Title	ECTS	Year /Semester
ME214	**Mechanics of Material**	**5**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**47**

Description

After completing this course, students should be able to do the following:

1- The main objective of studying the mechanics of materials is to provide the engineer with the means of analyzing and designing various machines and load-bearing structures.
2- Explain how materials react to various types of stress under multiple conditions.
3- As the engineering design of different components, structures, etc., used in practice is done using various kinds of materials, it is essential to understand the fundamental behavior of such materials

Model 17

Code	Course/Module Title	ECTS	Year /Semester
ME215	**Mechanical Drawing**	**6**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**4**	**93**	**57**

Description

After completing this course, students should be able to do the following:

1- Be educated on developing an understanding of and appreciation of Technical Drawing Industrial Society;

2- Discover and develop their talents in the fields of Technical Drawing and related technologies;
3- Develop technical problem-solving skills in Technical Drawing as related to materials an processes;
4- Develop the correct and accepted Technical Drawing skills as demanded by Industry;
5- Be aware of the career opportunities available in Technical Drawing and its related fields;
6- have a working knowledge and understanding of Computer Aided Drafting applications;
7- Develop skills to use drawing in the process of design.

Model 18

Code	Course/Module Title	ECTS	Year /Semester
ME216	**Programming of Computers**	**6**	**2/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**3**	**108**	**42**

Description

After completing this course, students should be able to do the following:

The course provides a gentle introduction to the MATLAB computing environment and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of interactive lectures and sample MATLAB problems, which are presented as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include essential use, graphical representations, and tips for designing and implementing MATLAB code.

Model 19

Code	Course/Module Title	ECTS	Year /Semester
ENG202	Mathematics IV	4	2/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	37

Description

After completing this course, students should be able to do the following:

The course provides a gentle introduction to the MATLAB computing environment and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of interactive lectures and sample MATLAB problems, which are presented as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include essential use, graphical representations, and tips for designing and implementing MATLAB code.

Model 20

Code	Course/Module Title	ECTS	Year /Semester
ME222	Fluid Dynamics	5	2/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47

Description

After completing this course, students should be able to do the following:

The overall objectives of dynamics fluid mechanics course are to give students a solid foundation in the fundamentals of Dynamics fluid mechanics, problem-solving skills, practical

knowledge, and a mindset for further learning and using fluid mechanics in diverse engineering situations

Model 21

Code	Course/Module Title	ECTS	Year /Semester
ME223	**Thermodynamics II**	**5**	**2/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**47**

Description

After completing this course, students should be able to do the following:

1- To provide students with the ability to integrate the principles of classical thermodynamics and fluid mechanics in order to provide a foundation for the subsequent analysis of industrial plant and process equipment.
2- To ensure all students can approach thermodynamic analysis of systems in a logical and methodological manner.
3- To understand the laws of thermodynamics and an appreciation of their consequences.
4- To develop some elementary analysis skills using the second laws of thermodynamics.
5- To deeply know the thermal engineering systems.

Model 22

Code	Course/Module Title	ECTS	Year /Semester
ME224	**Strength of Materials**	**4**	**2/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	**1**	**48**	**52**
Description			
After completing this course, students should be able to do the following: As the engineering design of different components, structures etc. used in practice are done using different kinds of materials, it is essential to understand the basic behavior of such materials.			

Model 23			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ME225	**Engineering Metallurgy**	**5**	**2/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**47**
Description			
After completing this course, students should be able to do the following: 1- To recognize the Mechanical properties of metals and alloys. 2- To learn the thermal equilibrium diagrams. 3- Learn about plain carbon steel and its heat treatment. 4- The types of alloy steels. 5- Understand the cast iron and non-ferrous metals and alloys. 6- Understand the polymers and their properties. 7- The corrosion types, mechanism, and damage.			

Model 23

Code	Course/Module Title	ECTS	Year /Semester
ME225	Engineering Metallurgy	5	2/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47

Description

After completing this course, students should be able to do the following:

1- To recognize the Mechanical properties of metals and alloys.
2- To learn the thermal equilibrium diagrams.
3- Learn about plain carbon steel and its heat treatment.
4- The types of alloy steels.
5- Understand the cast iron and non-ferrous metals and alloys.
6- Understand the polymers and their properties.
7- The corrosion types, mechanism, and damage.

