Module 1

Code	Course/Module Title	ECTS	Semester
ENG 003	Calculus I	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	63	87
Description			
This course provides a comprehensive guide and up-to-date treatment of engineering mathematics with an in-depth overview of the many mathematical. It is intended to introduce students of engineering, physics, mathematics, computer science, and related fields to those areas of applied mathematics that are most relevant for solving practical problems.			

Module 2

Code	Course/Module Title	ECTS	Semester
ENG 006	Engineering Mechanics I (Static)	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	63	87
Description			
This course is an introduction to learning and applying the principles required to solve engineering mechanics problems. Concepts will be applied in this course from previous courses you have taken in basic math and physics. The course addresses the modeling and analysis of static equilibrium problems with an emphasis on real world engineering applications and problem solving.			

Module 3

Code	Course/Module Title	ECTS	Semester
ENG 001	Physics	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/2/0/0	78	47
Description			
This is the first course in the two-semester sequence of calculus-based introductory physics courses designed to meet the needs of student majoring in Engineering. The course is a survey of the concepts, principles, methods and major findings of classical Physics. Primarily, it covers Newtonian mechanics, and thermal Physics, with topics include: Physics			

and measurement, Vectors, kinematics and dynamics of motion of a single particle in one and two dimensions, work and energy, system of particles, linear momentum and collisions, kinematics and dynamics of rotational motion, equilibrium of rigid bodies, and elasticity, fluid static and fluid dynamics, oscillatory motion, wave motion, and temperature and thermal equilibrium.

Module 4

Code	Course/Module Title	ECTS	Semester
MEC 001	Principles of manufacturing process	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/2	93	57
Description			

This course is designed to meet the needs of student majoring in Engineering. Materials engineering, physical properties and mechanical testing mechanical, industrial safety, measuring instruments, allowances and excesses, the production of metallic materials (ferrous and nonferrous), manufacturing operations, basic - plumbing, composition, hot, cold forming, manufacturing processes Secondary - welding, arrived metals , powder technology, operating Absolutely.

Module 5

Code	Course/Module Title	ECTS	Semester
UOA 001	Arabic Language I	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/0	33	17
Description			

This course aims at building students' familiarity with and competence in Arabic literature in its various genres so as to increase their ability to appreciate literature and to develop their awareness of its concepts through the study of poetry, novel and the short story.

Module 6

Code	Course/Module Title	ECTS	Semester
UOA 005	Human Rights and Democracy	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/0	33	17

Description
This course is designed to give the student the definition of freedom and the right language and idiomatically and legitimacy of the user, Origin of the right in the eyes of Islamic law, Elements of the right and types of, Personal freedom, Intellectual freedom, Rights and economic freedoms, Islam and Slavery, Human rights objectives, The use of freedom and the right general project, The right of a Muslim to his Muslim brother, Parental rights, Right neighbor, The right of women, Human rights in the heavenly religions, Religious tolerance in Islam.

Module 7

Code	Course/Module Title	ECTS	Semester
UOA 007	Computer Science I	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	0/2/0/0	48	27
Description			
This course introduces the student to computer concepts, control structures, functions, and arrays, single and multidimensional, and string processing found in Visual Basic. The course also examines input/output statements including data file I/O, arithmetic, logical and comparison operators, along with an introduction to classes.			

Module 8

Code	Course/Module Title	ECTS	Semester
ENG 004	Calculus II	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	63	87
Description			
Transcendental functions. Techniques of integration. Sequences and Infinite series. Parametric equations and polar coordinates			

Module 9

Code	Course/Module Title	ECTS	Semester
ENG 005	Fundamental of Electrical Engineering	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	72
Description			

This course is designed to meet the needs of student majoring in Engineering. The course is a survey of the concepts, principles, methods and major findings of Fundamental of electrical engineering, which is a continuation of the survey of principles of classical electrical engineering presented in course. This course introduces the basic fundamentals of DC machines (Motors, Generators) and transformer. The students will be able to define, identify and categorize the devices that make up rotating machinery. The students will also learn the different characteristics of rotating machinery and transformers along with electric power transmission

Module 10

Code	Course/Module Title	ECTS	Semester
ENG 007	Engineering Drawing	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/2	93	32
Description			

This course discusses the fundamental concepts of engineering graphics. It gives also an introduction to computer graphics using CAD software. The following topics are covered: Drawing conventions such as standards, line types and dimensioning; drawing of inclined and curved surfaces; deducting the orthographic views from a pictorial; drawing full and half sections; deducting an orthographic view from given two views; pictorial sketching (isometric and oblique).

