



Educational Services

April 2018 - March 2019

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PRICE LIST

Prices valid April 1, 2018 through March 31, 2019

Enrollment Information	3
Recommended Sequence of Courses for Customers.....	4-5

	Owings Mills, MD (per student)	Aiken, SC (per student)	Denham Springs, LA (per student)	Lenexa, KS (per student)	Length (days)	Page
D/3® User	\$3,975	\$3,975	\$3,975	\$3,975	10	9
D/3® Continuous Control Configuration.....	2,035	2,035	2,035	2,035	5	9
D/3® SABL®	2,035	2,035	2,035	2,035	5	10
Application Design Techniques.....	2,500	2,500	2,500	2,500	5	10
D/3® System Upgrade.....	1,995	1,995	1,995	1,995	3	11
D/3® Utilities Upgrade	1,995	1,995	1,995	1,995	3	11
D/3® System Management.....	1,995	1,995	1,995	2,133	3	12
D/3® 8000 I/O Configuration	1,125	1,125	1,125	1,125	2	12
D/3® Alarm Management	1,350	1,350	1,350	1,350	2	13
Plant State Suite (PSS).....	1,350	1,350	1,350	1,350	2	13
D/3® Product Overview	1,295	1,295	1,295	1,295	3	14
D/3® Introduction (Web-based).....	\$475 (per person - 30 day seat) 15% discount available for 15 or more students.					14
D/3® TotalVision® Applications I.....	2,060	2,060	2,060	2,060	5	15
D/3® TotalVision® Applications II.....	1,645	1,645	1,645	1,645	4	15
D/3® Operator Training.....	1,195	1,195	1,195	1,195	3	16
D/3® Operator (Web-based)	\$475 (per person - 30 day seat) 15% discount available for 15 or more students.					16

D/3® Hardware

D/3® Hardware Maintenance with 16000 I/O.....	1,820	1,820	1,820	1,820	5	17
D/3® Hardware Maintenance with Modicon Quantum I/O.....	1,820	1,820	1,820	1,820	4	17
D/3® Hardware Maintenance with NovaTech® 8000 I/O.....	1,947	1,947	1,947	1,947	3	18
D/3® Ethernet I/O.....	1,125	1,125	1,125	1,125	2	18
D/3® Hardware Maintenance with 505 I/O.....	1,947	1,947	1,947	1,947	4	19
D/3® Hardware Maintenance with Modbus® Plus I/O	1,540	1,540	1,540	1,540	4	19
D/3® Hardware Maintenance with Data Highway Plus I/O.....	1,540	1,540	1,540	1,540	4	20
D/3® Profibus I/O	1,400	1,400	1,400	1,400	3	20
D/3® ControlNet & Foundation Fieldbus I/O.....	1,400	1,400	1,400	1,400	3	21
D/3® General Purpose External I/O (GPXIO).....	575	575	575	575	1	21
D/3® Software Concepts for Hardware Personnel	1,995	1,995	1,995	1,995	4	22
D/3® Network Analysis Using Diagnostic Tools	1,695	1,695	1,695	1,695	3	22
D/3® Process Control Installation and Site Preparation.....	2,580	2,580	2,580	2,580	5	23

D/3® FlexBatch®

FlexBatch® Production Operator.....	\$1,350	\$1,350	\$1,350	\$1,350	2	23
FlexBatch® Recipe Developer.....	1,840	1,840	1,840	1,840	3	24
FlexBatch® D/3® Control Engineer.....	3,190	3,190	3,190	3,190	5	24

PRICE LIST (CONTINUED)

Prices valid April 1, 2017 through March 31, 2018

	Owings Mills, MD (per student)	Aiken, SC (per student)	Denham Springs, LA (per student)	Lenexa, KS (per student)	Length (days)	Page
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Microsoft® (Customized NovaTech® Courses)

