

Al-Furat Al-Awsat Technical University
جامعة الفرات الأوسط التقنية



First Cycle – Bachelor's Degree (B.Sc.) - Power Mechanic Engineering

بكالوريوس - هندسة ميكانيك القدرة



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1. Overview

This catalogue is about the courses (modules) given by the program of Power Mechanic Engineering to gain the Bachelor of Science degree. The program delivers (52) 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 هندسة ميكانيك القدرة للحصول على درجة بكالوريوس. يقدم البرنامج (٥٢) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
ATU24011	English for Academic(Level 1)	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1		18	32
Description			
Teaching the student, the basic principle of English Language. This description of the academic program provides a necessary summary of the most important characteristics of the program and the learning outcomes expected of the student to be achieved, demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course within the program. The academic program aims to prepare specialized, scientifically and professionally qualified cadres in the field of English language and translation who are able to compete in the local and global labor market by developing their linguistic, intellectual and research skills and enhancing their sense of confidence.			

Module 2

Code	Course/Module Title	ECTS	Semester
ATU24012	Computer Principals I	3	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
<p>This course includes general information about the principles of electronic computers, including the definition of computers and their types And the stages of development of its industry, then the description is completed by studying the types of computers and how to classify them. that components The physical computer, software, and programming languages in general, and the work of some of its units is considered to be among The basic vocabulary that is focused on so that the student has acquired what is necessary to form the image Learn about computers and their importance. Additional matters included in the course include the numerical system. The computer works and how it is used by the computer and its expression, as well as an idea of the diagrams Streamlined in a simplified way, given that the student is not specialized in studying electronic computer programming. At the end of the course, the student will have learned additional information about his specialization regarding how using the computer in his daily life and in his field of specialization by realizing the importance of storing it Information to be referred to when needed, as well as the use of some ready-made software such as programs Microsoft Office.</p>			

Module 3

Code	Course/Module Title	ECTS	Semester
ATU24013	Mathematics -I	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
<p>The study of this subject aims to make an introduction and revision to some mathematical concepts that studied in the previous years in the secondary school, and supported these knowledge with addition of some advanced items such as the definition of hyperbolic functions with their derivatives and integration rules. In the other side there is a gap in knowledge between students according to their background affiliation (technical secondary school) . So the target of mathematics 1 is filling this gap and try to make a balance between the students in next stage of their learning program.</p>			

Module 4

Code	Course/Module Title	ECTS	Semester
ATU24014	Workshop	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	6	93	57
Description			
<p>An Engineering Workshop has become important field in the industrial atmosphere to produce products for the service of mankind. The knowledge of converting a raw material into a use full product is highly essential for all engineers for familiarizing with concepts. The basic need of Engineering Workshop is to provide theoretical and practical knowledge of manufacturing environment to all the engineering students. Therefore, an attempt has been made through this laboratory subject to learn both the theoretical and practical knowledge of shaping a product. Considering the general needs of engineering students in the country and the fact that they hardly get any exposure to hand tools, equipments, machines and manufacturing setups, a basic course in Engineering Workshop remains a core subject for all the branches of engineering. This Engineering Workshop laboratory classes covers most of the basic skill that an engineering students needs to familiarize themselves.</p>			

Module 5

Code	Course/Module Title	ECTS	Semester
ATU24015	Fundamentals of Engineering Mechanics- Statics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	102
Description			
<p>Teaching the student, the fundamentals of engineering mechanics (Static's) in the engineering applications, the loads analysis, resultants, equilibrium in 2-D and 3-D, moments and couples, first and second moment of inertia, motion of particles, and their theories.</p> <p>The academic program in the College of Engineering aims to:</p> <ol style="list-style-type: none">1- Build the student scientifically and qualify him to work in the field of engineering techniques.2- Building and preparing the student psychologically to play his role as a reliable engineer in this field.3- Building students who are able to compete with other engineers for job opportunities and obtain the required seats in completing postgraduate studies.4- The ability to apply for external tests by local, regional or international bodies for the purpose of completing studies or appointment.5- Providing students with scientific, practical and self-skills that enable them to solve practical problems and deal with them using scientific concepts			

Module 6

Code	Course/Module Title	ECTS	Semester
ATU24016	Engineering Drawing (Fundamentals)	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	6	87	63
Description			
<p>This course introduces students to technical drawing a means of professional engineering communication. It will cover: sketching, line drawing, shape description, projections, drawing standards, sections and dimensioning.</p> <p>Course Objectives</p> <ul style="list-style-type: none">• To emphasize the importance of drawing as a language for engineers• To develop skills in engineering drawing and drafting.• To develop skills in interpretation of engineering drawings• To develop skills in computer aided drafting and design.			