Module 11

Code	Course/Module Title	ECTS	Semester
ENG 002	Chemistry	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	0/2/0/0	78	47
Description			

Chemistry and Measurement and significant figures. Atoms, molecules and ions. Formulas and names. Stoichiometry and chemical calculations. Chemical reactions. Thermochemistry and enthalpy changes. Quantum theory of the atom and electron configuration. Chemical bonding and molecular geometry. The Lab. Section presents Safety in the Lab. Measurement of mass, volume and density. Identification of an unknown compound. Qualitative analysis of anions. Empirical formula of a compound. Thermal decomposition of hydrates. Stoichiometric determination. Acidbase and redox titrations. Enthalpy of reactions

Module 12

Code	Course/Module Title	ECTS	Semester
MEC 002	Engineering Mechanics-II (Dynamics)	4	2
Class (hr/w)	**CL/Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/1	48	52
Description			

The course covers kinematics and equations of motion of a particle for rectilinear and curvilinear motion. Planar kinematics of rigid bodies. Kinetics for planar motion of rigid bodies, including equations of motion and principles of energy, impulse and momentum.

Module 13

Code	Course/Module Title	ECTS	Semester
MEC 003	Computer Programming	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	0/2/0/0	48	2
Description			

This course gives an introduction to programming in FORTRAN language. Language elements, data types and declaration, Arithmetic expressions, Precision. Comments, Intrinsic (built-in) procedures (functions),Simple input and output. Derived data types, Arrays (including dynamically-allocated),Logical and comparison expressions. Control statements (conditionals, loops etc.). Program units (functions, subroutines, modules). Complicated input and output, interactive and to files. Formatting and File Handling .Mathematical libraries.

Module 14

Code	Course/Module Title	ECTS	Semester
UOA 003	English Language I	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/0	33	17
Description			

This course is designed to enable academic writing course which provides an opportunity for the students to learn and practice the skills needed for handling topics related to the field of study. The course emphasizes the development of academic writing skills as well as the ability to read and think critically. Students will learn to use the library and appropriate online resources to find and evaluate sources to inform, develop and support their ideas in term paper writing. They will also learn skills for reading analysis, such as comprehension and inference.

Module 15

Code	Course/Module Title	ECTS	Semester
ENG 008	Calculus-III	6	Three
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	63	87
Description			

Calculus of functions of several variables: calculus of vector-valued functions, calculus of partial differentiation, Complex numbers, Point representation of complex numbers, Complex conjugate, Vectors and Properties of Vectors, Triple integrals and Applications, and Divergence and Stokes's Theorems.

Module 16

Code	Course/Module Title	ECTS	Semester
ENG 012	**Ethics and Leadership skills**	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/0	33	17
Description			

This course is designed to give the student the required skills in administration and leadership that the needs in his career life.

Module 17

Code	Course/Module Title	ECTS	Semester
MEC 004	Thermodynamics-I	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	47
Description			

Basics of thermodynamics. The system, working substance, heat and work, state and properties, temperature scales, processes and cycles. PV diagram, Internal energy, specific heats. Ideal gas laws, equations of state, first law of thermodynamics, system and control volume concept. Application of conservation of energy principle to isobaric, isochoric, isothermal, adiabatic, isentropic and polytrophic processes. Gas power cycles; Carnot cycle, Otto cycle, Diesel cycle, and Brayton cycle.

Module 18

Code	Course/Module Title	ECTS	Semester

MEC 005	Fluid Mechanics I	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	22
Description			
Fluid mechanics is a branch of physics concerned with the mechanics of fluids, which involves liquids and gases, and the forces on them. Fluid mechanics is defined as the science that deals with the behaviour of fluids at rest (fluid statics) or in motion (fluid dynamics), and the interaction of fluids with solids or other fluids at the boundaries. Fluid mechanics is also referred to as fluid dynamics by considering fluids at rest as a special case of motion with zero velocity.			