Practical Active Directory for D/3®	\$2,695	\$2,695	\$2,695	\$2,695	5	25
D/3® Network Support	1,995	1,995	1,995	1,995	3	25
D/3® Network Management.....	1,080	1,080	1,080	1,080	2	26
Windows Security for D/3®	2,695	2,695	2,695	2,695	5	26
Introduction to Visual Basic® .NET 2010	2,156	2,156	2,156	2,156	5	27
SQL Basics	895	895	895	895	1	27
Linux Utilities and Commands	2,156	2,156	2,156	2,156	5	28

OSHA General Industry 10 Hour Safety Training.....	200				2	28
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Utilities

Summary of Offerings						29
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Utility Product Courses

OrionLX / LXm Automation Platform (Full Course).....	\$1,350	\$1,350	\$1,350	\$1,350	1.5	30
OrionLX / LXm (Short Course).....	450	450	450	450	4 hours	30
Orion I/O (Full Course)	1,350	1,350	1,350	1,350	1.5	31
Orion I/O (Short Course)	450	450	450	450	4 hours	31

Utility Application and Operation Courses

Orion DA-Master Design, Operation and Maintenance (Full Course)	\$895	\$895	\$895	\$895	1	32
Orion DA-Master Design, Operation and Maintenance (Short Course)	450	450	450	450	4 hours	32
Orion WEBServer / SVG Graphics Design and Application	895	895	895	895	1	33
Orion Math and Logic (.bas) Design and Application (plus LogicPak)	895	895	895	895	1	33
Orion Advanced Math and Logic (.lua) Design and Application (plus LogicPak).....	895	895	895	895	1	34
Orion Protocols for SEL® Relay Integration Design and Application.....	675	675	675	675	6 hours	34
Orion IEC 61131-3 Math and Logic Design and Application	1,850	1,850	1,850	1,850	2	35
OrionLX / LXm Cyber Security Design and Application.....	1,500	1,500	1,500	1,500	2	36
OrionLX / LXm Alarm-Archive-Retentive Configuration and Application (AAR).....	450	450	450	450	4 hours	36
OrionLX / LXm Email Configuration and Application	450	450	450	450	4 hours	37
OrionLX / LXm Redundancy.....	450	450	450	450	4 hours	37
IEC 61850 on the Orion Automation Platform	895	895	895	895	1	38

Utility Technology Courses

DNP3.0 Protocol and Application including Serial Communications Basics	\$1,350	\$1,350	\$1,350	\$1,350	1.5	38
Broadband Networking	895	895	895	895	1	39
IEC 61850 Technology.....	1,350	1,350	1,350	1,350	1.5	39

Bitronics Courses

Utilities Power Specialist.....	\$1,080	\$1,080	\$1,080	\$1,080	2	40
Utilities Communication Specialist.....	540	540	540	540	1	40

Owings Mills, MD Map.....						41
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Lenexa, KS Map						44
Schedule						Inside Back Cover/ Back Cover

D/3, FlexBatch, TotalVision and SABL are registered trademarks of NovaTech Process Solutions, LLC.
 NovaTech is a registered trademark of NovaTech, LLC.
 InstAlarm, VersaTrend, Paperless Procedures and TotalWebVision are trademarks of NovaTech Process Solutions, LLC.
 Modbus is a registered trademark of AEG Schneider Automation, Inc.
 Microsoft, Windows, ActiveX and Visual Basic are registered trademarks of Microsoft Corporation.
 SEL is a registered trademark of Schweitzer Engineering Laboratories, Inc.
 Bitronics is a registered trademark of Bitronics, LLC.

ENROLLMENT INFORMATION

Four Easy Ways to Register

1. MAIL

Return the attached registration form to:

NovaTech, LLC
Educational Services
11425 Cronhill Drive
Owings Mills, MD 21117

2. CALL

Dial us directly at:
800.253.3842 or
410.753.8326

3. FAX

410.581.2108

4. Email

training@novatechweb.com

Course tuition includes all course materials and documentation. Course fees do not include travel, meals, accommodations, or other travel related expenses. As a courtesy, NovaTech will provide lunch for one day a week during the classes at all of our training facilities. Prices listed are valid for the period of time for which the schedule is in effect. Course tuition can be paid with a purchase order, check or credit card. Purchase orders and checks should be mailed to the following address, prior to the start of the course.

