

# LabVIEW Basics I: Development with CAN Bus Option Course

## Overview

The LabVIEW Basics I course introduces the LabVIEW environment, its features, dataflow programming, and common LabVIEW architectures. This course is the fastest way to become productive with LabVIEW. It prepares you to develop test and measurement, data acquisition, data logging, Controller Area Network (CAN) and measurement analysis applications using LabVIEW. At the end of LabVIEW Basics I, you can create applications using basic design templates and architectures to acquire, process, display, and store real-world data. The hands-on format of the course enables you to quickly apply skills learned in the course to your application. This course is our standard LabVIEW Basics I course except that the instrument control lesson taught on Day 3 is replaced with the CAN lesson.

## Duration

Three Days

## Audience

- New users and users preparing to develop applications using LabVIEW or NI Developer Suite
- Users and technical managers evaluating LabVIEW or NI Developer Suite in purchasing Decisions
- Users pursuing the Certified LabVIEW Associate Developer certification

## Prerequisites

- Experience with Microsoft Windows
- Experience writing algorithms in the form of flowcharts or block diagrams

## NI Products Used During the Course

- LabVIEW Professional Development System Version 8.5
- NI Data Acquisition device
- DAQ Signal Accessory
- High Speed NI CAN board
- CAN Demonstration Accessory

## After attending this course, you will be able to:

- Use LabVIEW to create data acquisition, analysis, and display applications
- Create user interfaces with charts, graphs and buttons
- Use the programming structures and data types that exist in LabVIEW
- Apply basic design templates and architectures for your applications
- Use various editing and debugging techniques

## Registration

Register online at [ni.com/training](http://ni.com/training) or call (800) 433-3488 Fax: (512) 683-9300 [info@ni.com](mailto:info@ni.com)

Outside North America, contact your local NI Office.  
Worldwide Contact Info: [ni.com/global](http://ni.com/global)

## Part Number

910724-xx  
-01 NI Corporate or Branch  
-11 Regional  
-21 Onsite (at your facility)

- Create and save your own VIs so you can use them as subVIs
- Read and write your data to files
- Create applications that use plug-in data acquisition (DAQ) boards
- Create applications that communicate to a Controller Area Network bus
- Create applications that synchronize CAN bus and DAQ measurements

## Suggested Next Courses

- LabVIEW Basics II: Development
- Data Acquisition and Signal Conditioning

## Recommended Certification

- Certified LabVIEW Associate Developer Certification

# LabVIEW Basics I: Development with CAN Bus Option Course Outline

## Day 1

### Problem Solving

This lesson introduces strategies to solve measurement and analysis needs using a software development method. Topics include:

- Identifying the steps in the software development method
- Defining a problem
- Designing an algorithm, flowchart, or state transition diagram
- Preparing for implementation, testing, and maintenance of applications

### Navigating LabVIEW

This lesson introduces the LabVIEW environment. In this lesson, you will build a LabVIEW application that enables you to fully explore the environment and that acquires, analyzes and presents data. Topics include:

- 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

### Troubleshooting and Debugging VIs

This lesson teaches various debugging and error checking techniques in LabVIEW to identify problems with block diagram organization or with data passing between different points in the block diagram.

Topics include:

- Using the LabVIEW help features include the Context Help, the LabVIEW Help and the Example Finder
- Correcting broken VIs
- Using common debugging techniques
- Addressing undefined or unexpected data
- Implementing error checking and error handling

## Day 2

### Implementing a VI

This lesson teaches how to implement code in LabVIEW to meet project requirements. Topics include:

- Designing a user interface (LabVIEW front panel)
- Choosing data types and displaying data as a plot
- Using structures like the While loops and For loops
- Adding software timing to your code
- Making decisions in your code using case structures and formula nodes
- Documenting your code

### Relating Data

This lesson introduces data types that combine data into a single structure and when their use can optimize applications. Topics include:

- Creating and using array controls and indicators
- Implementing cluster controls and indicators
- Using type definitions to define custom controls for applications

### Storing Measurement Data

This lesson introduces the different types of data formats available in LabVIEW and common File I/O operations. Topics include:

- An introduction to different file formats
- File I/O functions available in LabVIEW
- Implementing File I/O functions to read and write data to files

### Developing Modular Applications

This lesson introduces modular programming in LabVIEW. In LabVIEW, when a VI is used within another VI, it is called a subVI. You will learn how to build the icon and connector pane of a VI so that it can be used as a subVI. Topics include:

- Basics of modular programming
- Creating an icon and connector pane
- Using a VI as a subVI
- Creating subVIs from an existing VI

# LabVIEW Basics I: Development with CAN Bus Option Course Outline

## Day 3

### Acquiring Data

This lesson describes how to use plug-in data acquisition (DAQ) devices in LabVIEW. You will learn how to write a VI that communicates with DAQ devices.

Topics include:

- Plug-in DAQ devices – typical hardware characteristics
- Data acquisition in LabVIEW – software architectures
- Simulating a DAQ device
- Performing analog input and output
- Counters
- Performing digital input and output

### CAN Bus

This lesson describes the Controller Area Network (CAN) standard and how it is used today. You learn how to use a plug-in CAN board and LabVIEW to communicate with devices on a CAN bus. You also learn how to synchronize CAN and DAQ hardware for data logging or device validation applications. Topics include:

- CAN basics
- Common CAN applications
- CAN configuration and channel import
- CAN programming model in LabVIEW
- CAN synchronization with DAQ

### Common Design Techniques and Patterns

This lesson introduces common LabVIEW architectures and design patterns that exist within LabVIEW.

Topics include:

- Sequential programming
- State programming
- State machine architecture
- Parallelism