AMAL JYOTHI LAB VIEW ACADEMY

THE COURSE DESIGN

The Lab View course can be divided in to two

1. Lab VIEW Core-I
2. Lab VIEW Core-II

1. Lab VIEW Core- I

The Lab VIEW Core- I introduces the basic Lab VIEW environment. It introduces the concept of Data Flow programming and common Lab VIEW architectures. It prepares the students to develop test and measurement, data acquisition, instrument control, data logging and measurement analysis applications using Lab VIEW. At the end of Lab VIEW Core- I, the students can create applications using state machine design pattern to acquire, process, display and store real world data. The course is mostly designed in a hands-on format so that the students can quickly apply skills learned in the course to their applications.

1.1 Course Contents

1.1.1. Setting up hardware
1.1.2. Navigating Lab VIEW
1.1.3. Troubleshooting and Debugging VIs.
1.1.4. Implementing a VI(Virtual Instrument)
1.1.5. Relating Data
1.1.6. Managing Resources
1.1.7. Developing Modular Applications
1.1.8. Common Design Technique and Pattern
1.1.9. Using Variables.
1.1.10. Interfacing the hardwires like NI USB-6211 Bus-Powered M Series Multifunction DAQ Device, NI myDAQ, NI myRIO-1900 etc.

While completing the Lab VIEW Core-I course, the students will learn

1. All types of controls and displays in the control palette of the front panel
2. The structures(including loops, global variable and local variable)
3. The Arrays and Matrix operations
4. The clusters and conversion between clusters and arrays
5. All numeric functions(including basic mathematical operations, Conversion, Data Manipulation, Complex variables, scaling, fixed point, Math and Scientific Constant etc)
6. The Boolean Operations
7. The string Operations
8. The comparison Functions
9. The Timing Functions
10. The Dialogs and User Interface

11. The File Input/Output Functions
12. The waveform Functions
13. Report Generations
14. Express VIs etc.

While completing the Lab VIEW Core-I course, the students will be able to

1. Use Lab VIEW to create data acquisition, analysis and display operations
2. Create user interfaces with charts, graph and buttons
3. Use the programming stuctures and data types that exist in Lab VIEW
4. Use various editing and debugging techiniques
5. Create and save VIs for use as SubVIs
6. Read and write data to files

2. Lab VIEW Core- II

The Lab VIEW Core-II course teaches to design complete stand alone applications with Lab VIEW. This course is an extension of Lab VIEW Core- I and introduces the common design techniques for successfully implementing and distributing Lab VIEW applications for research, engineering and testing environments.

2.1. Course Contents

2.1.1. Common Design Techniques
2.1.2. Synchronization Techniques
2.1.3. Event Programming
2.1.4. Error Handling
2.1.5. Controlling the User Interface
2.1.6. File I/O Technique
2.1.7. Improving an Existing VI
2.1.8. Creating and Distributing Applications
2.1.9. Using Variables
2.1.10. Web Publishing of the VI Front Panel
2.1.11. Block Diagram Security Settings in Lab VIEW
2.1.12. Interfacing of the Customized Hardware with Lab VIEW for specific applications (Serial, Parallel, USB etc)

While completing the Lab VIEW Core-II course, the students will learn

1. Synchronization Functions in Lab VIEW
2. Signal Processing Operations in Lab VIEW
3. Vision Module (Image Processing)
4. NI-DAQmx
5. VISA (Virtual Instrument Software Architecture)

While completing the Lab VIEW Core-IIcourse, the students will be able to

1. Apply common design patterns that use notifiers, queues, semaphore, rendezvous, occurrences, first call? etc.
2. Programmatically control user interface objects
3. Optimize the reuse of existing code
4. Interface with MATLAB

3. The course Structure (Proposed)

The Lab VIEW course (both Core-I and Core-II) is designed for **10 weeks** of class room study. Each week is having **3 hours** and a total of **30 hours** is required for the completion of the course.

3.1. Course Plan

Week	Topic	Reading and Homework
1	What is Lab VIEW Project Explorer Parts of a VI Front Panel Block Diagram Searching for Controls, VIs, and Functions Selecting a Tool	Lab VIEW Core 1 Course Manual Lab VIEW Core 1 Exercises
2	Dataflow Building a Simple VI Correcting Broken VIs Debugging Techniques Undefined or Unexpected Data Error Handling Front Panel Basics Lab VIEW Data Types Documenting Code While Loops	LabVIEW Core 1 Course Manual LabVIEW Core 1 Exercises
3	For Loops Timing a VI Data Feedback in Loops Plotting Data—Waveform Chart Case Structures	LabVIEW Core 1 Course Manual LabVIEW Core 1 Exercises
4	Understanding Modularity Icon Connector Pane Using SubVIs Arrays Common Array Functions Polymorphism Auto-Indexing	LabVIEW Core 1 Course Manual LabVIEW Core 1 Exercises
5	Clusters Type Definitions Understanding File and Hardware Resources File I/O	LabVIEW Core 1 Course Manual LabVIEW Core 1 Exercises
6	Using Sequential Programming Using State Programming State Machines	LabVIEW Core 1 Course Manual LabVIEW Core 1 Exercises