Module 19

Code	Course/Module Title	ECTS	Semester
MEC 006	Strength of Materials I	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	22
Description			
This course based for Engineering students covers stresses and deformation in structural members due to axial, tensile and compressive loads, torsional loads on shafts and bending and shear loads on beams. Also included is the study of the basic design of structural members based on the analysis of stress, the deformation, and an understanding of the mechanical behavior of materials under various load conditions.			

Module 20

Code	Course/Module Title	ECTS	Semester
MEC 007	Mechanical Drawing	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	0/2/0/2	78	47

Description
This course provides engineering science and pre-engineering students with professional sketch skills that they need to visualize their designs, mark object dimensions, mechanical symbols, tolerances, understand others' drawings and to be able to draw assembly drawings of parts and components. This course requires both pencil-and-paper and computer aided drawing skills.

Module 21

Code	Course/Module Title	ECTS	Semester
UOA 002	Arabic Language II	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
This course aims at building students' familiarity with and competence in Arabic literature in its various genres so as to increase their ability to appreciate literature and to develop their awareness of its concepts through the study of poetry, novel and the short story.			

Module 22

Code	Course/Module Title	ECTS	Semester
UOA 006	**The Crimes of Baath Regime in Iraq**	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/0	33	17
Description			
This course aims to illustrate Crimes of the Baath regime according to the Law of the Supreme Iraqi Criminal Court in 2005 AD, sections of crimes and Psychological and social crimes and their effects, and the most prominent violations of the Baathist regime in Iraq.			

Module 23

Code	Course/Module Title	ECTS	Semester
ENG 009	Calculus-IV	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	63	87

Description
Calculus of functions of Higher order Differential Equations, Simultaneous Linear Differential Equations, Fourier series, Laplace Transforms, Integration in Vector Fields (Vector Analysis) Vector Fields and Line Integrals, and Sequences and Series.

Module 24

Code	Course/Module Title	ECTS	Semester
MEC 008	Thermodynamics-II	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	22
Description			
The Second Law of Thermodynamics definitions and formulation. Heat engines, heat pumps, thermal efficiency and coefficient of performance of reversible and irreversible engines. Concept of entropy and its application in open and closed systems, and entropy of ideal gases and vapors. Available and unavailable energy, isentropic processes, isentropic efficiency, temperature -entropy and enthalpy-entropy diagrams. Gas power cycles; Carnot cycle, Otto cycle, Diesel cycle, and Brayton cycle. Vapor power cycles; Carnot cycle, and Rankine cycle.			

Module 25

Code	Course/Module Title	ECTS	Semester
MEC 009	Fluid Mechanics II	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/0	63	37
Description			
Fluid mechanics is a branch of physics concerned with the mechanics of fluids, which involves liquids and gases, and the forces on them. Fluid mechanics is defined as the science that deals with the behaviour of fluids at rest (fluid statics) or in motion (fluid dynamics), and the interaction of fluids with solids or other fluids at the boundaries. Fluid mechanics is also referred to as fluid dynamics by considering fluids at rest as a special case of motion withzero velocity.			

Module 26

Code	Course/Module Title	ECTS	Semester
MEC 010	Strength of Materials II	4	4

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/0	63	37
Description			

This module is designed to teach the students of mechanical engineering many topics elastic and elastic-plastic behavior, plane stress and strain, constitutive relationships, principal stress and strain, failure criteria, stresses in thick cylinders, bending and shearing stresses in beams, Mohr's circle, deflections of beams, Euler buckling, short and long columns, torsion of solid and hollow circular sections, elastic axis, introduction to statically indeterminacy and simple redundant structures, work and strain energy concepts.

