Program	Engineering
Specialization	Automatic control technology
Course Number	20310231
Course Title	Programmable Logic Controllers programming and application
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Brief Course Description:

Cover basic function and application of PLC. Provides practice skills and knowledge on the PLC structure, interfacing with real industrial processor.. Programming PLC using ladder diagrams and statements list. Trouble shooting PLC system program .

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Course Objectives:

The objective of this course is to provide the necessary background information which will allow the student to have a good idea about programmable logic controllers .The student will be able to work well with PLCs, write programs. Make electrical wiring and do well with troubleshooting

Detailed Course Description

number	Unite name	Unite content	Time neded
1	**Programmable logic Controller(PLCs):An Overview**	• Programmable logic controller • Parts of a PLC • Principles of operation • Modifying the operation • PLCs versus Components • PLC size and application	1week
2	**PLC Hardware Components**	• The I/O section • Discrete I/O Modules • Analog I/O Modules • Special I/O Modules • I/O specification • The CPU • Memory type • Programming Devices • Recording and retrieving Data • PLC workstations	1 week
3	**Number System and codes**	• Decimal system • Binary system • Negative number • Octal system • Hexadecimal system • BCD system • Gray code • ASCII code • Party Bit • Binary arithmetic	1 week
4	**Fundamental of logic**	• The binary concept • AND, OR, and NOT Function • Boolean Algebra • Developing Circuits from Boolean expressions	1 week

		▪ Producing the Boolean equation from a Given Circuit ▪ Programming word Level logic instruction	
5	**Basic of PLC programming**	▪ Processor Memory organization ▪ Program Scan ▪ PLC Programming Languages ▪ Relay-Type Instructions ▪ Instruction addressing ▪ Branch Function ▪ Internal Relay instruction ▪ Set-reset ▪ Programming EXAMINE IF CLOSED and EXAMINE IF OPEN Instruction ▪ Entering the ladder Diagram ▪ Modes of Operation	2 weeks
6	**Developing Fundamental PLC Wiring Diagrams and Ladder logic Programs**	▪ Electromagnetic control relays ▪ Contactors ▪ Motor starters ▪ Manually Operated switches ▪ Mechanically Operated switches ▪ Transducers and sensors ▪ Output Control Device ▪ Seal-In Circuit ▪ Latching Relays ▪ Converting relays Schematics into PLC Ladder Programs ▪ Writing a Ladder Logic program Directly from a Narrative Description	2 weeks
7	**Programming timers**	▪ Mechanic timing Relay ▪ Timer Instructions ▪ On-Delay Timer Instruction ▪ Off-delay Timer Instruction ▪ Retentive Timers	1 week

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

		▪ Cascading timers	
8	**Programming Counters**	▪ Counter Instruction ▪ Up-Counter ▪ Down-Count	1 week
9	**Data Manipulation Instruction**	▪ Data Manipulation ▪ Data Transfer Operation ▪ Data Compare Instruction ▪ Data manipulation programs ▪ Numerical Data I/O interfaces ▪ Set-point Control	1 week
10	**Math instruction**	▪ Math instructions ▪ Addition Instruction ▪ Subtraction instruction ▪ Multiplication Instruction ▪ Division instruction	1 week
11	**Sequencer and shift register Instruction**	▪ Mechanical Sequencers ▪ Sequencer Instruction ▪ Sequencer program ▪ Shift register s ▪ Word Shift register	1 week
12	**PLC Installation practice, Editing, and troubleshooting**	▪ PLC Enclosures ▪ Electrical Noise ▪ Leak Inputs and Outputs ▪ Grounding ▪ Voltage variation and Surges ▪ Program Editing ▪ Programming and Monitoring ▪ Preventive and monitoring ▪ Troubleshooting ▪ Connecting your personal computer and your programming Logic Controller	1 week

□ **Evaluation Strategies:**

		Percentage	Date
1. Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Assignments	10%	
	Final Exam	50%	--/--/----
2. Homework and Projects			
3.Discussions and lecture Presentations			

□ **Teaching Methodology:**

1. Lecture

Text Books & References:

Text book:
1. Programmable Logic Controllers, Dr.Mazzoz Sulahat, Eng.Khaled Soboh, Eng Zeid Alhjazeen

References:-
1. Technicians guide to programmable controllers , third edition, Delmar publishers, 1995 Toronto Canada
2. Programmable logic controllers, principles and applications, third edition, Prentice Hall, 1995, U.S.A, John W.Webb, Ronald A.Reis.
3. The PLC workbook, programmable logic controllers made easy, prentice Hall. 1996, U.K, K.Flements –Jewery.W.Jeffcoat

Program	Engineering
Specialization	Automatic control technology
Course Number	20310232
Course Title	PLCs programming and Application Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

❖ Practical study that supports the theoretical material. This student shall be able to design required programs transfer or install in the PLC and after debugging to run it or modify it if necessary , practical exercises shall include time driven types.

The student shall realize different sequences using looping techniques by means of different timers, counters, internal detect duty cycle functions

Course Objectives:

At the conclusion of this course the student will be able to:

1. Write the ladder diagrams which is necessary to carry out an automatic process.
2. Write programs in instruction list language which is necessary to cary out an automatic process.
3. Down load the programs to the PLC RAM using hand programmer or PC.
4. Troubleshoot the written programs and do the necessary correction

Detailed Course Description:

Lab number	Lab name	Lab conttent	Time Needed
1	Logic basic function		1 weeks
2	Internal relay, set reset		1 week
3	Switching- three-phase motor, direct and reverse motors, Automatic star delta		2 week
4	Timers Ton, Toff, Tp		1 week
5	Investigating UP and down counters with practical applications		1 week
6	Sequence control –conveyer belt		3weeks
7	Traffic light		1week
8	Lift		3weeks
9	Application of the functions: move, compare, rotate and shift, registers and set-reset function		3weeks

☐ **Evaluation Strategies:**

		Percentage	Date
1. Exams	Reports	20%	--/--/----
	Midterm Exam	20%	--/--/----
	Assignments	10%	
	Final Exam	50%	--/--/----

☐ **Teaching Methodology:**

1. Lab

Text Books & References:

1. ELC-2001 Programmable Controller, Hardware Manual, Carlo Gavazzi Denmark.
2. S7-200 Programmable Controller, Quick Start manual, Semens 1995
3. different manuals company