curriculum for Technician Diploma Program

in

Instrumentation and Process Control Specialization

The curriculum of Technician Diploma in "Instrumentation and Process Control" 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**

August, 2016

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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 Electrical Circuits	3	3	0	
10301102	Principles of Electrical 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*
10304211	Protection and Control Systems	3	3	0	10301101
10304212	Protection and Control Systems Laboratory	1	0	3	10304211*
10306211	Pressure and Level Measurements	3	3	0	10306111
10306212	Pressure and Level Measurements Laboratory	1	0	3	10306211*
10306213	Flow and Temperature Measurements	3	3	0	10306111
10306214	Flow and Temperature Measurements Laboratory	1	0	3	10306213*
10306111	Instrumentation	3	3	0	
10306112	Instrumentation Laboratory	1	0	3	10306111*
10408223	Programmable Logic Controllers and their applications	3	3	0	10404101
10408224	Programmable Logic Controllers and their applications Laboratory	2	0	6	10408223*
10408221	Microprocessors and Microcontrollers	3	3	0	10404101
10408222	Microprocessors and Microcontrollers Laboratory	1	0	3	10408221*
10408211	Engineering Software Applications	2	0	6	10100131
10306291	Training	3	0		
Total		**42**	**27**		

***-Co-requisite**

Guiding Plan
for
Instrumentation and Process Control 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	10401101	Electronic Circuits and Devices Lab.	1
10100122	Applied Physics Laboratory	1	10404101	Digital Fundamentals	3
10100141	Engineering Workshop	1	10404102	Digital Fundamentals Lab.	1
10301101	Principles of Electrical Circuits	3	10306111	Instrumentation	3
10301101	Principles of Electrical Circuits Lab.	1	10306112	Instrumentation Lab.	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
10304211	Protection and Control Systems	3	10306213	Flow and Temperature Measurements	3
10304212	Protection and Control Systems Lab.	1	10306214	Flow and Temperature Measurements Lab.	1
10306211	Pressure and Level Measurements	3	10408223	PLCs and their Applications	3
10306212	Pressure and Level Measurements	1	10408224	PLCs and their Applications Lab.	2
10408221	Microprocessors and Microcontrollers	3	10306291	Training	3
10408222	Microprocessors and Microcontrollers Lab.	1			
10408211	Engineering Software Applications	2			
Total		**17**	**Total**		**15**

Brief Course Description
for
Instrumentation and Process Control Specialization

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First: Generic Skills

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

يوضح المساق مفهوم المواطنة ومهارات الحياة وأهميتهما في اكتساب مهارات قيمه، والعمل على استخدام هذه المهارات في سعيهم للحصول على تعليم افضل ونتائج ايجابيه في العمل، حيث ان المساق يراعي بناء المعرفه في الموضوعات التي يتضمنها البرنامج كما ويبني المهارة عند الشباب لاستخدامها في تطبيق المعرفه كما ويبني الثقه في قدرات الشباب على استخدام هذه المعرفه والمهارة بالاضافه الى توفير الدعم الشخصي والبيئي لتغيير السلوك من خلال تعزيز قيم المواطنة الايجابية والثقافة المجتمعية البناءة 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 المنشأت 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 شؤؤونها 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 ودورة 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 ة، اصناف الحريق معدات المكافحة،

الكهرباء مخاطرها تأثيراتها على الانسان الحماية من الكهرباء والمعالجة من الصدمة الكهربائية، التعامل مع المواد الكيماوية آثارها مخاطرها وشروط التخزين،القوانين المحلية والضمان الاجنماعي.

Third: Supportive Sciences

Applied Mathematics10100111(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

Principles of electrical 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.

Principles of electrical circuits Lab. 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.

Protection and Control Systems 10304211 (3:3-0)

Electrical faults. Importance of protective devices. Classification of protective devices. Switches, fuses, circuit breakers, contactors, relays. Examples of protective and control systems used in process control, motors, wiring.

Protection and Control Systems Lab. 10304212 (1:0-3)

The course aims at giving the students practical skills in order to select ,wire troubleshoot and maintain the most common control and protection devices like fuses, circuit breakers , relays ,contactors ,timers ,switches ,and measuring transformers

Pressure and Level Measurements 10306211 (3:3-0)

The course shall cover the different methods to measure the pressure of gasses, liquids and solid materials. Different level measurement methods shall be also treated. Calibration and installation of pressure and level instruments is also to be covered.

Pressure and Level Measurements Lab. 10306212 (1:0-3)

The student shall carry out the required experiments demonstrating different methods of level and pressure measurement by using capacitive and resistive transducers. LVDT is used also for level and a pressure measurement, calibration of pressure gauges by using dead weight tester is practiced.

Flow and Temperature Measurements 10306213 (3:3-0)

The course includes the study of differential pressure and variable area method flow meter. Different types of flow meters. Basic concepts of temperature scales units, measuring methods and devices like TC, RTD, Bimetallic, thermocouple, semiconductor and filled system thermometers.

Flow and Temperature Measurements Lab 10306214 (1:0-3)

The practical activity includes the study of different methods to measure flow and temperature such as RTD, Thermocouple, Thermistor, Rotameters, Vinturi tubes, Orifice plates and optical sensing propeller flow meter.

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Instrumentation 10306111 (3:3-0)

The course is intended to give the students the theoretical and technological experience related to different types of transducers used for measurements and control. The course classifies transducers and gives the principles of functioning and application of pressure, displacement, strain, flow, temperature and level transducers

Instrumentation Lab 10306112 (1:0-3)

At the conclusion of the laboratory course, the student shall be able to select, wire or tube, calibrate and specify a wide range of different transducers used in industrial control Also, the student will be able to carry out troubleshooting, and elementary modifications to that range of transducers

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.

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

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

Training 10306291 (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 Instrumentation and Process Control components and systems.