Module 27

Code	Course/Module Title	ECTS	Semester
MEC 011	Engineering of Metallurgy	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/0	63	37
Description			

Structure of Metals: Crystalline structure of metals Grains and grain boundaries, Nucleation and dendritic growth, Influence of solidification conditions on structure and properties. Identify defect in cast metals

Module 28

Code	Course/Module Title	ECTS	Semester
MEC 012	Electrical Machines	3	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/0	63	12
Description			

This course introduces the basic fundamentals of DC machines (Motors, Generators) and transformer. The students will be able to define, identify and categorize the devices that make up rotating machinery. The students will also learn the different characteristics of rotating machinery and transformers along with electric power transmission

Module 29

Code	Course/Module Title	ECTS	Semester
UOA 004	English Language II	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	0/0/0/0	33	17
Description			
This course expand vocabulary and enhance communication in everyday situations and Increase cultural awareness of English-speaking societies and customs, with Strengthen writing skills for well-structured and grammatically accurate compositions			

Module 30

Code	Course/Module Title	ECTS	Semester
UOA 008	Computer Science II	3	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	0/2/0/0	48	27
Description			
This course introduces the student to computer concepts, Introduction of Microsoft Excel Workbooks, Worksheets and Cell in Microsoft Excel and Formulas in Microsoft Excel. The course also examines the fundamentals of networks and internet			

Module 31

Code	Course/Module Title	ECTS	Semester
ENG 010	Engineering Statistics	4	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0-0-0-0	48	52
Description			
This course is designed to meet the needs of student majoring in Engineering. Classification of Data. Graphical representation. Arithmetical description. Probability theory, probability of an event and composite events. Addition rule and multiplication rule, independent events. Counting techniques. Random variables and probability distributions. Expected values. Continuous and discrete random variables. Normal distribution. Binomial distribution. Poisson distribution. Joint and marginal probability distributions. Independence of random variables. Covariance and correlation. Random sampling. Unbiased estimates. Statistical intervals and test of hypothesis for a single sample.			

Module 32

Code	Course/Module Title	ECTS	Semester

MEC 013	Heat Transfer-I	6	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USSWL (hr/w)**
2	0/2/0/1	78	72
Description			

This course is an introduction to the principal concepts of heat transfer methods. Heat transfer occurs when the temperatures of objects are not equal to each other and refers to how this difference is changed to an equilibrium state. This course focus on two different mechanisms of heat transfer: conduction (through direct contact), and radiation (through electromagnetic waves).

Module 33

Code	**Course/Module Title**	**ECTS**	**Semester**
MEC 014	Theory of Machines-I	6	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	72
Description			

This course introduces students to the principles and development of machinery. Using a systematic approach, the course will grant students' knowledge of the basic rules of machines and also ground the student in the regions of specialization within the discipline. Students will learn the various types of mechanisms and machines. The course will explore the applications of such phenomena like friction, energy transformation, etc. in the field of machinery.

Module 34

Code	**Course/Module Title**	**ECTS**	**Semester**
MEC 015	Engineering Analysis	5	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	0-0-0-0	63	62
Description			

Homogeneous linear equations with constant coefficients; General solutions of linear equations—theory; Initial value problems vs. boundary value problems; Mechanical vibrations, fluid flow problems, heat transfer problem; Nonhomogeneous equations— undetermined coefficients; Forced oscillations and resonance; Nonhomogeneous equations— variation of parameters; Nonhomogeneous equations—variable coefficients; Fourier Series; Fourier Cosine and Sine Series; Partial Differential Equations. A Model for Heat Flow; Method of Separation of Variables; The Heat Equation; The Wave Equation; Laplace's Equation. Functions of complex variables. Polar form of a Complex Number. Trigonometric

and Hyperbolic Functions- Euler's Formula; Cauchy–Riemann Equations- Laplace's Equation.

Module 35

Code	Course/Module Title	ECTS	Semester
MEC 016	Internal Combustion Engines	5	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	47
Description			

This course will explain the components of engines and how engines work and learn through this course how to classify engines. In addition, the types of cycles in which the engine operates and the calculation efficiency. This course will also explain how combustion and chemical reactions of combustion occur. The student will also learn fuel types and specifications.

Module 36

Code	Course/Module Title	ECTS	Semester
MEC 017	Gas Dynamics	4	Five
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/2	63	37
Description			

Explores fundamentals of gas dynamics and compressible fluid flow including one-dimensional isentropic flow; one-dimensional flow with friction and with heating or cooling; normal shock relations; oblique shocks and expansion waves; the moving normal shock wave; flow in variable area ducts; nozzles and diffusers; shock tubes; Fanno curve and Fanno flow equations, solution of Fanno flow equations, variation of flow properties ;Simple heating relation of a perfect gas, Rayleigh curve and Rayleigh flow equations, variations of flow properties, maximum heat transfer, tables and charts for Rayleigh flow.