Model 24

Code	Course/Module Title	ECTS	Year /Semester
UOM201	Computer II	5	2/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	17

Description

1- Artificial intelligence aims to improve performance in various fields by providing effective, rapid, and accurate solutions to different problems.

2- Artificial intelligence seeks to enhance efficiency in various operations by analyzing data and patterns and improving predictions, design, and process control.
3- Artificial intelligence aims to save time and effort in many fields by reducing the time required for operations, improving accuracy, and minimizing errors.
4- Artificial intelligence strives to enhance the services provided to users and customers by improving user experience and advancing medical, educational, and other services.
5- Artificial intelligence aims to enhance security and safety in various fields by analyzing data, identifying unusual patterns, improving early warning systems, and controlling automated systems.

Model 25

Code	Course/Module Title	ECTS	Year /Semester
UOM202	**Technical English**	**2**	**2/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**33**	**17**

Description

After completing this course, students should be able to do the following:

1- This module aims to improve the technical English language skills of students in the field of petroleum engineering. The primary focus will be on developing proficiency in reading, writing, speaking, and listening to technical content related to petroleum engineering. This module will also provide an understanding of the specific language used in the field and how to communicate effectively with other professionals.

Model 26

Code	Course/Module Title	ECTS	Year /Semester
MNS 120	**Crimes of the Baath regime in Iraq**	**2**	**2/2**

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17

Description

After completing this course, students should be able to do the following:

1- To learn and learn about a range of crimes committed by the defunct and dissolved Ba'ath Party against the Iraqi people and various components of its spectrum and to create awareness for students to reject all forms of injustice and bullying of these regimes and to claim all civil and political rights.

Model 27

Code	Course/Module Title	ECTS	Year /Semester
E311	Engineering Analysis	5	3/1
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	62

Description

After completing this course, students should be able to do the following:

1- Apply complex variable techniques to solve engineering problems, including complex integration and conformal mappings.
2- Understand the properties and applications of special functions (Gamma function).
3- Understand the concept and properties of Fourier series representation.
4- Apply Fourier series to analyze periodic functions and solve engineering problems involving periodic phenomena.
5- Explore the properties and applications of odd and even functions.
6- Apply half-range series to analyze and approximate even and odd functions.
7- Understand the concept of complex Fourier series and its applications.
8- Apply half-range expansion to analyze and approximate complex periodic functions.
9- Gain knowledge of Fourier integration techniques and their applications in solving differential equations.

10- Understand the concept and properties of Laplace transformation.
11- Gain proficiency in Laplace transformation techniques and their applications in solving initial value problems of ordinary differential equations (ODEs).
12- Understand and solve ordinary differential equations using Laplace transform and D-operator.
13- Develop an understanding of Bessel functions and Legendre functions.

Model 28

Code	Course/Module Title	ECTS	Year /Semester
ME312	**Heat Transfer I**	**4**	**3/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**52**

Description

After completing this course, students should be able to do the following:

1- Be educated on heat transfer methods.
2- Know the laws of heat transfer and their calculations.
3- Develop your understanding of heat transfer system thermal load calculations.
4- Identify the relationships that were examined.
5- Studying the applications of heat transfer
6- Identify the most important design parameters for heat transfer applications and systems.

Model 29

Code	Course/Module Title	ECTS	Year /Semester
ME313	**Theory of Mechanism**	**5**	**3/1**

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	32

Description

After completing this course, students should be able to do the following:

The student will be able to analyze:

1- The linear and angular velocities and accelerations.
2- The CAM and follower movements and design.
3- The gear terminology and stresses due to contact.
4- The role and design of flywheels.