Module 7

Code	Course/Module Title	ECTS	Semester
ATU24017	Arabic Language	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	2	31	19
Description			
<p>الحفاظ على كتاب الله وسنة نبيه محمد صلى الله عليه واله وسلم و إدراك مبادئ الإسلام وأسس شريعته والاعتزاز بحضارة الأمة الإسلامية .</p> <p>تعويد الطلاب على الاستفادة من المكتبة العربية والرجوع إلى أمهات الكتب .</p> <p>تنمية قدرات الطلاب ومهاراتهم الخطية والإملائية بحيث يستطيعون الكتابة الصحيحة مع ضرورة استعمال علامات الترقيم .</p> <p>تدريب الطلاب على استخدام القواعد النحوية والصرفية أثناء القراءة والكتابة والتعبير .</p> <p>اعانة الطلاب على التعبير الصحيح، وضبط الأساليب وتفهم القرآن الكريم والوقوف على أسراره .</p> <p>تمرين الطلاب على دقة التفكير والبحث العقلي الدقيق .</p>			

Module 8

Code	Course/Module Title	ECTS	Semester
ATU24021	Human Right and Democracy	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1		33	17
Description			
<p>التعرف على الحرية والديمقراطية في المجتمعات المتعددة وعلى مر العصور وأنواعها وكيف تحولت أنظمة بعض الدول من نظام إلى آخر. كذلك تتضمن اهداف عامه و اهداف سلوكيه الاهداف العامة</p> <p>1.الدفاع عن كرامة الإنسان.</p> <p>2.المساهمة في تغيير حياة الإنسان إلى الأفضل بشأن: التغيير في القيم والمشاعر - والتغيير في السلوك.</p> <p>3.ترجمة المعارف والخبرات والقيم وأنماط السلوك إلى عمل دائم ونشاط مستمر من أجل الدفاع عنها في الواقع المعاش وتعزيز الجهود الكفيلة بمعالجة قضايا حقوق الإنسان.</p> <p>الاهداف السلوكية:</p> <p>1.تعزيز الربط بين الفرد والجماعة والدولة ومؤسساتها.</p> <p>2.تعزيز مشاعر التضامن مع الآخرين.</p> <p>3.تنمية مهارات رصد الانتهاكات والتعامل مع المنتهكين.</p> <p>4.دعم مهارات فهم قضايا حقوق الإنسان.</p> <p>5.تعزيز سبل التعليم التفاعلي.</p> <p>6.تعزيز سبل المشاركة في الشأن العام – المواطنة.</p> <p>7.تعرف المبادئ الرئيسة لأبرز حقوق الإنسان ومصادرها وأنواعها والآليات المستخدمة لحمايتها.</p> <p>8. تعرف القيم والاتجاهات وأنماط السلوك التي تُعلي من شأن حقوق الإنسان وتعمل على التمسك بها .</p>			

Module 9

Code	Course/Module Title	ECTS	Semester
ATU24022	Mathematics -II	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
<p>The study of this subject aims to make an introduction and revision to some mathematical concepts that studied in the previous years in the secondary school, and supported this knowledge with addition of some advanced items such as the definition of hyperbolic functions with their derivatives and integration rules. In the other side there is a gap in knowledge between students according to their background affiliation (technical secondary school) . So the target of mathematics 2 is filling this gap and try to make a balance between the students in next stage of their learning program.</p>			

Module 10

Code	Course/Module Title	ECTS	Semester
ATU24023	Engineering Materials	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	92
Description			
<p>The subject aims to provide knowledge about construction of materials, their properties and key issues associated with their applications. The subject also introduces the relationships between the structure of a material and its properties. Understand the concepts of atomic bonding, crystal structures, imperfections, diffusion, mechanical properties, electron energy, and dislocations as related to processing and performance of engineering materials.</p> <p>This subject must be taken early in the progression of training to be an engineer as it is a prerequisite of design subjects, and contributes valuable insights into the role of materials in other disciplines of engineering . It partners with Engineering Mechanics to build a student's understanding of the way objects behave when load or deformations are applied to them.</p>			

Module 11

Code	Course/Module Title	ECTS	Semester
ATU24024	Fundamentals of Engineering Mechanics-Dynamics	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	102
Description			
<p>Teaching the student, the fundamentals of engineering mechanics (Dynamics) in the engineering applications, the loads analysis, resultants, equilibrium in 2-D and 3-D, moments and couples, first and second moment of inertia, motion of particles, and their theories.</p> <p>The academic program in the College of Engineering aims to:</p> <ol style="list-style-type: none">1- Build the student scientifically and qualify him to work in the field of engineering techniques.2- Building and preparing the student psychologically to play his role as a reliable engineer in this field.3- Building students who are able to compete with other engineers for job opportunities and obtain the required seats in completing postgraduate studies.4- The ability to apply for external tests by local, regional or international bodies for the purpose of completing studies or appointment.5- Providing students with scientific, practical and self-skills that enable them to solve practical problems and deal with them using scientific concepts			