Module 37

Code	Course/Module Title	ECTS	Semester

ENG 011	Engineering Numerical Methods	5	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/2/0/0	78	47
Description			

In numerical analysis one explores how mathematical problems can be analyzed and solved with a computer. As such, numerical analysis has very broad applications in mathematics, physics, engineering fiancé, and the life sciences. This course gives an introduction to this subject for mathematics majors. Theory and practical examples using Matlab will be combined to study a range of topics ranging from simple root-finding procedures to differential equations and finite element method.

Module 38

Code	Course/Module Title	ECTS	Semester
MEC 018	Heat Transfer-II	6	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	72
Description			

Heat Transfer/ II is a required module for mechanical engineering students. Convection heat transfer is studied in both internal and external geometries under laminar and turbulent flow regimes. Free convection is also considered where heat transfer is due to flow induced by fluid buoyancy. Heat Exchangers Types and the effective NTU relations are studied as well as Boiling and Condensation empirical correlations.

Module 39

Code	Course/Module Title	ECTS	Semester
MEC 019	Theory of Machines-II	6	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	72
Description			

This course introduces students to the principles and development of machinery. Using a systematic approach, the course will grant students' knowledge of the basic rules of machines and also ground the student in the regions of specialization within the discipline. Students will learn the various types of mechanisms and machines. The course will explore the applications of such phenomena like friction, energy transformation, etc. in the field of machinery.

Module 40

Code	Course/Module Title	ECTS	Semester
MEC 020	Manufacturing Processes	5	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/2	63	62
Description			

Properties of materials (Mechanical tensile properties, fatigue cyclic stresses, stress life behavior, S-N curves. Factor affecting fatigue life, safe-life predication. Creep test, classification of materials (ferrous and nonferrous metals, properties, classification). Polymer structures, hydrocarbon molecules, thermoplastic and thermosetting. Stress-strain behavior. plastic, fibers, ceramic structure and properties, silicate ceramics, glasses and glass ceramic, clay products, cements, advanced ceramics. Composites materials, fiber composite, large-particle composites, dispersions strengthened composite, matrix phase, polymer-matrix composites, martials selection Materials Selection Methodology, Ranking the materials by their ability to meet the objectives. Also, involves the manufacturing processes addresses manufacturing deformation process (rolling, forging, extrusion, wire and rod drawing and sheet metal deformation) and Other deformation processes related to them.

Module 41

Code	Course/Module Title	ECTS	Semester
MEC 021	Renewable and Sustainable Energy	4	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/1	48	52
Description			

Non-renewable& Renewable Energy Resources; Advantages of non-conventional energy sources; Disadvantages of non-conventional energy sources. The Physics of Solar Radiation; Sky Radiation; Principal Definitions; Calculation of Radiation Intercepted By Surface Beam Thermal solar collectors (Flat & Concentrating Collectors);Thermal Energy Losses from Solar Collector ;The amount of heat absorbed by the collector The Principal Working of PV Cell; Calculation the power of the domestic house devices; Calculation the losses power of Inverter &Converter; The number, cost and area of PV panelsWind Power Plant; The Principal Working of Wind Energy; Calculation Performance of wind turbine; Wind Turbine Classification; Geothermal energy; Electricity production; Flash Power Plant; Dry Steam Power Plant; Binary steam power plant; The Ground-Coupled Heat Pump (GCHS); Hydro power plant; General layout of a hydroelectric power plan.

Module 42

Code	Course/Module Title	ECTS	Semester
MEC 022	Industrial Engineering and Economic Analysis	4	Six
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0-0-0-2	63	37
Description			

This is a required course for the Mechanical Engineering Program. Production and services systems inputs and output, management concepts and history, Management systems role & functions of management. Factors affecting industrial development, industrial development of Iraq, organization structures & types. Productivity, basic concepts, classification, measurement and improvement. Role of work study, work measurement and work sampling.
Plant location criteria, equipment and utilities layout, types of layout. Material handling systems. Types of production, group technology, variety control, make or buy decisions.Demand forecasting, useful forecasting models, material requirement planning, capacity requirement planning MRPII. Inventory models and Just in time (JIT) technique, production planning, scheduling problems & models, Industrial safety.

