

LabVIEW Modular Instruments

Preliminary Outline - Courses to be scheduled starting February 2005

Overview

This course teaches you to develop scalable, high-performance test and measurement systems with LabVIEW and NI Modular Instrumentation. Using LabVIEW, you learn how to configure modular instrument hardware and programming techniques to integrate timing and synchronization for accurate, high-throughput measurements in automated test applications. The course also teaches the fundamentals of analog and digital measurements. Each course attendee has access to their own fully-equipped PXI modular instrumentation system for hands-on exercises. After you complete the course, you can quickly develop and maintain cost-effective, high-performance, scalable and accurate test and measurement systems.

Duration – Two Days

Audience

- Users and systems integrators preparing to develop applications with LabVIEW and PXI modular instrumentation
- Test engineers or managers who are using or evaluating modular Instrumentation to create integrated automated test systems
- Scientists, design engineers, and technicians who need to make, accurate measurements

Prerequisites

- LabVIEW Basics I and II courses or equivalent experience
- Recommended: Basic knowledge of electrical principles

NI Products Used During the Course

- LabVIEW Professional Development System Version 7.1
- NI SignalExpress
- NI PXI Chassis with Embedded Controller
- NI Modular Instruments (including Digitizers, Arbitrary Waveform Generators, DMMs and Switches)

REGISTRATION

Register online at ni.com/training or call (800) 890 2062 • Fax: (512) 683-9300
info@ni.com

Outside North America, contact your local NI office. Worldwide Contact Info: ni.com/global

NI can also hold this class onsite at your facility.

Ordering Information 910739-xx

-01 NI Corporate or Branch, -11 Regional, -21 Onsite

After attending this course you will be able to:

- Understand typical analog and digital measurements
- Identify the necessary components and critical specifications for a test system
- Correctly connect and configure an integrated measurement system to minimize error
- Make highly accurate measurements using interactive tools without programming
- Understand and use the API for each class of modular instrument
- Apply LabVIEW programming techniques to acquire data rapidly
- Manage large or complex data efficiently
- Use switching and synchronization to create a high-throughput automated test system

Suggested Next Courses

- TestStand Basics
- LabVIEW Intermediate

Preliminary Outline – LabVIEW Modular Instruments Course

Modular Instrument Sections

Each of the classes of Modular Instrument has specific techniques and considerations which you must be aware of in order to make optimal use of your instruments. Distributed through the course are sections to describe the most common types of Modular Instrument. These sections apply the concepts from supporting sections on specific measurements and instruments. Each of these sections contains exercises which demonstrate the use of the instrument as well as a project in which you learn to program an application with the instrument. Some of the projects from these sections will be combined and synchronized in the Final Project to create a multi-functional measurement system. Topics covered for each class of Modular Instrument include:

- Instrument Fundamentals
- Common Measurements
- Relevant Specifications
- Using the instrument without programming
- Using the LabVIEW API for the instrument
- Configuration and wiring considerations

Day 1

Analog Input

A practical understanding of the electrical and mathematical concepts which form the basis of a measurement system is essential when creating an effective application. This chapter gives an introduction to the fundamentals of analog input and also covers many practical considerations which are essential in performing accurate and efficient analog input. Although it provides some brief theory, this chapter is focused on practical concepts, and clearly shows how each section can be applied to improve the measurement system. Topics include:

- Description of Analog to Digital Conversion and the various types of ADC
- Explanations of common Analog Input specifications
- Techniques for performing optimized analysis of Analog Input
- Considerations and common sources of error

Modular Instrument: Digitizer

Modular Instrument: DMM

Analog Output Fundamentals

This section builds upon the understanding gained in the Analog Input chapter and applies it to concepts related to Analog Output. These topics are presented with a practical approach which focuses on how each can be applied to improve the efficiency of accuracy of a system. Topics include:

- Description of Digital to Analog Conversion and the various types of DAC
- Explanations of common Analog Input specifications
- Considerations and common sources of error

Modular Instrument: Function Generator

Day 2

Digital Fundamentals

This section provides essential background for creating digital systems. You gain fundamental understanding of digital devices and the various digital standards. This chapter also takes a practical look at timing issues and sources of error in digital communication.

Topics include:

- Description of various types of Digital I/O devices
- Voltage levels
- Timing and Triggering
- Explanations of common Digital specifications
- Considerations and common sources of error

Modular Instrument: HSDIO

Measurement System Integration

Although understanding each class of instrument is important, the real challenge for users of Modular Instruments is combining them together to create a measurement system. This chapter introduces the key factors you will need to consider to effectively combine your instruments into an integrated system. In addition, this chapter introduces new LabVIEW programming techniques for advanced measurement systems, including techniques to efficiently handle large or complex data. Topics covered include:

- Choosing the right hardware for a system
- LabVIEW Programming techniques for advanced measurement systems
- Synchronization
- Calibration
- Using Modular Instruments in Real Time systems

Modular Instrument: Switches

Final Project

This project will use the techniques described in the Measurement System Integration section to combine code modules written in different course exercises into an efficient, integrated measurement system.