Module 12

Code	Course/Module Title	ECTS	Semester
ATU24025	Engineering Drawing (CAD Drawing)	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	6	87	63
Description			
<p>Introduces computer aided design for 2D drawings. Students will use AutoCAD, one of the most popular computer aided design programs. Integrated CAD competencies include: model and layout space environments, prototype drawing use, coordinate input systems, 2D engineering geometry construction in model space, geometry editing and paper space drawing layout. Objects drawn are Mechanical . In this course which the students will learn the fundamentals of using CAD software. The students will learn basic CAD techniques that are used to draw and edit drawing entities; manipulate screen displays; write text; lay out drawings; print and plot drawings; apply dimensions; and manage drawing files. An introduction to computer use will be included in this course and previous knowledge of computers or computer programming is not required.</p>			

Module 13

Code	Course/Module Title	ECTS	Semester
ATU24026	Fundamentals of Electricity	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>Through lectures and hands-on lab experiments, the course covers basic electric circuits, parallel circuits, series-parallel circuits, wire tables and conductor sizes, magnetic induction, voltage sources, current sources, resistance, analysis of DC and AC circuits, and power considerations. The use of measuring instruments such as DMM and oscilloscopes is also included.</p> <p>Successful completion of Electrical Fundamentals will given the ability to:</p> <ul style="list-style-type: none">• Calculate and measure voltage, current, resistance and power in electrical DC circuits;• Identify resistances using colour codes;• Calculate and measure total equivalent resistances in series parallel circuits.			

Module 14

Code	Course/Module Title	ECTS	Semester
ATU24031	Fluid Mechanics -static	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>From the point of view of fluid mechanics, all matter consists of only two states, fluid and solid. The difference between the two is perfectly obvious to the layperson, and it is an interesting exercise to ask a layperson to put this difference into words. The technical distinction lies with the reaction of the two to an applied shear or tangential stress. A solid can resist a shear stress by a static deflection; a fluid cannot. Any shear stress applied to a fluid, no matter how small, will result in motion of that fluid. The fluid moves and deforms continuously as long as the shear stress is applied. As a corollary, we can say that a fluid at rest must be in a state of zero shear stress, a state often called the hydrostatic stress condition in structural analysis. In this condition, Mohr's circle for stress reduces to a point, and there is no shear stress on any plane cut through the element under stress.</p>			

Module 15

Code	Course/Module Title	ECTS	Semester
ATU24032	Electrical Engine	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
<p>Teaching the student, the principles of electrical machines and electronic devices that necessary for Power Mechanics engineer. This course focuses on the analysis and design of electric motors, generators, and associated power electronic drive systems, placing special emphasis on the design of machines for electric drives, including traction drives, drive motors for automated manufacturing (robots), material handling and drive motors for automotive, aircraft and marine propulsion systems, and associated power electronic drives. Course exercises will additionally investigate machine performance as affected by design measures such as selection of pole and slot count, winding details, induction machine slot profiles, and optimization of magnets.</p>			

Module 16

Code	Course/Module Title	ECTS	Semester
ATU24033	Mechanical Engineering Drawing	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	6	87	63
Description			
<p>Mechanical Drawing is an engineering course for students with bachelor's degrees in mechanical engineering. It's an area of study in which one learns and teaches the student advanced skills in the imagination of how to assemble or connect many mechanical parts to do a specific function. This course involves many important subjects such as teaching the students how to connect the parts by using mechanical connection methods like bolts, nuts, rivets, keys, pins, springs, and welding. It also includes teaching the students how to use the weld symbols, operation symbols, and dimensional relations between the connected parts by using fit and tolerance tables. This course involves the basic principles of drawing one or more connecting gear involute such as bevel gear, worm gear, and spur gear. The students will be able to draw the assembly drawing and working drawing in connecting many parts. Also, they will learn how to use ACD in mechanical drawing.</p>			

Module 17

Code	Course/Module Title	ECTS	Semester
ATU24034	Fundamentals of Thermodynamics	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>Thermodynamics is a branch of physics that deals with heat, work, and temperature, and their relation to energy, entropy, and the physical properties of matter and radiation. The behavior of these quantities is governed by the four laws of thermodynamics which convey a quantitative description using measurable macroscopic physical quantities, but may be explained in terms of microscopic constituents by statistical mechanics. Thermodynamics applies to a wide variety of topics in science and engineering, especially physical chemistry, biochemistry, chemical engineering and mechanical engineering, but also in other complex fields such as meteorology. The first law specifies that energy can be transferred between physical systems as heat, as work, and with transfer of matter. The second law defines the existence of a quantity called entropy, that describes the direction, thermodynamically, that a system can evolve and quantifies the state of order of a system and that can be used to quantify the useful work that can be extracted from the system.</p>			

Module 18

Code	Course/Module Title	ECTS	Semester
ATU24035	Baath Party Crimes	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			

Module 19

Code	Course/Module Title	ECTS	Semester
ATU24036	Mathematics- III	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
Teaching the student, the second part of advanced mathematics that include complex numbers and vectors and the partial lines beside Double and Triple integration and its applications with Polar coordinates and series to grow the student brain ability and make from it a useful application in his specialist side.			