Model 30

Code	Course/Module Title	ECTS	Year /Semester
ME314	Internal Combustion Engines I	5	3/1

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	32

Description

After completing this course, students should be able to do the following:

The student will be able to analyze:

1- Teaching of fundamentals of internal combustion engines.
2- Analysis of air standard cycles.
3- Engine operation calculations.
4- Description of different engines systems.
5- Studying The Difference between Wankel Engine and reciprocating engine

Model 31

Code	Course/Module Title	ECTS	Year /Semester
ME315	**Gas Dynamics**	**4**	**3/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**52**

Description

After completing this course, students should be able to do the following:

1- Deriving the main and basic equations that govern the compressible flow at different flow speeds and conditions starting from thermodynamic and fluid basics.
2- Differentiating the compressible flow into four different flow conditions according to its speed
3- Applying the compressible flow conditions on variable area ducts using ideal flow conditions (isentropic flow).
4- Taking the effect of normal shock wave on the ideal compressible flow in a variable area duct.
5- Taking the effect of friction on the ideal compressible flow in a constant area duct (Fanno duct).
6- Taking the effect of adding or absorbing heat on the ideal compressible flow in a constant area duct (Rayleigh duct).
7- Analyzing the thrust power and propulsive efficiency of turbojet, turbofan, and turbo prop engines.

Model 32

Code	Course/Module Title	ECTS	Year /Semester
ME316	**Manufacturing Process**	**7**	**3/1**

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	3	108	67

Description

After completing this course, students should be able to do the following:

1- The course aims to introduce students to various advanced manufacturing and production processes.
2- Students acquire the skills required to work on production machines, metal welding and various plumbing operations.
3- Introducing students to different traditional machines and comparing them with programmed ones and how to prepare different operating programs.
4- Ability to communicate with scientific and engineering developments.
5- Knowing an idea about the mechanism of orthogonal cutting and how they can withstand it.
6- Understanding the powder metallurgy, knowing its types, manufacturing methods, limitations and advantages.

Model 33

Code	Course/Module Title	ECTS	Year /Semester
E321	Numerical Analysis	5	3/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	47

Description

After completing this course, students should be able to do the following:

1- To study numerical analysis methods and their applications in mechanical engineering.
2- To solve mechanical engineering problems with numerical analysis techniques.
3- To learn the basics of programming language and to write simple codes using MATLAB language.

Model 34

Code	Course/Module Title	ECTS	Year /Semester
ME322	Heat Transfer II	6	3/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	57

Description

After completing this course, students should be able to do the following:

1- Be educated on heat transfer methods.
2- Know the laws of heat transfer and their calculations.
3- Develop your understanding of heat transfer system thermal load calculations.
4- Identify the relationships that were examined.
5- Studying the applications of heat transfer
6- Identify the most important design parameters for heat transfer applications and systems.

Model 35

Code	Course/Module Title	ECTS	Year /Semester
ME323	Theory of Machines	3	3/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	27

Description

After completing this course, students should be able to do the following:

1- The linear and angular velocities and accelerations.

2- The CAM and follower movements and design.
3- The gear terminology and stresses due to contact.
4- The role and design of flywheels.

Model 36

Code	Course/Module Title	ECTS	Year /Semester
ME324	**Internal Combustion Engines II**	**3**	**3/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**27**

Description

After completing this course, students should be able to do the following:

1- Teaching of engines fuels.
2- Teaching of combustion chamber phenomena (knocking, combustion, flame propagation, different flow motions).
3- Develop your understanding of Carbureting proses and Ignition system.
4- Identify the important of General combustion theory.
5- Description of different engines systems.

Model 37

Code	Course/Module Title	ECTS	Year /Semester
ME325	**Turbo Machinery**	**6**	**3/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**4**	**63**	**57**

Description
After completing this course, students should be able to do the following: 1- Discriminating turbomachines according to different criteria; work done on or by and the direction of flow. 2- Deriving the main equations govern turbomachines form its first principles. 3- Deriving different types of efficiencies and power for different types of turbomachines. 4- Using similarity and similitude methods to design any prototype turbomachine using the basic information from any module turbomachine under similar design conditions. 5- Analyzing flow over surfaces of blade of any turbomachine. 6- Using the data extracted from the above point to calculate the performance characteristics of any turbomachines

