Curriculum for Associate Degree Program
in
Mechanical Design Specialization

The curriculum of associate degree in **"Mechanical Design"** specialization consists of (72 credit hours) as follows:

Serial No.	Requirements	Credit Hours
First	University Requirements	12
Second	Engineering Program Requirements	17
Third	Specialization Requirements	43
Total		**72**

Al-Balqa' Applied University

جامعة البلقاء التطبيقية

تأسست عام 1997

The curriculum of associate degree
in
Mechanical Design Specialization

First: University requirements (12 credit hours) as follows:

Course No.	Course Title	Credit Hours	Weekly Contact Hours		Prerequisite
			Theoretical	**Practical**	
22001101	Arabic Language	3	3	-	
22002101	English Language	3	3	-	
21901100	Islamic Culture	3	3	–	
21702101	Computer Skills	3	1	4	
Total		**12**	**10**	**4**	

Second: Engineering program requirements (17 credit hours) as follow:

Course No	Course Title	Credit Hours	Weekly Contact Hours		Prerequisite
			Theoretical	**Practical**	
20201111	Engineering Workshops	1	–	3	-
20204111	AutoCAD	2	–	6	-
20506111	Occupational Safety	2	2	-	-
21301111	General Mathematics	3	2	2	-
21302111	General Physics	3	2	2	-
21302112	General Physics Laboratory	1	-	3	-
21702111	Communication Skills and Technical Writing	3	2	2	22002101
20201121	Engineering Materials	2	2	-	-
Total		**17**	**10**	**18**	

❖ **تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2008/2009**

Third: Specialization Requirements (43 credit hours) as follows:

Course No.	Course Title	Credit Hours	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
20301111	Electricity and Electronics	2	2	0	21302111*
20301112	Electricity and electronics Laboratory	1	0	3	20301113*
20207121	Mechanics	3	3	0	21302111
20204121	Strength of Materials	2	2	0	20207121
20204122	Strength of Materials Laboratory	1	0	3	20204121*
20207111	Fluids and Hydraulic Machines	3	3		21302111*
20207112	Fluids and Hydraulic Machines Laboratory	1	0	3	20207111*
20209111	Thermal Engineering	3	3	0	21302111*
20209112	Thermal Engineering Laboratory	1	0	3	20209111*
20204211	Mechanical Drawing	2	0	6	20204111
20201231	Theory of Machines	2	2	0	20207121
20201232	Theory of Machines Laboratory	1	0	3	20201231*
20202241	Metal Cutting	3	3	0	
20202242	Metal Cutting workshops	1	0	3	20202241*
20201261	CNC Workshops	2	0	6	20201251* or 20202241*
20202113	Manufacturing Processes	2	2	0	
20202114	Manufacturing Processes Workshops	1	0	3	20202113*
20204231	Mechanical Design 1	3	2	3	20204211*
20204232	Mechanical Design 2	3	2	3	20204231
20204291	Training**	3	0	-	-
20204292	Project	3	0	-	-
Total		**43**	**24**	**39**	

*-Co-requisite

** Equivalent to 280 training hours

❖ **تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2008/2009**

Guiding Plan

First Year					
First Semester			**Second Semester**		
Course ID	Course Name	Credit Hours	Course ID	Course Name	Credit Hours
22001101	Arabic Language	3	20209111	Thermal engineering	3
21302111	General Physics	3	20209112	Thermal Engineering Lab	1
21302112	General Physics Lab	1	22002101	English Language	3
21702101	Computer Skills	3	20207121	Mechanics	3
21301111	General Mathematics	3	20204111	AutoCAD	2
21901100	Islamic Culture	3	20506111	Occupational Safety	2
20201121	Engineering Materials	2	20201111	Engineering Workshops	1
			20301112	Electricity and electronics Lab	1
			20301111	Electricity and Electronics	2
Total		**18**	**Total**		**18**

Second Year					
Third Semester			**Fourth Semester**		
Course ID	Course Name	Credit Hours	Course ID	Course Name	Credit Hours
20204211	Mechanical Drawing	2	20202113	Manufacturing Processes	2
20204121	Strength of Materials	2	20202114	Manufacturing Processes Workshops	1
20204212	Strength of Materials Lab.	1	20201261	CNC Workshops	2
20202241	Metal Cutting	3	20204232	Mechanical Design 2	3
20202242	Metal Cutting Workshops	1	20204291	Training	3
20204231	Mechanical Design 1	3	20204292	Project	3
21702111	Communication Skills and Technical Writing	3	20201231	Theory of Machines	2
20207111	Fluids and Hydraulic Machines	3	20201232	Theory of Machines Lab.	1
			20207112	Fluids and Hydraulic Machines Lab.	1
Total		**18**	**Total**		**18**

