Al-Furat Al-Awsat Technical University
جامعه الفرات الاوسط التقنية

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

بكالوريوس ـ هندسة ميكانيك القدرة

Table of Contents

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 (50) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة ميكانيك القدرة للحصول على درجة بكالوريوس. يقدم البرنامج (50) 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 Acadimic(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	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	48	27
Description			

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.

Module 3

Code	Course/Module Title	ECTS	Semester
ATU24013	Mathematics -I	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	87
Description			

The study of this subject aims to make an introduction and revision to some mathmaticals 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 thier 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 mathmatics 1 is filling this gap and try to make a balance between the students in next stage of their learning program.

Module 4

Code	Course/Module Title	ECTS	Semester
ATU24014	Workshop	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
	6	93	82
Description			

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.

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			

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.
The academic program in the College of Engineering aims to:
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			

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.

Course Objectives

- 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
ATU24021	**Human Right and Democracy**	**2**	**2**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1		**18**	**32**
Description			

التعرف على الحرية والديمقراطية في المجتمعات المتعددة وعلى مر العصور وأنواعها وكيف تحولت أنظمة بعض الدول من نظام الى آخر. كذلك تتضمن اهداف عامه و اهداف سلوكيه

الاهداف العامة

1.الدفاع عن كرامة الإنسان.

2.المساهمة في تغيير حياة الإنسان إلى الأفضل بشأن: التغيير في القيم والمشاعر ـ والتغيير في السلوك.

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.

الاهداف السلوكية:

1.تعزيز الربط بين الفرد والجماعة والدولة ومؤسساتها.

2.تعزيز مشاعر التضامن مع الآخرين.

3.تنمية مهارات رصد الانتهاكات والتعامل مع المنتهكين.

4.دعم مهارات فهم قضايا حقوق الإنسان.

5.تعزيز سبل التعليم التفاعلي.

6.تعزيز سبل المشاركة في الشأن العام – المواطنة.

7.تعرف المبادئ الرئيسة لأبرز حقوق الإنسان ومصادرها وأنواعها والآليات المستخدمة لحمايتها.

8. تعرف القيم والاتجاهات وأنماط السلوك التي تُعلي من شأن حقوق الإنسان وتعمل على التمسك بها .

Module 8

Code	Course/Module Title	ECTS	Semester
ATU24022	**Mathematics -II**	**6**	**2**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	**1**	**63**	**87**
Description			

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 mathmatics 2 is filling this gap and try to make a balance between the students in next stage of their learning program.

Module 9

Code	Course/Module Title	ECTS	Semester
ATU24023	**Engineering Materials**	**2**	**2**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		**33**	**17**
Description			

 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.
  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.

Module 10

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			

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.

The academic program in the College of Engineering aims to:

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 11

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			

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.

Module 12

Code	Course/Module Title	ECTS	Semester
ATU11	**Arabic language**	**1**	**2**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1		33	17
Description			

تتمثل في ان يطبق الطلاب المعرفة العلمية التي تلقوها في مجال لغة القران الكريم وفروعها بما يضمن تحقيق التواصل المعرفي بينهم والاستفادة من مستجدات وتطورات العصر وسرعة تناقل المعلومات، وتزويدهم بالمعرفة العلمية المتكاملة في اللغة العربية وآدابها، وأن يتقنوا إعداد البحوث العلمية وفق منهجية علمية متكاملة، ويعرفوا أساليب

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			

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.
Successful completion of Electrical Fundamentals will given the ability to:
• 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**	**63**	**87**
Description			

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**.**

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**	63	62
Description			

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.

Module 16

Code	Course/Module Title	ECTS	Semester
ATU24033	**Mechanical Engineering Drawing (CAD)**	**4**	**3**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**4**	33	67

Description

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, warm 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.

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

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.
In thermodynamics, interactions between large ensembles of objects are studied and categorized.

Central to this are the concepts of the thermodynamic system and its surroundings. A system is composed of particles, whose average motions define its properties, and those properties are in turn related to one another through equations of state. Properties can be combined to express internal energy and thermodynamic potentials, which are useful for determining conditions for equilibrium and spontaneous processes.

Module 18

Code	Course/Module Title	ECTS	Semester
ATU24035	**English for Academic(Level 2)**	**2**	**3**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1		18	32
Description			

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.

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
ATU24037	جرائم حزب البعث في العراق	**2**	**3**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		18	32
Description			
لقد تضمن هذا المنهج ماجاء مفاتيح معرفية بيد الطالب الجامعي يقوي بها على كل مرتج حبكت رواية اكذوبة ايادي البعث واعلامة المزيف وباعت ضميرها انفس ترى ان تبقى الى الان ذليلة اسيرة وذيلا تابعا			

Module 21

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			
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.			

Module 22

Code	Course/Module Title	ECTS	Semester
ATU24042	**Metallurgy**	**5**	**4**
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	**2**	63	62

Description

   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.

   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**).**

Module 23

Code	Course/Module Title	ECTS	Semester
ATU24043	**Mathematics- IV**	**5**	**4**
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 24

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 25

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	2	48	27

Description

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.

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.

Module 26

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

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.

In thermodynamics, interactions between large ensembles of objects are studied and categorized. Central to this are the concepts of the thermodynamic system and its surroundings. A system is composed of particles, whose average motions define its properties, and those properties are in turn related to one another through equations of state. Properties can be combined to express internal energy and thermodynamic potentials, which are useful for determining conditions for equilibrium and spontaneous processes.

With these tools, thermodynamics can be used to describe how systems respond to changes in their environment. This can be applied to a wide variety of topics in science and engineering, such as engines, phase transitions, chemical reactions, transport phenomena, and even black holes. The results of thermodynamics are essential for other fields of physics and for chemistry, chemical engineering, corrosion engineering, aerospace engineering, mechanical engineering, cell biology, biomedical engineering, materials science, and economics, to name a few.