Module43

Code	Course/Module Title	ECTS	Semester
MEC 023	Design of Machine Elements-I	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0-0-0-1	63	62
Description			

Machine Design or Mechanical Design can be defined as the process by which resources or energy is converted into useful mechanical forms, or mechanisms so as to obtain useful output from the machines in the desired form as per the needs of the human beings. Machine design can lead to the formation of an entirely new machine or can lead to up-gradation or improvement of the existing machine.
This course covers basic criteria of the performance and design of machine parts, determination of permissible and actual stresses. The first part of the course deals with the analysis and design of parts subjected to static loading, variable loading, and how to proportion them to successfully resist such conditions. The second part provides a classical treatment on the design of machine elements such as shafts, screws, fasteners, welding, and bonding by presenting established design methodologies as set by the appropriate organizations.

Module44

Code	Course/Module Title	ECTS	Semester
ME 024	Air conditioning	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/2/0/1	78	72
Description			
Air conditioning is part of the curriculum of Mechanical Engineering Program. This course covers the key aspects of air conditioning, including the calculation of the moist air properties, the use of the psychometric chart, the estimation of the heating and cooling loads, as well as the design of air ducts and air conditioning systems			

Module45

Code	Course/Module Title	ECTS	Semester
MEC 025	Mechanical Vibrations	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0-2-0-1	78	47
Description			
This course describes the fundamental of vibration in various mechanical vibrations systems and formulate their mathematical models based on Newton's laws of motion, energy method, Lagrange's method, etc. It analysis the vibration performance by evaluating natural frequencies, modes of vibrations, resonance phenomenon, effect of damping factor for single and multi-degree of freedom systems. The calculation of these values provides practical solutions to avoid excessive vibrations in modern design of mechanical systems. The students will be able to model mathematical relations, derivation/solution of equations of motion. The course also will reinforce the skills of students relating to how to utilize experimental techniques of vibration measurement.			

Module46

Code	Course/Module Title	ECTS	Semester
MEC 26	Engineering Materials	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0/0/0/1	48	77

Description
Properties of materials (Mechanical tensile properties, fatigue cyclic stresses, stress life behavior, S-N curves. Factor affecting fatigue life, safe-life predication. Creep test, classification of materials (ferrous and nonferrous metals, properties, classification). Polymer structures, hydrocarbon molecules, thermoplastic and thermosetting. Stress-strain behavior. plastic, fibers, ceramic structure and properties, silicate ceramics, glasses and glass ceramic, clay products, cements, advanced ceramics. Composites materials, fiber composite, large-particle composites, dispersions strengthened composite, matrix phase, polymer-matrix composites, martials selection Materials Selection Methodology, Ranking the materials by their ability to meet the objectives.

Module47

Code	Course/Module Title	ECTS	Semester
MEC 01E	Computational Fluid Dynamics	5	7

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/1	78	47

Description
This is a required course for Mechanical Engineering Program. Studying the basic concepts and applications of computational fluid dynamics to the analysis and design of fluid systems and components.

Module48

Code	Course/Module Title	ECTS	Semester
MEC 027	Final Year Project I	100	7

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	1/2/0/1	78	22

Description
Final year project is a core course, which is a part of student training as a researcher in mechanical engineering department. The project is the final part of the work on the dissertation and presents its practical part. During the implementation of the project, undergraduates work out in laboratory conditions the results of scientific research obtained at the previous stages of work on the dissertation. The project is carried out in specialized laboratories in scientific groups. Final project allows you to gain professional

skills and experience in research activities. For successful development of Final project, the student must possess practical knowledge, skills, universal, professional and General professional competencies acquired as a result of mastering the previous blocks of the education program.

Module49

Code	Course/Module Title	ECTS	Semester
MEC 028	Design of Machine Elements-II	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0-0-0-1	63	62
Description			

Design of machine elements is defined as the use of imagination, scientific principles and engineering techniques to create elementary components of machine or structure economically, in order to satisfy the industry requirements and then needs of customers. The focus in this course is on blending fundamental development of concepts with practical specification of components so that students find them familiar with both the basis for decisions and the standards of industrial components.

