
curriculum for Technician Diploma Program in Mechatronics Specialization

The curriculum of Technician Diploma in “Mechatronics” consists of (66) credit hours as follows:

No.	Field of Requirements	Credit Hours
1	Generic Skills	6
2	Employability Skills	9
3	Supportive Sciences	9
4	Specialization Skills	42
Total		66

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in
Mechatronics Specialization

First: Generic Skills Requirements (6) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10000111	Positive Citizenship and Life Skills	3	3	0	-
10000112	Skills in English Language	3	3	0	-
Total		6	6	0	

Second: Employability Skills Requirements (9) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10000121	Communication Skills in English Language	3	3	0	10000112
10000122	Small Productive Enterprises Management	3	3	0	-
10000123	Supervision and Industrial Organization	3	3	0	-
Total		9	9	0	

Third: Supportive Sciences Requirements (9) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10100111	Applied Mathematics	3	3	0	-
10100121	Applied Physics	3	3	0	-
10100122	Applied Physics Laboratory	1	0	3	10100121*
10100131	AutoCAD	1	0	3	
10100141	Engineering Workshop	1	0	3	
Total		9	6	9	

*Co-requisite

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Fourth: Specialization Skills Requirements (42) credit hours as follows:

Course Number	Course Title	C.H.	Weekly Contact Hours		Prerequisite
			Theoretical	Practical	
10301101	Principles of Electric Circuits	3	3	0	
10301102	Principles of Electric Circuits Laboratory	1	0	3	10301101*
10401101	Electronic Circuits and Devices	3	3	0	
10401102	Electronic Circuits and Devices Laboratory	1	0	3	10401101*
10404101	Digital Fundamentals	3	3	0	
10404102	Digital Fundamentals Laboratory	1	0	3	10404101*
10301103	Electrical Machines	3	3	0	10301101*
10301104	Electrical Machines Laboratory	1	0	3	10301103*
10310101	Control Technology	3	3	1	
10310102	Control Technology Laboratory	1	0	3	10310101*
10307201	Semiconductor Electric Drive Systems	3	3	0	10301103
10307202	Semiconductor Electric Drive Systems Laboratory	1	0	3	10307201*
10408211	Engineering Software Applications	2	0	6	10100131
10408221	Microprocessors and Microcontrollers	3	3	0	10404101
10408222	Microprocessors and Microcontrollers Laboratory	1	0	3	10408221*
10408223	Programmable Logic Controllers and their Applications	3	3	0	10307201*
10408224	Programmable Logic Controllers and their Applications Laboratory	2	0	6	10408223*
10408231	Pneumatic and Hydraulic Drive Systems	3	3	0	
10408232	Pneumatic and Hydraulic Drive Systems Laboratory	1	0	3	10408231*
10408291	Training	3	0		
	Total	42	27		

Guiding Plan for “Mechatronics” Specialization/ Technical Diploma Program

First Semester			Second Semester		
Course No.	Course Title	C.H.	Course No.	Course Title	C.H.
10000111	Positive Citizenship and Life Skills	3	10000121	Communication Skills in English Language	3
10000112	Skills in English Language	3	10100131	AutoCAD	1
10100111	Applied Mathematics	3	10401101	Electronic Circuits and Devices	3
10100121	Applied Physics	3	10401102	Electronic Circuits and Devices Laboratory	1
10100122	Applied Physics Laboratory	1	10404101	Digital Fundamentals	3
10301101	Principles of Electric Circuits	3	10404102	Digital Fundamentals Laboratory	1
10301102	Principles of Electric Circuits Laboratory	1	10301103	Electrical Machines	3
10100141	Engineering Workshop	1	10301104	Electrical Machines Laboratory	1
Total		18	Total		16

Third Semester			Fourth Semester		
Course No.	Course Title	C.H.	Course No.	Course Title	C.H.
10000123	Supervision and Industrial Organization	3	10000122	Small Productive Enterprises Management	3
10310101	Control Technology	3	10408223	PLCs and their Applications	3
10310102	Control Technology Laboratory	1	10408224	PLCs and their Applications Laboratory	2
10307201	Semiconductor Electric Drive Systems	3	10408231	Pneumatic and Hydraulic Drive Systems	3
10307202	Semiconductor Electric Drive Systems Laboratory	1	10408232	Pneumatic and Hydraulic Drive Systems Laboratory	1
10408221	Microprocessors and Microcontrollers	3	10408291	Training	3
10408222	Microprocessors and Microcontrollers Laboratory	1			
10408211	Engineering Software Applications	2			
Total		17	Total		15

