Curriculum for Associate Degree Program in CNC Machining Technology Specialization

The curriculum of associate degree in **"CNC Machining Technology"** 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**

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

The curriculum of associate degree in CNC Machining Technology

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	21302111*
21702111	Communication Skills and Technical Writing	3	2	2	22002101
20201121	Engineering Materials	2	2	-	-
Total		**17**	**10**	**18**	

* Co-requisite

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

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

Course No.	Course Title	Credit Hours	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
20212111	Mechanical Drafting	2	-	6	20204111
20212121	Mechanical Measurements	2	2	-	
20212122	Mechanical Measurements Lab.	1	-	3	20212121*
20301111	Electricity and Electronics	2	2	-	21302111
20301112	Electricity and Electronics Lab.	1	-	3	20301111*
20212231	Manufacturing Processes	2	2	-	
20212232	Manufacturing Processes Workshop	1	-	3	20212231*
20212241	Nontraditional Machining	3	1	6	
20212141	Metals Machining Technology	2	2	-	
20212151	Computer-Aided Design and Programming	2	-	6	20204111
20212251	Computer-Aided Manufacturing	3	3	-	20212151*
20212142	Turning and Milling Workshops	2	-	6	
20212152	CNC Machines Workshop	2	-	6	
20212261	Molds Design and Manufacturing	2	2	-	
20212262	Molds Design and Manufacturing Workshop	2	-	6	20212261*
20212252	Advanced Applications of CNC Machines	3	1	6	20212152
20212221	Materials Testing	2	2	-	
20212222	Materials Testing Lab.	1	-	3	20212221*
20409111	Industrial Supervision	2	2	-	20506111
20212291	Training**	3	0	-	-
20212292	Project	3	0	-	-
Total		**43**	**19**	**54**	

*-Co-requisite

** Equivalent to 280 training hours

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

Guiding Plan

First Year					
First Semester			Second Semester		
Course ID	Course Name	Credit Hours	Course ID	Course Name	Credit Hours
22001101	Arabic Language	3	21302111	General Physics	3
21702101	Computer Skills	3	21302112	General Physics Lab.	1
20201111	Engineering Workshops	1	20212111	Mechanical Drafting	2
20212141	Metals Machining Technology	2	21301111	General Mathematics	3
20212121	Mechanical Measurements	2	20201121	Engineering Materials	2
20212122	Mechanical Measurements Lab.	1	20212151	Computer-Aided Design and Programming	2
20204111	AutoCAD	2	20212152	CNC Machines Workshop	2
20212142	Turning and Milling Workshop	2	22002101	English Language	3
Total		**18**	**Total**		**18**

Second Year					
Third Semester			Fourth Semester		
Course ID	Course Name	Credit Hours	Course ID	Course Name	Credit Hours
20301111	Electricity and Electronics	2	20212252	Advanced Applications of CNC Machines	3
202031112	Electricity and electronics Lab.	1	20212261	Molds Design and Manufacturing	2
21702111	Communication Skills and Technical writing	3	20212262	Molds Design and Manufacturing Workshop	2
20212241	Nontraditional Machining	3	20212221	Materials Testing	2
20212251	Computer-Aided Manufacturing	3	20212222	Materials Testing Lab.	1
21901100	Islamic Culture	3	20409111	Industrial Supervision	2
20212231	Manufacturing and Layout Processes	2	20212291	Training	3
20212232	Manufacturing and Layout Processes Workshop	1	20212292	Project	3
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 لدى الطلاب الدارسين.

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

English 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.

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 .

Specialization Requirements

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

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

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.

Mechanical Drafting	**20212111**	**2 (0-6)**

Auxiliary views, temporary fasteners, keys, feathers, splines, rivets, cotters, springs, power-screws, welding symbols. Dimensioning, tolerance, limits and fits (ISO system). Details and working drawings. Reading of mechanical engineering drawings, assembly drawings. Graphics display hardware. Graphics software. Mapping computer graphics standards. Homogeneous representation of solids. 2D and 3D transformations for modeling and viewing. Features for CAD/CAM integration. Applications for CAD modeling.

Mechanical Measurements	**20212121**	**2 (2-0)**

Principles of linear measurements, linear measurements, standards for measurements (metric and inch), tools of measurements, venires and micrometer angel measurement, combination set, gauge blocks, inspection tools and gauges, dial indicating gauge, surface finish measurements, layout tools, surface plate, angle plate, v-blocks, layout techniques, puncher, dividers.

Mechanical Measurements Lab.	**20212122**	**1 (0-3)**

Measuring lengths with tape, metal rulers, calipers and micrometers, measuring angles with protectors combination sets, use of gauges blocks, comparing dimensions and flatness with dial-indicating gauge, layout using tools & samples.