NovaTech, LLC
Educational Services
11425 Cronhill Drive
Owings Mills, MD 21117

Cancellations and Substitutions

Course registrations can be cancelled with a full refund up to 10 working days prior to the starting date of the course. Cancellations received within fewer than 10 working days before the scheduled start date of the course, will be subject to a late-cancellation fee of 25 percent or full tuition. A fee equivalent to the cost of the course, will be charged on cancellations on or after the scheduled start date or no-show. NovaTech's Educational Services has the right to cancel courses two weeks prior to the start date that do not meet minimum enrollment standards.

Accommodations

Baltimore-Washington International Airport is about a twenty-minute drive from NovaTech's Owings Mills Training Facility. Suggested hotels:

* Embassy Suites (\$118- \$129)
213 International Circle
Hunt Valley, MD 21030
410.585.1000 or 800-EMBASSY

* Hilton Garden Inn (\$121)
4770 Owings Mills Boulevard
Owings Mills, MD 21117
410.654.0030

Augusta Bushfield Airport is about a thirty-minute drive from NovaTech's Aiken Training Facility and Columbia Airport is about an hour away. Suggested hotels:

* Hilton Garden Inn (\$135)
350 Eastgate Drive
Aiken, SC 29803
803.641.4220

* Country Inn and Suites (\$86)
3270 Whiskey Road
Aiken, SC 29803
803.649.4024

Kansas City Airport is about a forty-minute drive from NovaTech's Lenexa Training Facility. Suggested hotels:

* Double Tree (\$109)
10100 College Boulevard
Overland Park, KS 66210
913.451.6100

Baton Rouge Airport is about a thirty-minute drive from NovaTech's Denham Springs Training Facility. Suggested hotels:

* Hampton Inn (\$109)
201 Rushing Road, West
Denham Springs, LA 70726
225.665.0555

* Hotel prices are subject to change.

Registration Form

Full Name _____

Company Name _____

Mailing Address _____

City, State and Zip Code _____

Area Code and Phone Number _____ email address _____

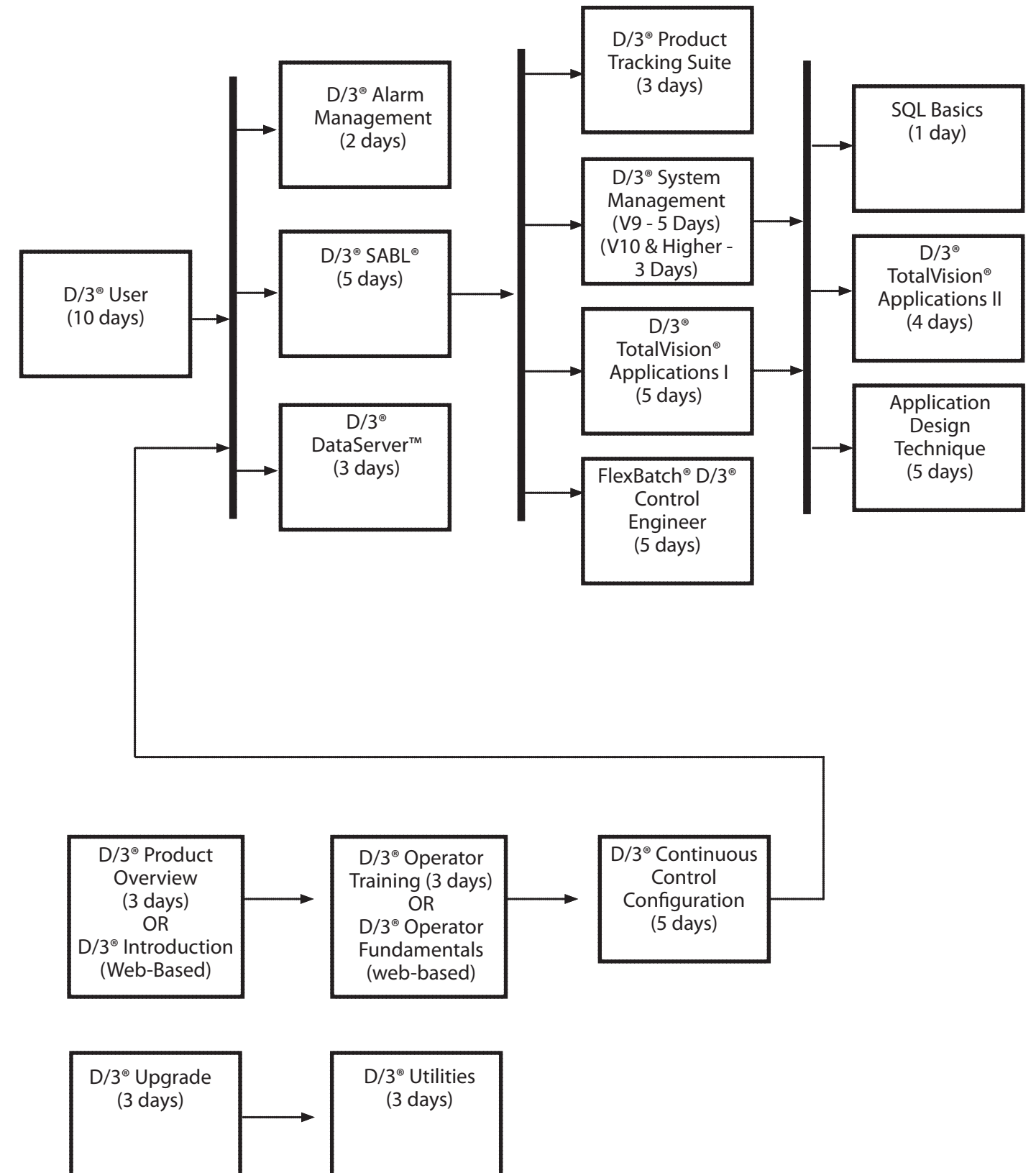
I would like to register for the following course(s): _____

