Curriculum for Associate Degree Program in Air Conditioning, Refrigeration and Heating Systems Specialization

The curriculum of associate degree in "Air Conditioning, Refrigeration and Heating Systems" 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
Air Conditioning, refrigeration and Heating Systems 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 follows:

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 2009/2008

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	20301111*
20209111	Thermal Engineering	3	3	0	21302111*
20209112	Thermal Engineering Laboratory	1	0	3	20209111*
20207111	Fluids and Hydraulic Machines	3	3	0	21302111*
20207112	Fluids and Hydraulic Machines Laboratory	1	0	3	20207111*
20207121	Mechanics	3	3	0	21302111
20204112	Mechanical Drawing	2	0	6	20204111
20204121	Strength of Materials	2	2	0	20207121
20204122	Strength of Materials Laboratory	1	0	3	20204121*
20209221	Heating Systems	3	3	0	20209111
20209231	Refrigeration Systems	3	3	0	20209111
20209241	Air Conditioning Systems	3	3	0	20209111
20209251	HVACR Instrumentation and Control	2	2	0	20209241
20209252	HVACR Instrumentation and Control Laboratory	1	0	3	20209251*
20209161	Energy Conversion	2	2	0	20209111
20209271	Refrigeration and Air Conditioning Workshops	2	0	6	20209241*
20209272	Heating and Sanitary Systems Workshops	1	0	3	20209221*
20209273	Refrigeration and Air Conditioning Laboratory	1	0	3	20209241*
20209291	Training**	3			-
20209292	Project	3			-
Total		**43**	**26**	**33**	

*- 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 No.	**Course Title**	**Credit Hours**	**Course No.**	**Course Title**	**Credit Hours**
22001101	Arabic Language	3	21901100	Islamic Culture	3
22002101	English Language	3	21702111	Communication Skills and Technical Writing	3
21702101	Computer Skills	3	20207121	Mechanics	3
21301111	General Mathematics	3	20201111	Engineering workshops	1
21302111	General Physics	3	20301111	Electricity and Electronics	2
21302112	General Physics Laboratory	1	20301112	Electricity and electronics Laboratory	1
20506111	Occupational safety	2	20209111	Thermal Engineering	3
			20204111	AutoCAD	2
Total		**18**	**Total**		**18**

Second Year					
First Semester			Second semester		
Course No.	**Course Title**	**Credit Hours**	**Course No.**	**Course Title**	**Credit Hours**
20209241	Air Conditioning systems	3	20209251	HVACR Instrumentation and Control	2
20209112	Thermal Engineering Laboratory	1	20209252	HVACR Instrumentation and Control Laboratory	1
2004112	Mechanical Drawing	2	20209271	Refrigeration and Air Conditioning Workshops	2
20207111	Fluids and Hydraulic Machines	3	20209272	Heating and Sanitary Systems Workshops	1
20207112	Fluids and Hydraulic Machines Laboratory	1	20209291	Training	3
20204121	Strength of Materials	2	20209292	Project	3
20204122	Strength of Materials Laboratory	1	20209221	Heating Systems	3
20209161	Energy Conversion	2	20209231	Refrigeration Systems	3
20209273	Refrigeration and Air Conditioning Laboratory	1			
20201121	Engineering Materials	2			
Total		**18**	**Total**		**18**

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

Brief Course Description for Associate Degree in Engineering Program Specializations

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 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.

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.		

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.		
Heating Systems	**20209221**	**3 (3-0)**
Introduction, Insulation, Heating Load Calculations, Fuel used for Heating Systems, Components Of Hot Water System, Hot Water Heating System, Under-floor System, Vapor Heating System, Hot Air Heating System.		
Refrigeration Systems	**20209231**	**3 (3-0)**
Introduction and Concepts, Simple Vapor Compression Cycle, Refrigerants, Cooling Load Estimation, Absorption Refrigeration System, Condensers, Evaporators, Compressors, Expansion Valves, Application of Refrigeration.		
Air Conditioning Systems	**20209241**	**3 (3-0)**
Introduction, Air Conditioning Processes, Air Conditioning Load Calculations, Central Air Conditioning Methods, Air Ducts and Fans, Filtration, Air Cooler Coils, Air Conditioning Equipments.		
HVACR Instrumentation and Control	**20209251**	**2 (2-0)**
Measurement and Pneumatics control, Temperature measurement and control devices, Electrical control devices, Domestic Air conditioner control circuit, Air conditioning and heating control system, Temperature control system, Heating system control system.		
HVACR Instrumentation and Control Lab.	**20209252**	**1 (0-3)**
Measuring and control elements, Temperature, pressure, flow rate and humidity measurement and control, Control system of cooling, heating and A/C processes, Adjustment. Monitoring & troubleshooting		
Energy Conversion	**20209161**	**2 (2-0)**
Introduction and Basic concept, Energy types, solar energy, Power cycles, Energy Storage, Energy Conservation.		

Refrigeration and Air Conditioning Workshops	**20209271**	**2 (0-6)**

Safety rules, Tools, machinery associated with refrigeration, A/C systems. Troubleshooting& repair, services, visits and reports**.**

Heating and Sanitary Systems Workshops	**20209272**	**1 (0-3)**

Safety rules, Tools, machinery used for heating system, Practice in heating equipment, use and care of hand and power tools, piping fabrication of copper, steel, cast iron, and plastic pipe, oil burner, boiler installation and service

Refrigeration and Air Conditioning Lab.	**20209273**	**1 (0-3)**

Liquid Receiver, Section Accumulator, Oil Separator, Operation of the Compressor, Thermostatic Expansion Device, Automatic Expansion Device , Capillary Tube Performance, Sub Cooling and Super Heating, Evaporation in Parallel, Solenoid Valve Control, Wet Bulb and Dry Bulb Temperature Measurement, Air Condition Processes, Heating, Cooling Humidification

Training	**20209291**	**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	**20209292**	**3**

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