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

Brief Course Description

University Requirements

Course Title	Course No	Credit Hours (Theoretical /Practical)
Arabic Language	**22001101**	**3 (3-0)**

تتضمن هذه المادة مجموعة من المهارات اللغوية بمستوياتها وأنظمتها المختلفة: الصوتية، والصرفية، والنحوية، والبلاغية، والمعجمية، والتعبيرية، وتشتمل نماذج من النصوص المشرقة: قرآنية ، وشعرية، وقصصية ، من بينها نماذج من الأدب الأردني؛ يتوخى من قراءتها وتذوقها وتحليلها تحليلا أدبيا؛ تنمية الذوق الجمالي لـدى الطـلاب الدارسين.

English Language	**22002101**	**3 (3-0)**

English 1 is a general course. It covers the syllabuses of listening, speaking, reading, writing, pronunciation and grammar, which are provided in a communicative context. The course is designed for foreign learners of the English language, who have had more than one year of English language study. The extension part would be dealt with in the class situation following the individual differences.

Islamic Culture	**21901100**	**3 (3-0)**

1. تعريف الثقافة الإسلامية وبيان معانيها وموضوعاتها والنظم المتعلقة بها – وظائفها وأهدافها.

2. مصادر ومقومات الثقافة الإسلامية والأركان والأسس التي تقوم عليها.

3. خصائص الثقافة الإسلامية.

4. الإسلام والعلم، والعلاقة بين العلم والإيمان

5. التحديات التي تواجه الثقافة الإسلامية.

6. رد الشبهات التي تثار حول الإسلام.

7. الأخلاق الإسلامية والآداب الشرعية في إطار الثقافة الإسلامية.

8. النظم الإسلامية.

Computer Skills	**21702101**	**3 (1-4)**

An introduction to computing and the broad field of information technology is given. Topics covered include the basic structure of digital computer system, microcomputer, operating systems, application software, data communication and networks, and the internet. Hands-on learning emphasizes Windows xp, MS-office2000, and the internet.

❖ **تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2008/2009**

Engineering Program requirements

Engineering Workshops	20201111	**1 (0-3)**

Development of basic manual skills in Mechanical and Electrical works. Use of manual tools and measuring devices. Hand filing, welding, metal cutting and forming. Electrical wiring.

AutoCAD	20204111	**2 (0-6)**

Introduction to AutoCAD, application of AutoCAD, commands, geometric entities. Geometric construction. Dimensioning, free –hand sketching, object representation, orthographic drawing and projections.

Occupational safety	20506111	**2 (2-0)**

Role of technicians in economic development First aid accident prevention. Protective devices and equipment. Industrial safety standards. Nature of fire hazards. Sand fire regulations. Physiological effects of electrical shock on human body. First aid and treatment for the effects of electric shock. Rules of spare and chemicals storage and handing.

Communication Skills and Technical Writing	21702111	**3 (2-2)**

The main goal of this course is to equip the students with the necessary communication skills in everyday life & work situations and improve their abilities in technical writing to meet market needs. For this course, the English language is the language of teaching & the means of communication for all classroom situations.

Engineering Materials	20201121	**2 (2-0)**

Definition of engineering materials. Classification of materials and their properties. Metallic and non-metallic materials. Metals, alloys and composite materials. Conductors, insulators and semiconductors. Mechanical, Magnetic, Thermal and electrical characteristics of materials. Industrial applications of different types of materials.

General Mathematics	21301111	**3 (2-2)**

Real numbers coordinate planes, lines, distance and circles. Functions: (operations and graphs on functions), limits, continuity, limits and continuity of trigonometric functions. Exponential and logarithmic functions. Differentiation (techniques of differentiation, chain rule, implicit differentiation). Application of differentiation (increase, decrease, concavity). Graphs of polynomials. Applications: Rolls Theorem and Mean-Value Theorem, Integration (by substitution, definite integral, fundamental theorem of Calculus). Application of definite integral (area between two curves, volumes)

General Physics	21302111	**3 (2-2)**

The physical concepts to be studied includes: vectors, motion in one dimension, motion in two dimensions, the laws of motion, applications of Newton's laws, circular motion, energy and energy transfer, potential energy, linear momentum, electricity, electrical potential, capacitance, current and resistance .

General Physics lab	21302112	**1 (0-3)**

In this course, the student performs thirteen experiments in mechanics and in electricity.

❖ **تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008**

Specialization Requirements

Electricity and Electronics	20301111	2 (2-0)

Concepts and definitions, electrical circuit elements, voltage, current, resistance, capacitance and inductance, ohms law and dc circuit Calculations. Ac Circuits. Three phase circuits, transformers, and electrical machines. Basic electronic devices and circuits. Introduction to electrical protection.

