

**Mechatronics Department, Faculty of Engineering
Philadelphia University, Jordan**

Course Syllabus	
Course Title	Programmable Logic Controllers
Course Number	640445/640573/630530
Course Level	4 th year
Class Time	11.10 → 13.00
Instructor	Dr. Mohammed Bani Younis
email	mbaniyounis@philadelphia.edu.jo
website	www.philadelphia.edu.jo/academics/mbaniyounis
Prerequisites	Microprocessor and Microcontroller Systems
Office Hours	09:45-11:00 MW, Office 732
Text Book	Programmable Controllers: Theory and Implementation , 2 nd edition By Bryan and Bryan. Industrial Text Company Publications

Objective and Goals:

The course objective is to provide the students with comprehensive information on the operation and applications of PLCs in the industrial automation field. The main course goals are:

- Understand PLC operations and applications.
- Understand I/O systems, both discrete and analog.
- Interface PLC with I/O devices.
- Program PLC for industrial automation.
- Introduce IEC Standards.

Contents:

Week	Topic	Chapter
Oct 16	Introduction to Programmable Controllers Definition, PLC History, Operation Principles, Ladder Diagrams, PLC advantages	Ch. 1
Oct 23	Review of Number Systems and Logic Concepts	Ch. 2,3
Oct 01	Processors and Power Supply Processors, Process Scan, System Power Supply, Error Checking, Programming Devices	Ch. 4
Nov 6	Memory Systems and I/O Interaction Memory Overview, Structure, and Organization, Configuration, and I/O Interaction	Ch. 5
Nov 13	Discrete Input / Output System I/O Racks, PLC I/O Instructions, Discrete I/O Types	Ch. 6
Exam I (Nov 16-24)		
Nov 20	Analog Input / Output System Analog I/O Instructions, I/O Data Representation and Handling	Ch. 7
Nov 27	Special Function I/O Special Analog, Temperature, PID Interfaces, and Positioning Interfacing	Ch. 8
Dec 4	PLC Programming Types of PLC Languages, Ladder Diagram Format	Ch. 9
Dec 11	Ladder Relay Programming	
Dec 18	Timers and Counters	
Exam 2 (Dec 21- Jan02)		
Dec 25	Flow Control Instructions	
Jan 01	Arithmetic Instructions and Data Manipulations	
Jan 8	The IEC 61131 Standards General Information, Programming Languages: LD, FBD, IL, ST, SFC	Ch. 10
Jan 15	System Programming and Implementation Control Strategy, Implementation Guidelines, I/O Control Programming	Ch. 11
Jan 22	PLC Applications and Industrial Examples Drilling Machine, Package Sorting, Injection Molding, Bottle Filling, X-Y Dispenser	Ch. 24 Ref. 2
FINAL EXAMS (Jan 28- Feb 05)		

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Assessment Instruments

Evaluation of students' performance (final grade) will be based on the following three categories:

- **Exams.** Two in-class exams will be given. Each will cover about 6-weeks of lectures
- **Project.** A project assignment will be handed to the students. The assignment will ask the students to program a particular product that can be controlled using Step 7 of Siemens. Students will be asked to write a technical report and show their work in the lab. A group of three students are expected to work on the project.
- **Final Exam:** The final exam will cover all the class material.

Allocation of Marks	
Exam I	20%
Exam II	20%
Project	20%
Final Exam	40%

References:

1. **Programmable Logic Controllers**, 3rd edition by Frank Petruzella. McGraw Hill 2005.
2. **Industrial Control Electronics: Devices, Systems, and Applications**, 3rd edition by Bartelt. Thomson Delmar Learning 2006.