Module 20

Code	Course/Module Title	ECTS	Semester
ATU24041	Fluid Mechanics-Dynamics	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>From the point of view of fluid mechanics, all matter consists of only two states, fluid and solid. The difference between the two is perfectly obvious to the layperson, and it is an interesting exercise to ask a layperson to put this difference into words. The technical distinction lies with the reaction of the two to an applied shear or tangential stress. A solid can resist a shear stress by a static deflection; a fluid cannot. Any shear stress applied to a fluid, no matter how small, will result in motion of that fluid. The fluid moves and deforms continuously as long as the shear stress is applied. As a corollary, we can say that a fluid at rest must be in a state of zero shear stress, a state often called the hydrostatic stress condition in structural analysis. In this condition, Mohr's circle for stress reduces to a point, and there is no shear stress on any plane cut through the element under stress.</p>			

Module 21

Code	Course/Module Title	ECTS	Semester
ATU24042	Metallurgy	4	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
<p>Teaching the student, the importance of engineering materials, metals and nonmetals behavior. Metallurgy and Materials Engineering involves the engineering principles required to concentrate, extract and refine metals, materials and carbon (coal) materials, as well as to develop new alloys and materials, including ceramics and composites.</p> <p>Metallurgical engineers conduct testing to ensure the safety of materials, develop sustainable materials and processes for recycling existing materials, investigate material failures, and create testing procedures to ensure materials can withstand extreme environments. Core subjects in Materials Engineering focus on the structure and behaviour of materials and their conversion into usable forms (through heat treatment, welding and forming processes, and powder metallurgy).</p>			

Module 22

Code	Course/Module Title	ECTS	Semester
ATU24043	Mathematics- IV	4	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	37
Description			
Teaching the student, the second part of advanced mathematics that include complex numbers and vectors and the partial lines beside Double and Triple integration and its applications with Polar coordinates and series to grow the student brain ability and make from it a useful application in his specialist side.			

Module 23

Code	Course/Module Title	ECTS	Semester
ATU24044	Strength of Materials	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
Strength of Materials is an engineering course in the second level for students with bachelor's degrees in mechanical engineering. The basic principle of this course is to study and learn many subjects in this field of material science by utilizing the whole knowledge in many disciplines of mechanical engineering. It requires a support knowledge in the fundamentals of engineering mechanics-statics. This course includes many important subjects such as analysis of internal forces, simple stress, shearing, bearing, tearing stresses, thermal stresses, hook's law, axial deformation, impact test, Euler's formula for long columns, Mohr's circle, and application of Mohr's circle. Finally, this course will enable the students to have a clear vision of many engineering materials that are used in different industrial applications and enable them to determine the main causes that may lead to and cause material failure.			

Module 24

Code	Course/Module Title	ECTS	Semester
ATU24045	Computer 2	3	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	12
Description			
<p>MATLAB is a high-level programming language designed for engineers and scientists that expresses matrix and array mathematics directly. You can use MATLAB for everything, from running simple interactive commands to developing large-scale applications. MATLAB is a software package for high-performance mathematical computation, visualization, and programming environment. It provides an interactive environment with hundreds of built-in functions for technical computing, graphics, and animations.</p> <p>MATLAB stands for Matrix Laboratory. MATLAB was written initially to implement a simple approach to matrix software developed by the LINPACK (Linear system package) and EISPACK (Eigen system package) projects. MATLAB is a modern programming language environment, and it has refined data structures, includes built-in editing and debugging tools, and supports object-oriented programming. MATLAB is Multi-paradigm. So, it can work with multiple types of programming approaches, such as Functional, Object-Oriented, and Visual.</p>			

Module 25

Code	Course/Module Title	ECTS	Semester
ATU24046	Thermodynamic - Applications	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>Thermodynamics applies to a wide variety of topics in science and engineering, especially physical chemistry, biochemistry, chemical engineering and mechanical engineering, but also in other complex fields such as meteorology. The first law specifies that energy can be transferred between physical systems as heat, as work, and with transfer of matter. The second law defines the existence of a quantity called entropy, that describes the direction, thermodynamically, that a system can evolve and quantifies the state of order of a system and that can be used to quantify the useful work that can be extracted from the system.</p> <p>In thermodynamics, interactions between large ensembles of objects are studied and categorized.</p>			