Fundamentals of gears are included to address the design of compound gear trains to achieve specified gear ratios. The discussion of the relationship between torque, speed, and power is clarified. Design of rolling bearing introduces the invariant, the statistical distribution of life as well as some useful deterministic equations addressing load versus life at constant reliability. The importance of lubrication in reducing friction, wear, and heating of machine parts that move relative to each other is explained. Recent metallurgy developments in bearing materials combined with increased knowledge of the lubrication process give a possibility to design journal bearings with satisfactory lives with very good reliabilities. This course discusses the more frequently used types of springs, their necessary parametric relationships, and their design. Moreover, the course provides a classical treatment on the design of machine elements such as brakes, clutches, and flywheels, and their applications by presenting established design methodologies as set by the appropriate organizations.

Module50

Code	Course/Module Title	ECTS	Semester
MEC 029	Refrigeration	5	8

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/1	78	47
Description			

Refrigeration is part of the curriculum of Mechanical Engineering. This course covers some aspect of Refrigeration Engineering, including a review of basic principles, the vapour compression cycles and heat pumps, the refrigerants, the vapour absorption cycles, the air refrigeration cycles, the thermoelectric refrigeration, the vortex tube refrigeration, as well as the steam jet water vapour refrigeration system.

Module51

Code	Course/Module Title	ECTS	Semester
MEC 408	Measurement and Control Systems	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0-2-0-2	93	57
Description			

Engineering control is a study and analysis the regulation and output behaviors of dynamical systems subject to various input signals. It involves the design of engineering products or systems where a requirement is to accurately control some quantity. It is essential for students pursuing degrees in electrical, mechanical, aerospace, biomedical, or chemical engineering. Control systems are found in a broad range of applications within these disciplines, from aircraft and spacecraft to robots and process control systems. It bases on using mathematical models to represent physical systems in a suitable form for ease of use in the analysis and design of much more stable systems. The working principles of measurement signals in control systems are also explained, which can mainly be employed by using various sensors and transducers.

Module52

Code	Course/Module Title	ECTS	Semester
MEC 404	Power Plants	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	0/0/0/1	60	90
Description			
This is a required course for Mechanical Engineering Program. The course will cover the principles of Power Engineering Technology. This course provides the student with anintroduction to the major systems and components that make up a modern power plants.			

Module53

Code	Course/Module Title	ECTS	Semester
MEC 02E	Finite Element Methods (FEM)	4	Seven
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0-0-0-1	48	52
Description			
The finite element method is an indispensable tool for engineers in all disciplines. This course introduces students to the fundamental theory of the finite element method as a general tool for numerically solving differential equations for a wide range of engineering problems. Field problems described by the Laplace, and Poisson equations are presented first and all steps of the FE formulation are described. Specific applications in heat transfer and flow in porous media are demonstrated with associated tutorials. The application of the method to elasticity problems is then developed from fundamental principles. Specific classes of problems are then discussed based on abstractions and idealizations of 3D solids, such as plane stress and strain, Euler-Bernoulli and Timoshenko beams and Kirchhoff and Mindlin-Reissner plates and shells. Time dependent problems and time integration schemes are presented. Special topics such as multiple constraints, mixed formulations and substructuring are introduced. Finite element formulation for incompressible flow problems is introduced through discretization of Euler and Navier-Stokes equations.			

Module54

Code	Course/Module Title	ECTS	Semester
MEC 032	Final Year Project II	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	1/2/0/1	78	22

Description
Final year project is a core course, which is a part of student training as a researcher in mechanical engineering department. The project is the final part of the work on the dissertation and presents its practical part. During the implementation of the project, undergraduates work out in laboratory conditions the results of scientific research obtained at the previous stages of work on the dissertation. The project is carried out in specialized laboratories in scientific groups. Final project allows you to gain professional skills and experience in research activities. For successful development of Final project, the student must possess practical knowledge, skills, universal, professional and General professional competencies acquired as a result of mastering the previous blocks of the education program.