Model 38

Code	Course/Module Title	ECTS	Year /Semester
ME326	**Electrical Machines**	**7**	**3/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**3**	**108**	**67**

Description
After completing this course, students should be able to do the following: 1- Discriminating turbomachines according to different criteria; work done on or by and the direction of flow. 2- Deriving the main equations govern turbomachines form its first principles. 3- Deriving different types of efficiencies and power for different types of turbomachines. 4- Using similarity and similitude methods to design any prototype turbomachine using the basic information from any module turbomachine under similar design conditions. 5- Analyzing flow over surfaces of blade of any turbomachine. 6- Using the data extracted from the above point to calculate the performance characteristics of any turbomachines

Model 39

Code	Course/Module Title	ECTS	Year /Semester
ME411	**Design of Machine Elements I**	**7**	**4/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**3**	**108**	**67**

Description

After completing this course, students should be able to do the following:

1- To analyze Stress and strain and their role in Mechanical design.
2- To learn the theories of mechanical failures.
3- Learn about safety factors, their range and importance.
4- The types of curved beam and analysis of its loadings.
5- How to design and select helical springs.
6- Fatigue stress and how to identify endurance limit.
7- Design and select screws and fasteners.
8- Designing and analyses of pressure vessels (thin and thick cylinders).
9- To understand Computer Aided Design (CAD) and its use in mechanical design.

Model 40

Code	Course/Module Title	ECTS	Year /Semester
ME412	**Power Plant**	**8**	**4/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	**4**	**123**	**77**

Description

After completing this course, students should be able to do the following:

1- Graduating engineers specialized in the fields of power plant in line with the progress made in the field of power plants including the clean energy power plant.
2- Providing the labor market with engineers capable to deal with modern power plant.
3- Coordination of work with researchers in power plant as groups to advance the reality of scientific research in this field.
4- Producing projects and applicable research, and marketing.

Model 41

Code	Course/Module Title	ECTS	Year /Semester
ME413	**Theory of Vibrations**	**3**	**4/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**1**	**48**	**27**

Description

After completing this course, students should be able to do the following:

1- Know the basic concepts of vibrations.
2- Gain skills to deal with engineering problems and cases related to vibrations.
3- Calculation of the displacement (response) of undamped and damped one-degree-of-freedom systems caused by the initial excitation , harmonic force, periodic load, and an aperiodic load.
4- Finding the equivalents of the components of the mechanical vibration system.
5- How to avoid the occurrence of resonance phenomenon in mechanical systems.
6- How to write equations of motion and find natural frequencies of vibration systems using the energy equation, Newton's second law, and Lagrange's equation.
7- Calculate the normal modes and natural frequencies of two and multiple degree of freedom systems.

Model 42

Code	Course/Module Title	ECTS	Year /Semester
ME414	Control	3	4/1
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	27

Description

After completing this course, students should be able to do the following:

1- To develop problem solving skills and understanding of control theory through the application of techniques.
2- Understanding the ability to recognize and analyze feedback control mechanisms and design feedback control systems is the key learning outcomes; the principle of feedback is a universal principle behind many processes and devices encountered in Mechanical Engineering as well as electrical, compute, physics, chemical, and biology, etc.
3- To understand mechanical element used in control systems.

Model 43

Code	Course/Module Title	ECTS	Year /Semester
ME415	Engineering Materials	5	4/1
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		63	62

Description

After completing this course, students should be able to do the following:

1- After completing this course, students should be able to do the following:
2- Name different types of engineering materials.