Module 26

Code	Course/Module Title	ECTS	Semester
ATU24047	English for Academic(Level 2)	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The main objective that will be adopted in this lesson is to teach the student the main principles and rules used in constructing sentences that are used in different situations, and work to encourage students to write and speak in groups in order to raise language skills and improve listening skill as well. This will be achieved through interactive educational patterns and means, and by encouraging students to write about topics of interest to students. This is important to improve the level of students at this level in English using multiple means. Also, to understand the main rules of writing, especially for writing lab reports or graduation projects. This course is concerned with introducing students to the main concepts of writing, reading, speaking and listening. It will achieve the possibility for the student to write a short article as well as the ability to read for various scientific and general topics.</p>			

Module 27

Code	Course/Module Title	ECTS	Semester
ATU24051	Hydraulics	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>Hydraulics, branch of science concerned with the practical applications of fluids, primarily liquids, in motion. It is related to fluid mechanics, which in large part provides its theoretical foundation. Hydraulics deals with such matters as the flow of liquids in pipes, rivers, and channels and their confinement by dams and tanks. Some of its principles apply also to gases, usually in cases in which variations in density are relatively small. Consequently, the scope of hydraulics extends to such mechanical devices as fans and gas turbines and to pneumatic control systems. In hydraulic power systems there are five elements: the driver, the pump, the control valves, the motor, and the load. The driver may be an electric motor or an engine of any type. The pump acts mainly to increase pressure. The motor may be a counterpart of the pump, transforming hydraulic input into mechanical output. Motors may produce either rotary or reciprocating motion in the load.</p>			

Module 28

Code	Course/Module Title	ECTS	Semester
ATU24052	Internal Combustion Engine	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>Internal combustion engines are known as one of the necessary and vital means in performing the work of vehicles of all kinds for the needs of movement from one place to another, and it is also used in generating electrical energy in power stations and in cranes used in construction, as well as boats and trains. Internal combustion engines are a system in which the chemical energy inherent in a fuel is converted into thermal energy produced by ignition of fuel and then converted into mechanical energy.</p>			

Module 29

Code	Course/Module Title	ECTS	Semester
ATU24053	Engineering Analyses	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	52
Description			
<p>The primary aims of the material in this text are to provide the fundamental analytical and underpinning knowledge and techniques needed to successfully complete scientific and engineering principles modules. The material has been designed to enable students to use techniques learned for the analysis, modelling and solution of realistic engineering problems. It also aims to provide some of the more advanced knowledge required for those wishing to pursue careers in mechanical engineering, aeronautical engineering, electronics, communications engineering, systems engineering and all variants of control engineering. In other side this module also involves some aspects of numerical analysis to common engineering cases and solving it numerically using suitable methods.</p>			

Module 30

Code	Course/Module Title	ECTS	Semester
ATU24054	Gas Dynamics	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>This course is designed to introduce students to the fundamentals of compressible fluid flow, with an emphasis on a wide variety of steady, one-dimensional flow problems and a general understanding of the principles of multi-dimensional flow.</p> <p>One-dimensional compressible flows including basic concepts; isentropic flow; normal and oblique shock waves; flows with heat transfer, friction, and mass addition; simple waves; small perturbation theory for linearized, steady flows; method of characteristics for two-dimensional, steady flow and one-dimensional, unsteady flow.</p>			

Module 31

Code	Course/Module Title	ECTS	Semester
ATU24055	Heat Transfer (conduction)	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>This course is an introduction to the principal concepts and methods of heat transfer. The specific objectives of this integrated subject are as follows:</p> <ol style="list-style-type: none"> 1. Model basic heat transfer processes and identify modes 2. Calculate thermal resistances 3. Perform an energy balance to determine temperature and heat flux 4. Identify fins and calculate fin performance 5. Use shape factors for 2-D conduction 6. Solve lumped parameter transient heat transfer problems 7. Solve distributed parameter transient heat transfer problems 8. Steady state multi dim. Conduction, Numerical solution (finite difference) 9. Unsteady state conduction, Biot's number, Lumped heat-Capacity system, Semi-infinite bodies 10. Calculate and evaluate the impacts of initial and boundary conditions on the solutions of a particular heat transfer problem. 			