Brief Course Description for Air Conditioning, Refrigeration and Heating Systems Specialization

First: Generic Skills

المواطنة الإيجابية ومهارات الحياة 10000111 (3:0-3):

يوضح المساق مفهوم المواطنة ومهارات الحياة وأهميتهما في اكتساب مهارات قيمه، والعمل على استخدام هذه المهارات في سعيهم للحصول على تعليم افضل ونتائج ايجابية في العمل، حيث ان المساق يراعي بناء المعرفة في الموضوعات التي يتضمنها البرنامج كما ويبني المهارة عند الشباب لاستخدامها في تطبيق المعرفة كما ويبني الثقة في قدرات الشباب على استخدام هذه المعرفة والمهارة بالاضافة الى توفير الدعم الشخصي والبيئي لتغيير السلوك من خلال تعزيز قيم المواطنة الايجابية والثقافة المجتمعية البناء والعمل المجتمعي التطوعي.

Skills in English Language 10000112 (3:3-0)

This is a General English Language course which aims at developing the four English Language receptive and productive Skills; Listening, Reading, Writing and Speaking, as well as providing practice for the basics of grammar and vocabulary for effective and meaningful communication inside and outside the classroom.

Second: Employability Skills

Communication Skills in English Language 10000121 (3:3-0)

This is a communication skills course which aims at improving learners' oral and written communication skills by providing learners with the language needed to naturally and confidently communicate in an English speaking workplace environment and real life situations.

إدارة المنشآت الإنتاجية الصغيرة 10000122 (3:3-0)

يوضح المساق مفهوم المنشآت الإنتاجية الصغيرة وأهميتها في الإقتصاد الوطني والقضاء على البطالة، وكيفية إدارتها و مواجهة التحديات التي تعترضها، وتقييم فرص نجاحها من خلال دراسة الجدوى، وآلية إدارة المشتريات والمخزون، وكيفية تمويلها وإدارة شؤونها المالية، وتقديم خدمة العملاء وكذلك الالتزام بأخلاقيات العمل، وكيفية عمل تسويق لها، والطبيعة القانونية لها وخطة العمل اللازمة للبدء بها مع التركيز على التجربة الأردنية في هذا المجال.

الإشراف والتنظيم الصناعي 10000123 (3:3-0)

المنشآت الصناعية انواعها ومواصفاتها واشكالها ، اشكال التنظيم الاداري وميزاتها، دور الفني في تطوير الصناعة ودوره في التسلسل الهرمي في المؤسسة الصناعية و ادارة ظروف العمل في المنشآت الصناعية . التعرف على المخاطر وطرق السيطرة عليها . التعرف على أجهزة ومعدات الحماية حسب المواصفات المعتمدة، اصناف الحريق معدات المكافحة، الكهرباء مخاطرها تأثيراتها على الانسان الحماية من الكهرباء والمعالجة من الصدمة الكهربائية، التعامل مع المواد الكيماوية أثارها مخاطرها وشروط التخزين،القوانين المحلية والضمان الاجنماعي.

Third: Supportive Sciences

Applied Mathematics 10100111 (3: 3-0)

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)

Applied Physics 10100121 (3: 3-0)

Applied Physics course designed to explain the basic concepts of physics in two fields:

- 1- Concepts and applications of mechanical physics including: Vectors, motion in one dimension, Laws of Motion (Newton's laws), work and energy and the linear momentum.
- 2- Concepts of electricity including: electrical force, electrical field, electrical potential difference, - capacitance, current and resistance.

Applied Physics Laboratory 10100122 (1:0-3)

Applied Physics Lab course is to accompany the General Physics course.

Laboratory experiments will be in Mechanics and Electricity to reinforce the theoretical portion in the General Physics course.

AutoCAD 10100131 (1:0-3)

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

Engineering Workshop 10100141 (1:0-3)

Apply basic manual skills in engineering workshops: mechanical, electrical and carpentry.

Fourth: Specialization Skills

Principle of electric circuits 10301101 (3:3-0)

Circuits and circuit elements. DC and AC current. Circuit variables: Voltage, Current, Energy, Power factor, Power, Active power, Reactive power, Apparent power. Connection of circuit elements: series, parallel and compound connections. Energy sources. Basic calculations: Equivalent resistance, impedance, current, voltage, power and energy calculations. KVL, KCL, Superposition principle. Resonance. Measurements of circuit variables.