Payment due prior to course start date. I will be forwarding payment for this course by the following method:

- Purchase Order
 Company Check
 Credit Card # _____ Type: VISA Mastercard AMERICAN EXPRESS

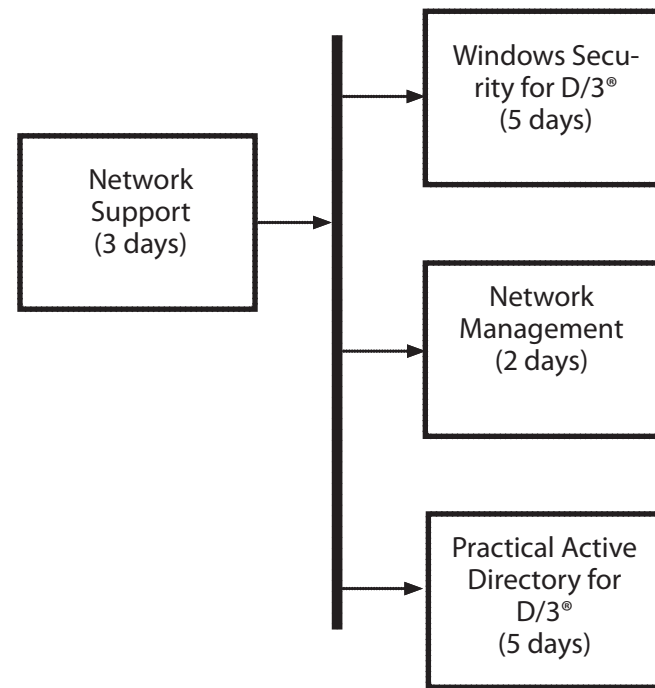
RECOMMENDED SEQUENCE OF COURSES

D/3® Track

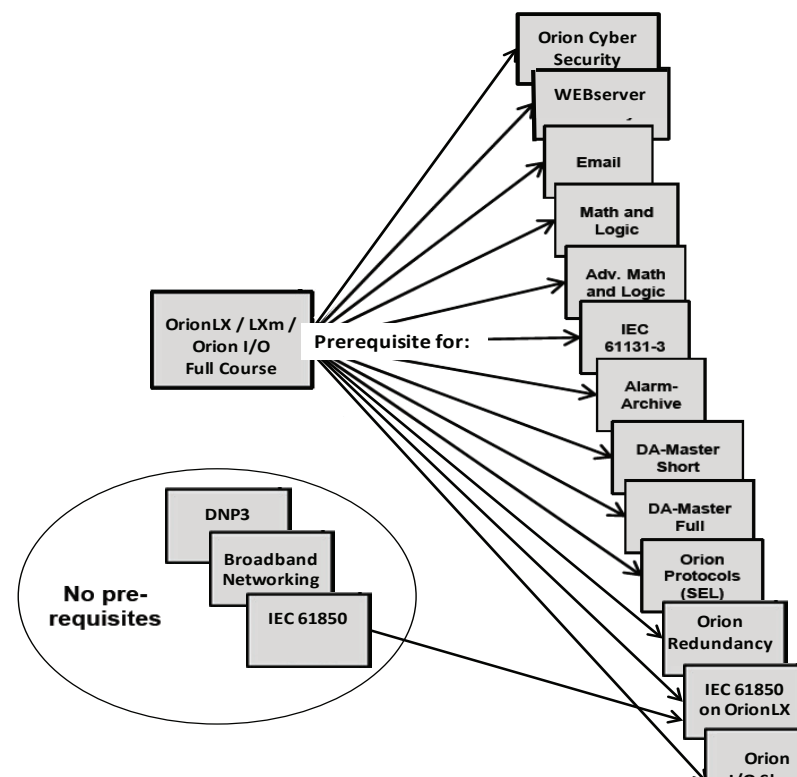


RECOMMENDED SEQUENCE OF COURSES

Microsoft Track (Customized NovaTech Courses)



Orion Track



D/3® USER

Objective

Design, structure and maintain the D/3® Continuous Control Databases and Operator Console displays in order to monitor and control a process using the Windows CDCM.

Prerequisites

Familiarity with the Windows desktop is helpful.

Description

A ten-day entry level course using D/3® software explaining the architecture and configuration of the D/3®, operation and control of the D/3® Operator Console, and the configuration of the Continuous Control Database. The course includes explanations and definitions of all software packages for Continuous Control and console operations. The D/3® Operator Console is discussed and used in lab exercises. This class is more comprehensive than the Continuous Control Configuration class and provides the knowledge and documentation necessary to efficiently maintain and use the basic software of the D/3® system. Laboratory exercises are provided for hands-on experience.

Topic Outline

- Hardware and Software Overview
- Console Software