Module 32

Code	Course/Module Title	ECTS	Semester
ATU24056	Professional Ethics	2	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>A study of ethical problem-solving in the professional and workplace settings. The course provides students with the concepts, methods, and theories needed to analyze moral problems in a variety of professions and workplaces. The course includes lectures, discussions, case studies, the nature and formation of codes of professional ethics. Some analyses are performed in teams of students. This Professional Ethics course aims to prepare you for what to do when you are faced with ethical dilemmas throughout your career. In this course, we will discuss why ethics matters within an organization, the key elements of business ethics, and what contributes to a strong ethical culture within the organization.</p> <p>Then we will explore the moral principles of integrity that constitute professional conduct. Finally, we will walk through the ethical decision-making process and provide a few sources of ethical guidance. You will practice using the ethical decision-making framework to face real-life ethical dilemmas in case studies.</p>			

Module 33

Code	Course/Module Title	ECTS	Semester
ATU24061	Renewable energy	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
<p>This course provides the foundation for a deeper understanding of the problems, issues, perspectives, and developments in the areas of bio-fuels, solar and wind energy. A significant focus of the course will be on critical and creative thinking, problem solving, and communication of ideas relating to renewable energy.</p> <p>The student identifies and uses scientific methods to design and complete experiments such as, how photovoltaic cells are used to harness the sunlight and convert it into energy, how wind turbines are used to harness the wind's energy and convert it into electricity, how various sources of bio-fuels are broken down chemically and the resulting energy is harnessed to produce electricity.</p>			

Module 34

Code	Course/Module Title	ECTS	Semester
ATU24062	Turbo-Machinery Operation and Maintenance	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>This course will provide a turbo-machinery package operator and maintenance technician with the knowledge and skills necessary to operate and maintain the package safely and efficiently. This requires a degree of background knowledge of the package systems and system components, the working relationship between the components, and their operating sequences. Therefore, the purpose and function of each of the package major components and support systems will be explained, as well as the components in each system, and the sequences of operation. Common malfunction conditions will be discussed, along with the significance of each, the probable causes, and the recommended action for each condition. The students will thus be able to recognize which abnormal conditions may be influenced and corrected by adjusting operational conditions, and which will require further investigation and “maintenance-based” corrective action. The general principles of effective routine maintenance of turbo-machinery will be discussed, along with identification of the sources of information used to plan and support maintenance activities.</p>			

Module 35

Code	Course/Module Title	ECTS	Semester
ATU24063	Heat Transfer (Convection & Radiation)	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>This course is an introduction to the principal concepts and methods of heat transfer by convection and radiation. The specific objectives of this integrated subject are as follows:</p> <ol style="list-style-type: none"> 1. Recognize basic convective heat transfer and apply appropriate methods for quantifying convection 2. Calculate convective heat transfer coefficients for internal flow 3. Calculate convective heat transfer coefficients for external flow 4. Design and size heat exchangers, The Log Mean Temperature Difference Method 5. Predict heat exchanger performance 6. Calculate radiation view factors, Relations between shape factors 7. Determine radiation heat transfer 			

Module 36

Code	Course/Module Title	ECTS	Semester
ATU24064	Computer 3	3	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
<p>3D CAD (3-dimensional computer-aided design) is a technology that engineers, product developers and designers use to create functional, virtual prototypes of three-dimensional objects. With 3D CAD, designers can dynamically create and modify every detail of a product, part or assembly. 3D CAD software facilitates and automates other aspects of product engineering, such as simulation testing, drawing and drafting, manufacturing, data management, computer generated animation, and more. These three-dimensional models can be used in simulation studies to predict how the object will respond to stress and environmental factors.</p>			

Module 37

Code	Course/Module Title	ECTS	Semester
ATU24065	Numerical Analyses	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	22
Description			
<p>The primary aims of the material in this text are to provide the fundamental analytical and underpinning knowledge and techniques needed to successfully complete scientific and engineering principles modules. The material has been designed to enable students to use techniques learned for the analysis, modelling and solution of realistic engineering problems. It also aims to provide some of the more advanced knowledge required for those wishing to pursue careers in mechanical engineering, aeronautical engineering, electronics, communications engineering, systems engineering and all variants of control engineering. In other side this module also involves some aspects of numerical analysis to common engineering cases and solving it numerically using suitable methods.</p>			

Module 38

Code	Course/Module Title	ECTS	Semester
ATU24066	Theory of Machines	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
<p>Theory of machines is representing a main branch of mechanical engineering, where it deals with analytical interpretation of behavior for different mechanical machines including brakes system, clutches, governors, cam profiles, belts, etc. All of these systems are working under different dynamic boundary conditions so it is essential to study first the expected interaction between displacement, velocity, and acceleration and in both cases of linear and angular cases. At the same time, and as a first introduction to this specific topic, velocity and acceleration diagrams must be investigated analytically and graphically in order to find the angular parameters in terms of linear ones. Also this topic is clarifying how to balance rotating masses in one and multiple planes to ensure a soft and smooth working conditions for mechanical machines. This topic has been assigned for third stage students in mechanical engineering departments.</p>			