Principle of electric circuits 10301102 (1:0-3)

DC and AC circuit construction and measurements. Resonance. Measuring devices

Electronic circuit and devises 10401101 (3:3-0)

Semiconductor devices. Diodes: classification, characteristics and applications. Transistors: Classification, characteristics and applications. Amplifiers. Oscillators. Logic gates and Integrated circuits: Basic function s, symbols and applications. Introduction to electronic measurements: Oscilloscope applications.

Electronic circuit and devises Lab 10401101 (1:0-3)

Use of oscilloscope in measurements. Investigation of characteristics of semiconductor devices. Construction and study of electronic circuits. Experiments in electronics have to cover the main electronic devices (diode, zener diode, diode applications, BJT, FET, op – amp, oscillator, SCR)

Digital fundamentals 10404101 (3:3-0)

Numerical systems, operations, and codes, logic gates, Boolean algebra and logic simplification, combinational logic and function of combinational logic, flip – flops, counters, shift registers. Fixed – function Integrated Circuits, and Programmable Logic Devices (PLDs).

Digital fundamentals Lab 10404102 (0:0-3)

Experiments in digital fundamentals have to cover logic gates, combinational logic, flip – flops, counters, shift registers.

Electrical machine 10301103 (3:3-0)

Construction, principles of operation, characteristics, and applications of various types of electrical machines: DC/AC, transformers, motors, generators, single-phase and three phase, synchronous and special machines.

Electrical machine lab 10301104 (1:0-3)

Identification of various types of electrical machines components, measurement of electrical machines characteristics like losses, efficiency, speed control, and external connections.

Control technology 10310101 (3:3-0)

Introduction to control systems and application , control elements, open and closed control systems, I/O interfacing, data conversion, solid state drives, , process control applications

Semiconductor electronic drive systems 10307201 (3:3-0)

Power electronics fundamental, DC solid state devices, controlled rectifier drives, Basic principle of chopper drive, regenerative and dynamic breaking, induction machines starting, electric drives for induction motors, induction machine speed control, frequency control and stator voltage control.

Semiconductor electronic drive systems Lab 10307202 (1:0-3)

Familiarization with solid state drives, investigation of controlled rectifiers characteristics, investigation of chopper circuits.

Engineering software application 10408211 (2:0-6)

Familiarization with MATLAB and LAB View programs, Systems representation, performance and controlling by using software.

Microprocessor and microcontrollers 10408221(3:3-0)

Introduction, difference between microprocessor and microcontroller, microcontroller architecture, memory unit, CPU, buses, I/O units, serial communication, ADC and DAC, architecture of 16F8** microcontroller, programming, interfacing and application.

Microprocessor and microcontrollers lab 10408222 (1:0-3)

Light emitting diodes, opt coupler, relays, generating a sound, shift registers, input shift register, output shift register, 7-segment Displays, LCD display, 12-bit ADC, serial communication.

<p>Programmable logic controllers and their Application 10408223 (3:3-0) Comparison between relays and programmable controllers, basic structure of PLC, cycle-scan. CPU memory, Registers, timers, and counters addresses I/O modules, interfacing programming instructions, Programming devices programming procedures, peripheral equipments, troubleshooting and maintenance</p>
<p>Programmable logic controllers and their Application Lab 10408224 (2:0-63) Identification of PLC architecture, I/O modules, programming languages, procedures, instruction set, control instructions, data manipulation, basic troubleshooting and maintenance</p>
<p>Pneumatic and hydraulic drive systems 10408231 (3:3-0) Introduction to fluid mechanics. Properties of hydraulics and pneumatics. Structure of pneumatic and hydraulic systems. Components of pneumatic and hydraulic systems: Execution final elements, Control valves, Timers, Limit switches, Reed switches, Proximity sensors. Symbols and schematic standards, numbering system and identification of pneumatic and hydraulic components. Basic pneumatic and hydraulic drives.</p>
<p>Pneumatic and hydraulic drive systems lab 10408232 (1:0-3) Industrial pneumatic and hydraulic drives, such as actuator positioning, speed control, event driven controls, and realizing different sequential operations.</p>
<p>Training 10408291 (3:0-280) Equivalent to 280 hours of field training targeted to emphasize the ability of students to apply the theories in operating, maintaining and troubleshooting of Mechatronics components and systems.</p>