- VersaTrend™
- InstAlarm™
- TotalVision® Navigator
- System Configuration – WinCOD and D3PSM
- Alarm Routing
- Continuous Database Control and Management
- MDL and WinMOD
- MDL Builder
- Process Control Concepts
- Analog Processing Blocks/Algorithms
- MDVBuilder and Digital Blocks
- D3Manager
- D3Architect
- Introduction to D3Edit
- D/3® Notebook
- Annunciator Panel
- Loop Optimizer
- D/3 TrendR Database
- Summary Report
- SNR Serial Number Report
- ProcessVision Console

Course Number	Location	Price (per person)
M452	Owings Mills, MD September 10, January 14	\$3,975 or 10 FACET credits
S452	Aiken, SC May 14, November 5	\$3,975 or 10 FACET credits
L452	Denham Springs, LA July 23	\$3,975 or 10 FACET credits
K452	Lenexa, KS	\$3,975 or 10 FACET credits

D/3® CONTINUOUS CONTROL CONFIGURATION

Objective

Design, structure and maintain the D/3® Continuous Control Database in order to monitor and control a process using the Windows CDCM.

Prerequisites

Students should be familiar with the Windows desktop, D/3® Architecture. Prior to class, students should be able to use the D/3® Operator Console and TotalVision® Graphics to control analog and digital points, and configure faceplate and trend displays. They should also be familiar with WinCOD ADI/CEI tables and console protection, editing EPNs using WinMOD, using D3Architect to edit and build setting files and database files, using D3Manager to Load PCMs.