Electricity and Electronics Lab.	20301112	1 (0-3)

DC and AC circuits. Current and voltage measurements. Simple electronic circuits. DC and AC machines. Single-phase transformers. Protection devices and circuits.

Mechanics	20207121	3 (3-0)

Basic definitions and concepts. SI units. Equilibrium. Free body diagrams. Simple structural analysis. Internal forces. Friction. Moment of inertia. Kinematics of particles.

Strength of Materials	20204121	2 (2-0)

Principles of static including equilibrium and static equivalence, determination of moment and force resultants in slender members, introduction to mechanics of deformable bodies, concept of stress and strain, classification of material behavior, stress-strain relations and generalized Hook's law, application to engineering problems involving members under axial load, torsion of circular rods and tubes, bending and shear stress in beams ,combine stresses , deflection of beams, buckling of columns.

Strength of Materials Lab.	20204122	1 (0-3)

Applying theory gained within the strength of materials theoretical through practical experimentation.

Fluids and Hydraulic Machines	20207111	3 (3-0)

Fluid properties, fluid static's, fluid motion, continuity equation, momentum principle, energy principle, Fluid flow in pipes, pipe friction, introduction to Pumps, Types, Selection and application of pumps.

Fluids and Hydraulic Machines Lab.	20207112	1 (0-3)

Measuring of physical properties of fluids, force on immersed plate, Jet force on plate, Bernoullis equation, Reynolds experiments, flow through orifices, and nozzle venture friction factor.

Thermal Engineering	20209111	3 (3-0)

Concepts and definitions, Properties of a pure substance, Work and heat, the first law of thermodynamics, the second law of thermodynamics, Principles of heat transfer

Steady state conduction, Radiation, Heat exchangers

Thermal Engineering Lab.	20209112	1 (0-3)

Pressure – Temperature relation in the saturation region; Compressor cycles and analyses; Heat pump performance; Conduction heat transfer; Radiation heat transfer; and Heat exchanger performance

Mechanical Drawing	20204211	2 (0-6)

The course is designed to develop the technical sense for the student and enable him to create and analyze the different mechanical parts, pipes and ducts, mechanical and HVAC symbols . Assembly and detailed drawings for technical arrangements. Applications for CAD and Solid Works modeling.

Theory of Machines	20201231	2 (2-0)

Introduction, linkages and mechanisms, cams, spur gears, .nonstandard spur gears, bevel, helical and worm gears, gear trains, velocity and acceleration analysis, force analysis of machinery, Blanca of machinery introduction to synthesis, governors, special mechanisms and robotics

Theory of Machines Lab.	20201232	1 (0-3)

This course give the student an opportunity to apply the theory gained within the theory of machines theoretical course through practical experimentation. Balancing motion transmission through mechanisms .speed changing.

Metal Cutting	20202241	3 (3-0)

Machinability. Surface Finishing. Cutting Forces. Power construction. Tool life, machine cutting speed, feed rate and depth of cut, cutting-tool material and geometry. Work piece, hardness or strength. Ductility, chemical composition, thermal properties, microstructure, manufacturing process of raw material, mechanics of metal cutting machining. Non traditional machining operation. CNC Machining.

Metal Cutting Workshops	20202242	1 (0-3)

Application of different kinds of cutting machines. Safety measures. Using measuring devices.

Manufacturing Processes	20202113	2 (2-0)

Forming processes used in manufacturing. Casting, extrusion, rolling, forging, sheet metal forming and wire and pipe drawing. Welding systems and welding inspection, including gas and arc welding, welding rods.

Manufacturing Processes Workshops	20202114	1 (0-3)

Practicing forming processes and analyzing structure and properties of metals and alloys, providing casting processes, cold rolling, pressing bending, and shearing process. Application of welding techniques. Including safety, shop practicing for different welding methods, inspections of welding defects

Mechanical Design 1	20204231	3 (2-3)

Application of design principles converting stress analysis, fatigue, deflection, fasteners, bolts, belts and chains, springs, and use of manufacturer's data. Computer activities.

Mechanical Design 2	20204232	3 (2-3)

Application of design principles converting design of gears, shafts and axis, Bearings, clutches and brakes, power transmission machinery, and use of manufacturer's data. Computer activities.

CNC Workshops	20201261	2 (0-6)

This course is designed to develop the student's ability in the programming, set-up, and operation of Computerized Numerical Control machine tools as well as construct and execute basic operation programs.

Training	20204291	3 (280 training hours)

Equivalent to (280 hours) of field training targeted to emphasize the ability of students to apply the theories in the real world of the profession.

Project	20204292	3

An integrated assembly/design practical work related to the major fields of study.