

Engineering Program

Specialization	Technology of remote industrial sensing and controlling
Course Number	20413271
Course Title	Programmable Automation controllers
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

Introduction to programmable automation controllers , Hardware and software modules, Timing, files, instrument drive basic, Real time application design, Real time controller, Data transfer and, Hosting synchronization , FPGA, **LabVIEW Embedded**.

Course Objectives:

Upon the completion of the course, the student will be able to:

- To interpret programmable automation controllers (PAC) control systems.
- To determine programmable automation controller (PAC) system components.
- To determine programmable automation controller (PAC) software components.
- To implement local I/O modules.

Detailed Course Description:

Chapter No.	Content	Textbook	Time Needed
1	<p>Overview of Labview programming</p> <ul style="list-style-type: none"> - Sequencing and Data Flow - Polymorphic Vis - Array and clusters - Shift registers - Global and local variables - Code calling and executing 		2
2	<p>Timing</p> <ul style="list-style-type: none"> - Using the Built-in Timing Functions - Intervals - Timed structures - Timing sources - Execution and priority - Timing guidelines - Sending timing data to other applications - High-resolution and high-accuracy timing 		2
3	<p>Synchronization</p> <ul style="list-style-type: none"> - Polling Events - Occurrences - Notifiers - Queues - Semaphores . . 		
4	<p>Files and documentation</p> <ul style="list-style-type: none"> - Type of files - Accessing files - VI description - Writing a formal documentation - Distributed documents 		3
5	<p>Instrument driver basic</p> <ul style="list-style-type: none"> - Finding Instrument Driver Basics - Communication standards - Learn about Your Instrument - Determine Which Functions to Establish Communications - Hardware and wiring - Protocols and basic message passing. 		3
6	<p>Instrument Driver Development Techniques</p> <ul style="list-style-type: none"> - Plug-and-Play Instrument Drivers 		

	<ul style="list-style-type: none"> - General Driver Architectural Concepts - Error I/O flow control - Modularity by grouping of functions - Project organization - Initialization - Configuration - Action and status 		
7	<p>Development of Data acquisition software</p> <ul style="list-style-type: none"> - Data Analysis and Storage 325 - Postrun analysis - Real-time analysis and display - Sampling and Throughput - Signal bandwidth - Oversampling and digital filtering - Timing techniques - Configuration Management - What to configure - Configuration editors - Configuration compilers - Saving and recalling configurations - A Low-Speed Data Acquisition Example - Medium-Speed Acquisition and Processing 		3
8	<p>Real time system</p> <ul style="list-style-type: none"> - RT Hardware - Designing Software to Meet Real-Time Requirements - Measuring performance - Shared resources - Multithreading and multitasking - Organizing VIs for best real-time performance - Context switching adds overhead - Scheduling - Timed structures - Communications 		2
9	<p>Field-Programmable Gate Array</p> <ul style="list-style-type: none"> - Introduction to FPGA - LabVIEW for FPGAs - RIO hardware platforms - Plug-in cards - CompactRIO - Timing and 		2

	<ul style="list-style-type: none"> - Compact Vision . - Application Development 		
10	<p>LabVIEW Embedded</p> <ul style="list-style-type: none"> - LabVIEW Embedded Development Module - Running LabVIEW Embedded on a new - Porting the LabVIEW runtime library - Incorporating the C toolchain - The Embedded Project Manager - LEP plug-in VIs Target OnSelect - Other plug-in VIs - Incorporating I/O drivers - LabVIEW Embedded programming best practices - Interrupt driven programming - LabVIEW Embedded targets . 		2

Evaluation Strategies:

		Percentage	Date
1. Exams	First Exam	20%	/ /20__
	Second Exam	20%	/ /20__
	Final Exam	50%	/ /20__
2. Homework and Projects		10%	/ /20__
Total		100%	

Teaching Methodology:

- Lectures
- PowerPoint slides
- Term projects

Text Books & References:

*تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي



Textbooks

LabVIEW Graphical Programming, Gary W. Johnson, Richard Jennings, Fourth Edition

References