Description

A five-day course using D/3® software explaining the configuration of the Continuous Control Database using MDL and WinMOD. This class provides the information needed to design analog and digital control for the D/3®. Prior knowledge of D/3® Architecture and experience using the D/3® Operator Console is mandatory. Laboratory exercises are provided for hands-on experience.

Topic Outline

- Continuous Database Control and Management
- MDL and WinMOD
- Analog Processing Blocks/Algorithms
- MDVBuilder and Digital Blocks
- Using D3Manager to Load the Continuous Database
- Using D3Edit, MDL Builder and D3Architect to Build the CDB

Course Number	Location	Price (per person)
M451	Owings Mills, MD April 2, October 1	\$2,035 or 5 FACET credits
S451	Aiken, SC June 18	\$2,035 or 5 FACET credits
L451	Denham Springs, LA February 4	\$2,035 or 5 FACET credits
K451	Lenexa, KS	\$2,035 or 5 FACET credits

D/3® SABL®

Objective

Develop and maintain the control applications for a D/3® Distributed Control System using the Windows CDCM.

Prerequisites

Completion of the D/3® User or D/3® Continuous Control Configuration course.

Description

A five-day course, using D/3® software, covering the steps involved in developing and using the SABL® package. Students will develop the Sequence Database and SABL® programs necessary to manipulate and interact with the continuous database and operator console. The programs will use recipe variables and unit variables designed in class to allow recipe control. Databases and programs will be designed to take advantage of SABL® Unit Relativity and equipment allocation. Laboratory exercises are provided for hands-on experience.

Topic Outline

- Sequence and Batch Control Overview
- Recipe File Management
- Sequence and Batch Database Definition using D3Architect and Wizards
- Sequence and Batch Package Console Displays
- Introduction to Sequence and Batch Language Statements
- Sequence and Batch Debug Utility - WinSSD
- Compilation and Execution of SABL® Programs
- D3Edit
- Header Files
- Include Sub-Routines
- Unit Relativity

Course Number	Location	Price (per person)
M456	Owings Mills, MD April 9, October 8	\$2,035 or 5 FACET credits
S456	Aiken, SC June 25, December 17, February 11	\$2,035 or 5 FACET credits
L456	Denham Springs, LA August 20	\$2,035 or 5 FACET credits
K456	Lenexa, KS	\$2,035 or 5 FACET credits

APPLICATION DESIGN TECHNIQUES

Objective

Design robust process control applications that provide predictable control under all process conditions.

Prerequisites

Completion of the D/3® User or D/3® Continuous Control Configuration course, D/3® SABL® and D/3® TotalVision® Applications I or in-depth knowledge of TotalVision® graphics preferred.

Description

A five-day course covering best practices of D/3® Application Design and Implementation. Two commonly used application techniques provide case studies of how to design controls that behave in predictable manner under all process conditions. Project implementation from design to test and commissioning is covered throughout the course. This course has been tailored to reflect NovaTech's recommended Standard State-Based (ISA-106), Flex (ANSI/ISA-88) application techniques.

Topic Outline

- Creating the Unit Operations document - design before you code
- Designing for operational requirements
- Maximizing use of unit-relative operations
- Reducing development time by using common MDV logic, graphic SGOs and SABL® routines
- Designing unit-based operations with predictable Hold and Fail behavior
- Designing intuitive and robust user-interfaces and graphics
- State based control and State Transition Diagrams
- Designing for S88 implementation (FlexBatch® users)
- Unit to Unit communication techniques
- Effective use of shared equipment
- Designing process simulation programs
- Testing process control logic

Upon completion, students will leave with a robust process control application technique using standardized methodology. Course includes standard suboutines, on CD, for use back at the plant.

Course Number	Location	Price (per person)
M441	Owings Mills, MD June 4, March 18	\$2,500 or 5 FACET credits
S441	Aiken, SC July 16	\$2,500 or 5 FACET credits
L441	Denham Springs, LA October 15	\$2,500 or 5 FACET credits
K441	Lenexa, KS	\$2,500 or 5 FACET credits

D/3® SYSTEM UPGRADE

Objective

Use the new features of the latest version. Perform upgrades from Version 9 to the latest version.