Module 39

Code	Course/Module Title	ECTS	Semester
ATU24067	English for Academic(Level 3)	2	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The main objective that will be adopted in this lesson is to teach the student the main principles and rules used in constructing sentences that are used in different situations, and work to encourage students to write and speak in groups in order to raise language skills and improve listening skill as well. This will be achieved through interactive educational patterns and means, and by encouraging students to write about topics of interest to students. This is important to improve the level of students at this level in English using multiple means. Also, to understand the main rules of writing, especially for writing lab reports or graduation projects. This course is concerned with introducing students to the main concepts of writing, reading, speaking and listening. It will achieve the possibility for the student to write a short article as well as the ability to read for various scientific and general topics.</p>			

Module 40

Code	Course/Module Title	ECTS	Semester
ATU24071	Steam Power Plants	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>The main objective that will be adopted in this course is to provide the students with application of thermal engineering and mechanics to different thermo-fluid systems. types, construction, working principles performance of; boilers, heat exchangers, turbines, power plants and internal combustion engines are covered. Overall plant performance, load curves and economics of power plants is introduced. The student will be able to analyze different types of steam cycles and estimate efficiencies in a steam power plant. Also, the student is evaluated the cycle efficiency and performance of a gas cooled reactor power plant. and classify different types of coupled vapor cycles and list the advantages of combined cycles power plant. This course is supported by tutorials, laboratory experiments and field visits.</p>			

Module 41

Code	Course/Module Title	ECTS	Semester
ATU24072	Vibration Theory	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
<p>Theory of Vibrations is considered as a back bone of mechanical engineering, where it deeply deals with the mechanical vibrated systems (masses) under miscellaneous boundary conditions for both single, two, three and multiple degrees of freedom. The employed procedure is by depending on the well-known Newton's second law motion or the energy approach to find the governing equation of motion and the induced natural frequency followed by the expecting response. Number of degrees of freedom is depending on the total number of the vibrated masses for example, if there is only one vibrated mass then the system is having single degree of freedom and if two masses then the case will have two degrees of freedom and so on. This topic has been assigned for fourth stage students in mechanical engineering departments.</p>			

Module 42

Code	Course/Module Title	ECTS	Semester
ATU24073	Refrigeration and Air Conditioning	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	93	57
Description			
<p>This Course provides a simple understanding of Refrigeration and Air-conditioning fundamentals. Ideally suited to those with a little or no knowledge of the subject. The course consists of different refrigeration cycles and understanding of psychrometry and psychrometric processes used for the purpose of air-conditioning. Further, the comfort air-conditioning and indoor environment health are also addressed in this course.</p> <p>Focussing on the practical skills and knowledge required to install, service and maintain refrigeration and air-conditioning systems, on successful completion of this qualification the learner will be well equipped to start or progress their career in the refrigeration & air-conditioning industry.</p>			

Module 43

Code	Course/Module Title	ECTS	Semester
ATU24074	Manufacturing Processes	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	33	92
Description			
<p>This is an undergraduate course in manufacturing processes and analysis. Topics include: manufacturing properties, casting, metal forming (rolling, forging, extrusion, and drawing), polymer processing, particulate processing (powder metallurgy and ceramic/glass forming), heat treatment, welding, and machining.</p> <p>Course Goals</p> <ul style="list-style-type: none"> <input type="checkbox"/> To understand the fundamental principles of materials processes and manufacturing <input type="checkbox"/> To gain knowledge of various manufacturing processes and related technical analysis <input type="checkbox"/> To gain proficiency in communication through written and oral reports <input type="checkbox"/> To practice solving problems through teamwork <input type="checkbox"/> To understand the importance of economic considerations in the selection of manufacturing processes 			

Module 44

Code	Course/Module Title	ECTS	Semester
ATU24075	Computer 4	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	3	63	12
Description			
<p>SOLIDWORKS is used to develop mechatronics systems from beginning to end. At the initial stage, the software is used for planning, visual ideation, modeling, feasibility assessment, prototyping, and project management. The software is then used for design and building of mechanical, electrical, and software elements. Finally, the software can be used for management, including device management, analytics, data automation, and cloud services.</p> <p>The SOLIDWORKS software solutions are used by mechanical, electrical, and electronics engineers to form a connected design. The suite of programs is aimed at keeping all engineers in communication and able to respond to design needs or changes.</p>			

Module 45

Code	Course/Module Title	ECTS	Semester
ATU24076	Project	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	3	48	77
Description			
<p>The graduation project represents a real test for the student, as it reveals his ability to integrate the knowledge he acquired throughout his university studies, with the skills of analyzing problems and devising new solutions for them by designing a project using one of the techniques that were studied before reaching the graduation project. The graduation project represents an actual experiment. It is important for the student to be an introduction to his practical life after graduation, as the student relies entirely on his effort, research and creativity in project work.</p>			

