# Engineering Program	
Specialization	**Technology of remote industrial sensing and controlling**
Course Number	
Course Title	**Human machine interface software Lab**
Credit Hours	
Theoretical Hours	**0**
Practical Hours	**1**

Brief Course Description:
This course covers the basic of LabVIEW environment toolkits, it is also and covers the usage of LabVIEW for industrial measurement and control. In addition the course dealing with Labview programming techniques and how to build END user application.

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

- Introduce to LabVIEW learning path;
- Help students to explore the LabVIEW environment, dataflow programming, and common LabVIEW architectures in a hands-on format.
- Learn to develop data acquisition, instrument control, data-logging, and measurement analysis applications.
- Create applications using basic design templates and architectures to acquire, process, display, and store real-world data.

Detailed Course Description:

Chapter No.	**Unit title**	**Content**	**Time Needed**
1	Navigating LabVIEW	• The LabVIEW environment including windows, menus, and tools • The LabVIEW front panel and block diagram • Creating and using LabVIEW projects • Understanding the dataflow programming model of LabVIEW • Searching for controls, VIs, and functions	
2	Troubleshooting and Debugging VIs	• Correcting broken VIs • Using common debugging techniques • Addressing undefined or unexpected data • Implementing error checking and error handling	
3	Implementing a VI	• Designing a user interface (LabVIEW front panel) • Choosing data types • Using structures like the While Loop and For Loop • Adding software timing to your code • Making decisions in your code using case structures • Documenting your code	
4	Developing Modular Applications	• Basics of modular programming • Creating an icon and connector pane • Using a VI as a subVI • Creating subVIs from an existing VI	
4	Creating and Leveraging Structures	• Creating and using array controls and indicators • Creating and using cluster controls and indicators • Using type definitions to improve reuse of data structures in applications	
5	Managing File and Hardware Resources	• High-level and low-level file I/O functions available in LabVIEW • Implementing File I/O functions to read and write data to files	

		• Programming with the DAQmx API • Instrument control and programming with instrument drivers	
6	Using Sequential and State Machine Algorithms	• Sequential programming • State programming • State machine design pattern	
7	Solving Dataflow Challenges Using Variables	• Communicating between parallel loops • Using local variables • Writing to controls and reading from indicators • Understanding and avoiding race conditions	
8	Moving Beyond Dataflow with Events and Queues	• Asynchronous communication • Queues • Events driven programming	
9	Implementing Design Patterns	• Design patterns • Single loop design patterns– Including the state machine design patterns and functional global variables • Multiple loop design patterns – Including producer/consumer design patterns • Error handlers • Generating error codes and messages • Timing a design pattern	
10	Controlling the User Interface	• VI Server architecture • Property nodes • Invoke nodes • Control references	
11	File I/O Techniques	• Comparing file formats • Creating file and folder paths • Writing and reading binary files • Working with multichannel text files with headers • Accessing Technical data management streaming (TDMS) files in LabVIEW and Excel	

12	Improving an Existing VI	• Refactoring inherited code • Typical issues when refactoring code	
13	Creating and Distributing Applications	• Preparing the files • Creating build specifications • Creating and debugging an application • Creating an Installer	

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:

- Practical experimental work in small groups
- PowerPoint slides
- Term projects

Text Books & References:

Textbooks

LabVIEW Basics I Development Course Manual

LabVIEW Basics II Development Course Manual

References

LabVIEW Core 1 Course Manual, Part Number 325290A-01

LabVIEW Core 1 Exercises Part Number 325291A-01