Prerequisites

A working knowledge of the D/3® Continuous and Batch Control systems using Version 9 or higher.

Description

A three-day course designed to show the tools used to upgrade the D/3® system and databases to the latest version of D/3®, build the database, and load the system. Students will have the chance to install software, run WinCOD for system configuration, build databases using D3Architect, load databases using D3Manager, make a master device prototype using MDVBuilder, use D3Edit, and create the sequence database using SABL® Wizards.

Topic Outline

- D/3® Overview
- PCM and DCM Hardware Enhancements
- Installing D/3® Software
- D/3® Licenses
- WinCOD and D3PSM
- Console Enhancements
- Using D3Architect to Build Databases
- CDB Builder
- MDVBuilder
- Summary Reports
- Using D3Manager to Load and Run the D/3®
- D/3® DataPick
- Using D3Edit to Write SABL® Code
- SABL® Wizards
- TotalVision® Editor
- TrendR™ Enhancements
- D/3 Report Writer™
- How to Upgrade from Version 9
- Conversion Programs
- Operator Accounts
- Dynamic Alarm Management and Alarm Suppression
- Application Source Code Management
- Alarm Inhibit Time Out
- Alarm Delay On/Off
- OPCCONNECT
- Online Upgrades
- Sequence and Batch Debug Utility - WinSSD

Custom classes for groups upgrading from versions other than Version 9 are available upon request.

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M479	Owings Mills, MD	\$1,995 or 3 FACET credits
S479	Aiken, SC	\$1,995 or 3 FACET credits
L479	Denham Springs, LA	\$1,995 or 3 FACET credits
K479	Lenexa, KS	\$1,995 or 3 FACET credits

D/3® UTILITIES UPGRADE

Objective

Learn how to use all the available Utilities that come with the latest Windows Versions of D/3®.

Prerequisites

Working knowledge of the D/3® System, Continuous Database, and Console Displays. Familiarity with the Windows desktop is helpful.

Description

A three-day course explaining the D/3® utilities available on the newest version of D/3®. Learn the use of each utility to take advantage of all that D/3® has to offer. Laboratory exercises are provided for hands-on experience.

Topic Outline

- VersaTrend™
- InstAlarm™
- TotalVision® Navigator
- Configuring Console Users/Passwords
- MDVBuilder - MDV to TotalVision®
- D/3® TrendR™
- Summary Report
- D3Client
- D/3® Datapick
- SNR
- MEAT
- Alarm Suppression
- Dynamic Alarm Management
- PAAC
- LOOK
- SNAP
- WinSSD
- D3Architect
- MDL Builder
- D3Edit
- D3Manager
- ... and many others
- Summary of Enhancements from V10 to V15

Course Number	Location	Price (per person)
M482	Owings Mills, MD February 6	\$1,995 or 3 FACET credits
S482	Aiken, SC October 3	\$1,995 or 3 FACET credits
L482	Denham Springs, LA June 6	\$1,995 or 3 FACET credits
K482	Lenexa, KS	\$1,995 or 3 FACET credits

D/3® SYSTEM MANAGEMENT

Objective

Configure, install and manage D/3® system software using Windows CDCMs and DCMs.

Prerequisites

Completion of the D/3® User or D/3® Continuous Control Configuration course. Completion of the D/3® SABL® course or at least six months of site-specific knowledge of options is highly recommended.

Description

A three-day course using and explaining the operation of the D/3® software including the directories, files, batch procedures created to manage and run the D/3® System. Windows System Management utilities needed to configure and maintain accounts and networks are discussed. Lab exercises on CDCMs and DCMs complement the lecture material.