	Communication Between Parallel Loops Controls and Indicators Variables Local Variables Race Conditions Asynchronous Communication Queues	LabVIEW Core 2 Course Manual LabVIEW Core 2 Exercises
7	Event-Driven Programming Design Patterns Simple Design Patterns Multiple Loop Design Patterns Error Handlers Generating Error Codes and Messages	LabVIEW Core 2 Course Manual LabVIEW Core 2 Exercises
8	Timing a Design Pattern Functional Global Variable Design Pattern VI Server Architecture Property Nodes Invoke Nodes Control References	LabVIEW Core 2 Course Manual LabVIEW Core 2 Exercises
9	Compare File Formats Create File and Folder Paths Write and Read Binary Files Work with Multichannel Text Files with Headers Access TDMS Files in LabVIEW and Excel Refactoring Inherited Code Typical Refactoring Issues	LabVIEW Core 2 Course Manual LabVIEW Core 2 Exercises
10	Preparing the Files Build Specifications Create and Debug an Application Create an Installer	LabVIEW Core 2 Course Manual LabVIEW Core 2 Exercises

4. Program Outcome (PO) Electronics & Communication Engineering

At the end of the Programme, a student will be able to

1. Apply knowledge of Mathematics, Science and Engineering to solve the complex engineering problems in Electronics and Communication Engineering
2. Investigate, design and conduct experiments, analyze and interpret data, make inferences from the resulting data and apply the research skills to solve complex engineering problems in analog and digital systems.
3. Demonstrate basic engineering practices and conduct experiments in electronics, electrical system and in programming language.
4. Model and simulate communication systems and analyze the performance using modern tools.
5. Demonstrates the knowledge of theoretical & practical aspects of signal and systems to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety.

6. Test, measure and provide valid conclusions on energy saving design using modern engineering tools and softwares for environmental sustainability.
7. Understand the impact of engineering solutions on the society by considering contemporary issues through lifelong learning.
8. Work as a member of a project team to find cost effective design solutions to the problems related to electronics and communication systems-
9. Communicate effectively in both verbal and written form along with ethical responsibilities.
10. Design systems for applications based on the acquired knowledge to solve real time requirements.

5. COURSE OBJECTIVE

To understand the basic concepts of Virtual Instrumentation and application of Lab VIEW for measurement and control applications

5.1. COURSE OUTCOME(CO)

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

[CO 1] Understand the basics of virtual instrumentation concept and dataflow programming

[CO 2] Understand various functions available in Lab VIEW for engineering applications

[CO 3] Design projects using the functions available in Lab VIEW

[CO 4] Understand the interfacing of DAQ devices and customized user designed hardware with Lab VIEW

[CO 5] Write the Certified LabVIEW Associate Developer (CLAD) exam, administered by National Instruments, for the certification and leading to placements in core companies

5.2. PROGRAMME OUTCOME – COURSE OUTCOME (Mapping)

COURSE OUTCOME	PROGRAM OUTCOME								
Upon completion of the course, the students will be able to:	1	2	3	4	5	6	7	8	10
CO1 Understand the basics of virtual instrumentation concept and dataflow programming	High	High	High	High	High	High	High	High	High
CO2 Understand various functions available in Lab VIEW for engineering applications			High	High		High			

CO3 Design projects using the functions available in Lab VIEW				High	High				High
CO4 Understand the interfacing of DAQ devices and customized user designed hardware with Lab VIEW				Medium	Medium				High
CO5 Write the Certified LabVIEW Associate Developer (CLAD) exam, administered by National Instruments, for the certification and leading to placements in core companies							High	High	

6. Exams

1. There should be an examination after the completion of the 10 week course and topics are material from the lectures, assigned readings and videos and from programming assignments. It should consist of written questions as well as practical programming exercises.

2. The second exam will be the **Certified LabVIEW Associate Developer (CLAD)** exam administered by National Instruments. It is an online exam consisting of 40 multiple choice questions. A minimum of **70% (28 out of 40)** is required for getting the CLAD certification from National Instruments.

7. Project

Each student should do a project after the completion of the 10 week course. Each project must involve interfacing a computer to data acquisition hardware. Projects can be completed either individually or as a group. The instructor must approve the makeup of any group. Students are also encouraged to submit their project to the **VI MANTRA** and **NI YANTRA** competition conducted by National Instruments.

8. The course fee and other details

- **Lab VIEW Core-I**
  Pre-requisite : None
  Course fee : 4000/-
- **Lab VIEW Core-II**
  Pre-requisite : Should complete Core-I
  Course fee : 3000/-