Manufacturing and Layout Processes	**20212231**	**2 (2-0)**

Hot and cold working of metals, elastic deformation, rolling, forging, extrusion, drawing, pipe and tube manufacturing, casting, molding, and foundry processes. Metal cutting methods, turning, drilling, milling, sawing, planning. Machining cutters and machining operations.

Manufacturing and Layout Processes Workshop	**20212232**	**1 (0-3)**

Practical applications of the following processes: forging, drawing, extrusion, rolling. Sand casting and molding processes. Applications of different kinds of metal cutting. Safety measures. Using measuring devices and tools.

Nontraditional Machining	**20212241**	**3 (1-6)**

Introduction to advanced manufacturing machines, EDM, EDB, ECM, WCM, USM where is no Sharpe tools needed, classification, specification, components and process diagram, operation of those machines, electrodes .

Metals Machining Technology	**20212141**	**2 (2-0)**

Introduction to cutting and machining, holding devices, lubricants and cutting fluids, sawing operation and power sawing (hacksaws, band saws), drilling, milling machines, drilling operation, lathe and lathe operation, lathe cutting tools, cutting parameters, milling machines and milling operations, cutting parameters, workpiece holding devices and accessories, shaping, planning, and broaching, precision grinding.

Computer-aided Design and Programming	**20212151**	2 (0-6)

Introduction to numerical control NC and CNC systems. Structure of NC and CNC systems, applications of NC systems, types of NC systems, NC part programming. Programming languages. G-M-Codes and functions. Key issues of NC programming. Programming modes, tool path, units, tool programming, zero set. Compensations, machine setup. NC part program introducing. Interpolation. Program test (simulation mode) and machining mode.

Computer-Aided Manufacturing	**20212251**	**3 (3-0)**

Introduction to production and manufacturing systems. Metal removal processes. Metal removal machine tools. Machining parameters. Basic relationships and calculations. NC and CNC machine tools. Structure, types and specifications. Control resolution, accuracy and repeatability of positioning systems. Process planning. NC part programming. Instruction coding, ISO coding system. Examples of part programming.

Turning and Milling Workshop	**20212142**	**2 (0-6)**

Introduction to conventional machining operations: turning, milling, shaping, grinding. Cutting tools: drills, turning tools, milling tools, shaping tools and sharpening tools. Workpiece fixing. Grinding wheels. Examples of machining operations.

CNC Machines Workshop	**20212152**	**2 (0-6)**

Setup and operating NC machine tools and machining centers. Cutting tools installing. Programming straight lines and curves. Programming simple machining operations. Installing NC part programs. Single and cycle programming. Program testing and execution. Examples.

Molds Design and Manufacturing	**20212261**	**2 (2-0)**

Introduction to mold design. Metal forming processes. Classification of iron alloys used for molds. Working characteristics at a given mass and shape of parts. Detailed design. Molding process and materials. Allowances and tolerance. Design of shearing and bending dies. Design of cores and complex shapes.

Molds Design and Manufacturing Workshop	**20212262**	**2 (0-6)**

Hand forging processes. Sheet metal work. Rolling, bending and drawing. Metal arc welding, oxy-acetylene welding, brazened, soldering and metal cutting. MIG and TIG welding. Equipment and operations. Examples.

Advanced Applications of CNC Machines	**20212252**	**3 (1-6)**

Operator monitor, dwell time, subroutine call, polygon programming, tool path correction, face turning, redrawing cycle, threading, industrial machine registry, peripheral instrument programming, PC design tutorial and NC programming, creating 2D geometry, tool path contour, chamfer, roughing and finishing passes, rotating geometry and tool path, creating drill tool paths, working in 3D geometry, facing and pocketing, creating multi-axes tool path, machining solids.

Materials Testing	**20212221**	**2 (2-0)**

Principles of statics including equilibrium and static equivalence. Determination of moment and force resultants in slender members. Introduction to mechanics of deformable bodies: concepts of stress and strain, classification of materials behavior, stress-strain relations and generalized Hook's law. Applications to engineering problems involving members under axial load, torsion of circular rods and tubes, bending and shear stresses in beams, combined stresses in beams, combined stresses, deflection of beams, buckling of columns. Methods of materials testing. Equipment and procedures of testing. Standards and references.

Materials Testing Lab.	**20212222**	**1 (0-3)**

Structural analysis of materials. Photo-electrical and thermo-electrical effects analysis. Chemical, mechanical and electrical properties of materials, strength, tensile and impact testing, hardness testing, tests for detecting cracks and flaws, ultrasonic inspection.

Industrial Supervision	20409111	2 (2-0)

Supervising duties, training knowledge, introduction, job standards, job analysis, training needs study, training programs and curriculum, training evaluation, subordinates appraisal, job organization, production orders forms filling.

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.