Module 46

Code	Course/Module Title	ECTS	Semester
ATU24081	Machine Design	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	1	63	62
Description			
<p>Machine Design is a full-time engineering course for students with bachelor's degrees in mechanical engineering. Machine design is an area of study in which one learns to design machine parts by utilizing the whole knowledge and experience in the field of mechanical engineering. It requires a knowledge of basic and engineering sciences such as Physics, Mathematics, Engineering Mechanics, Strength of Materials, Theory of Machines, and Engineering Drawing. In this course, students may learn how to design complex engineering systems design. This course involves many important subjects such as stress-strain analysis to design machine elements to meet strength, reliability, safety, and cost specifications. It also focuses on components using analytical, design of mechanics, experimental, and numerical approaches. Its concentrates on areas such as the design of segments, machine tools, and machine parts such as gearbox belts bearings shafts, coupling, and pressure vessels. After completing this course, graduates will be able to participate in many parts of industrial technologies.</p>			

Module 47

Code	Course/Module Title	ECTS	Semester
ATU24082	Measuring and Control Devices	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	47
Description			
<p>It is important that engineers be able to perform successful experiments, and it is equally important that they know or be able to estimate the accuracy of their measurements. This course discusses a rather broad range of instruments and experimental measurement techniques. Strong emphasis is placed on problem solving, and the importance of accuracy, error, and uncertainty in experimental measurements is stressed throughout all the discussions.</p> <p>The course is generally suitable as an accompaniment to laboratory sessions oriented around the specific experiments available at a particular institution. The lectures would be concerned with the principles of instrumentation, whereas the laboratory periods would afford the student an opportunity to use some of the devices discussed in this text and laboratory manuals that may be available to faculty planning the course.</p>			

Module 48

Code	Course/Module Title	ECTS	Semester
ATU24083	Hydraulic Power Plants	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
<p>The main objective that will be adopted in this course is to provide the students with application of fluid engineering and mechanics to different hydraulic systems. Types, construction, working principles performance of hydraulic turbine, draft tube, and cavitations are covered. The most recent types of hydraulic turbines: Francis, Kaplan, and Pelton are discussed. Efficiency and performance of the aforementioned types are studied in details. The hydraulic system components that include the turbine, and the associated conduits-like penstocks, tunnel and surge tank-and its control system are introduced . Overall hydroelectric power plant, performance curves and selection of hydraulic turbines are introduced as well. This course is supported by tutorials, laboratory experiments and field visits.</p>			

Module 49

Code	Course/Module Title	ECTS	Semester
ATU24084	The industrial engineering	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	52
Description			
<p>This course is an introduction to the principal concepts the industrial engineering. The specific objectives of this integrated subject are as follows:</p> <ol style="list-style-type: none"> 1. Study the techniques for improvement in productivity of the people and equipment. 2. Plan the production schedule accordingly organize material supply for the manufacturing activities. 3. Minimize the direct and indirect cost by optimizing the use of resources available. 4. Learn accounting process, inventory control and process planning. 5. Employ Modern techniques in manufacturing system. 6. Increasing productivity, 7. Eliminating waste and non-value-added activities, and 8. To come up with the optimum use of scarce resources that would bring out the best results 			

Module 50

Code	Course/Module Title	ECTS	Semester
ATU24085	Statistics	3	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3		48	27
Description			
<p>This course is an introduction to descriptive statistics, probability, sampling, estimation, hypothesis testing, correlation, and regression. It provides an intuitive approach to why and when the procedures may be used, without involving mathematical proofs. This course is recommended for anyone who wishes to develop the ability to intelligently evaluate published statistical data, and for students of arts, criminal justice, education, and social science in particular. Students also have the opportunity to analyze data sets using technology.</p>			

Module 51

Code	Course/Module Title	ECTS	Semester
ATU24086	Final Project	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	3	48	77
Description			
<p>The graduation project represents a real test for the student, as it reveals his ability to integrate the knowledge he acquired throughout his university studies, with the skills of analyzing problems and devising new solutions for them by designing a project using one of the techniques that were studied before reaching the graduation project. The graduation project represents an actual experiment. It is important for the student to be an introduction to his practical life after graduation, as the student relies entirely on his effort, research and creativity in project work.</p>			

Module 52

Code	Course/Module Title	ECTS	Semester
ATU24087	English for Academic(Level 4)	2	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>The main objective that will be adopted in this lesson is to teach the student the main principles and rules used in constructing sentences that are used in different situations, and work to encourage students to write and speak in groups in order to raise language skills and improve listening skill as well. This will be achieved through interactive educational patterns and means, and by encouraging students to write about topics of interest to students. This is important to improve the level of students at this level in English using multiple means. Also, to understand the main rules of writing, especially for writing lab reports or graduation projects. This course is concerned with introducing students to the main concepts of writing, reading, speaking and listening. It will achieve the possibility for the student to write a short article as well as the ability to read for various scientific and general topics.</p>			