3- Name various types of steels and cite compositional differences, distinctive properties, and typical uses for each.
4- Name the five cast iron types and describe the microstructure and note the general mechanical characteristics for each.
5- Name different types of nonferrous alloys and cite the distinctive physical and mechanical characteristics.
6- State the purposes of and describe procedures for the following heat treatments: process annealing, normalizing, and full annealing.
7- Describe a typical polymer molecule in terms of its chain structure and, in addition, how the molecule may be generated from repeat units.
8- Name and briefly describe the four general types of polymer molecular
9- structures, and the four types of copolymers.
10- Cite the differences in behavior and molecular structure for thermoplastic and thermosetting polymers.
11- Describe the process that is used to produce glass–ceramics.
12- Name the types of clay products and forms of carbon.
13- Cite three important requirements that normally must be met by refractory ceramics, abrasive ceramics and cement.
14- Name and briefly describe some forming methods that are used to fabricate glass pieces.
15- Describe the mechanism of crack propagation for both ductile and brittle modes of fracture.
16- Define fracture toughness and make a distinction between fracture toughness and plane strain fracture toughness.
17- Define fatigue and specify the conditions under which it occurs.
18- Define creep and specify the conditions under which it occurs, and determine the steady-state creep rate and the rupture lifetime.
19- Distinguish between oxidation and reduction electrochemical reactions and explain forms of corrosion and corrosion prevention.

Model 44

Code	Course/Module Title	ECTS	Year /Semester
ME416	**Engineering Project**	**4**	**4/1**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**22**

Description

Model 45			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ME421	**Design of Machine Elements II**	**5**	**4/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	**1**	**63**	**62**
Description			
After completing this course, students should be able to do the following: 1- Understand gear types and design and analysis of contact forces. 2- Analysis and selection of Rolling Contact Bearings. 3- Design and analyses of Journal Bearings. 4- Design and analyses of shafts, their loadings, from the viewpoints of bending, torsion and fatigue. 5- Design, analysis and selection of different belt drive systems. 6- Analyses of different joints (rivets and welding joints). 7- The principals of analyzing clutches, brakes and flexible joints (coupling).			

Model 46			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ME422	**Air Conditioning and Refrigeration**	**5**	**4/2**

Class(hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	4	123	52

Description

After completing this course, students should be able to do the following:

1- Preparing engineers for meeting the labor market needs of private and public sectors in the mechanical engineering field through diversifying the methods of learning, teaching, and training for the students.
2- Providing academic programs in the field of mechanical engineering, both theoretical and practical, according to the international standards of academic quality and the needs of the labor market.
3- Encouraging and developing scientific research in the fields of mechanical engineering in the fields of air conditioning and thermal performance of buildings.
4- Preparing a suitable environment for faculty members to develop their knowledge and research skills. To develop some elementary analysis skills using the first and second laws of thermodynamics.

Model 47

Code	Course/Module Title	ECTS	Year /Semester
ME423	Vibration Applications	5	4/2
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	32

Description

After completing this course, students should be able to do the following:

1- The ability to use laboratory equipment correctly to obtain the best results.
2- Know how to measure the characteristics of vibrations of the mechanical systems and interpret the results.
3- Analyze and perform mathematical formulations of real-world mechanical vibration problems.

4- How to compute the natural frequencies and mode shapes of transverse vibration of strings and rods.
5- Measure and control of vibration and noise.

Model 48

Code	Course/Module Title	ECTS	Year /Semester
ME424	**Measurements**	**5**	**4/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**3**	**78**	**47**

Description

After completing this course, students should be able to do the following:

1- This course covers the basic use and application of sensors, transducers, mechanical and electronic measuring instruments. The theory of analogue DC and AC measuring instruments is first established which is then used to study analog electronic and digital meters. Different types of sensors and transducer are studied with their analog and digital interfacing. The use and application of different measuring instruments are also covered.

Model 49

Code	Course/Module Title	ECTS	Year /Semester
ME425	**Industrial Engineering**	**5**	**4/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		**63**	**62**

Description

After completing this course, students should be able to do the following:

1- Develop knowledge of industrial engineering principles.
2- Foster an understanding of project management principles.
3- Enhance problem-solving and analytical skills.
4- Develop critical thinking and decision-making abilities.
5- Cultivate effective communication and teamwork skills.
6- Promote ethical and sustainable practices.

Model 50			
Code	**Course/Module Title**	**ECTS**	**Year /Semester**
ME416	**Engineering Project (contnued)**	**3**	**4/2**
Class(hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
	3	**48**	**27**
Description			

3. Contact

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