Topic Outline

- Network Configuration - WinCOD
- Online - WinCOD
- D/3® Directory Structure
- Monitoring D/3® Processes
- License Management
- Installing D/3® Software
- Snap
- Startup and Shutdown
- System Settings and Customization
- User Accounts and System Security
- D3Manager
- Console Files and D3PSM
- Loading DCMs
- Performing Upgrades
- OPC Configuration
- Application Source Code Management
- D3Diagnostics
- Online Upgrades

Course Number	Location	Price (per person)
M450	Owings Mills, MD August 13	\$1,995 or 3 FACET credits
S450	Aiken, SC April 30, March 11	\$1,995 or 3 FACET credits
L450	Denham Springs, LA December 3	\$1,995 or 3 FACET credits
K450	Lenexa, KS	\$1,995 or 3 FACET credits

D/3® 8000 I/O CONFIGURATION

Objective

Learn how to interface 8000 I/O hardware to the D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or Operator class or a good working knowledge of PVN Console Display navigation and D/3® Manager tools.

Description

A two-day course explaining the configuration and maintenance of the EthernetMPC2 (Multi Protocol Controller) Interface Card and 8000 I/O hardware. Use software tools to build databases and perform 8000 I/O diagnostics from operator consoles and D/3 utilities.

Topic Outline

- Ethernet Network Architecture
- WinCOD Configuration
- EthernetMPC2 (Multi Protocol Controller) Card Setup
- Ethernet Configuration Tool
- Ethernet 8000 I/O Configuration Tool
- Ethernet I/O Database and String Table
- MODEL Point Definition
- 8000 I/O EBIM Configuration
- Loading the 8000 I/O Configuration
- 8000 I/O Diagnostic Tools

Course Number	Location	Price (per person)
M413	Owings Mills, MD August 9, January 31	\$1,125 or 2 FACET credits
S413	Aiken, SC May 10, November 1	\$1,125 or 2 FACET credits
L413	Denham Springs, LA September 27	\$1,125 or 2 FACET credits
K413	Lenexa, KS	\$1,125 or 2 FACET credits

D/3® ALARM MANAGEMENT

Objective

Design, structure and maintain all alarm databases on the D/3® including the ADI table, Continuous Control, Alarm Suppression and Dynamic Alarm Management Database.

Prerequisites

Completion of the D/3® User, D/3® Continuous Control Configuration course or equivalent experience.

Description

A two-day course using D/3® software to implement alarm management control strategies. The course provides hands-on experience using the Alarm Suppression and Dynamic Alarm Management packages, as well as configuring the continuous database for advanced alarming, Alarm Inhibit, Alarm Inhibit Timeout and Alarm Delay On/Off. Students will setup OPC alarms for InstAlarm™.

Topic Outline

- System Configuration
- Continuous Control Alarms
- OPC Alarms
- Alarm Inhibit and Alarm Inhibit Timeout
- Alarm Delay
- Alarm Suppression
- Dynamic Alarm Management
- InstAlarm™ Setup
- Alarm Settings

Course Number	Location	Price (per person)
M492	Owings Mills, MD August 16	\$1,350 or 2 FACET credits
S492	Aiken, SC May 3, March 14	\$1,350 or 2 FACET credits
L492	Denham Springs, LA December 6	\$1,350 or 2 FACET credits
K492	Lenexa, KS	\$1,350 or 2 FACET credits

PLANT STATE SUITE (PSS)

Objective

Perform alarm analysis on the D/3® System alarms using PSS.

Prerequisites

Completion of the D/3® Alarm Management course.

Description

A two-day course using PSS software to manage alarms on the D/3® system. The course provides hands-on experience with importing the alarm information from the D/3® System and using the PSS software to analyze the data.

Topic Outline

- D/3® File Structure
- PSS Import Settings
- Importing Data
- PSS Data Analysis
- PSS Alarm Graphs
- PSS Alarm Filtering

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M439	Owings Mills, MD	\$1,350 or 2 FACET credits
S439	Aiken, SC	\$1,350 or 2 FACET credits
L439	Denham Springs, LA	\$1,350 or 2 FACET credits
K439	Lenexa, KS	\$1,350 or 2 FACET credits

D/3® PRODUCT OVERVIEW

Objective

Identify D/3® System capabilities.

Prerequisites

Basic knowledge of digital or analog control systems preferred but not required.

Description

A three-day course designed to acquaint users with the operation of the D/3® Distributed Process Control System. The course content includes an overview of the D/3® architecture along with a discussion of the hardware and software capabilities of integrated control. Emphasis is placed on the interface between the supervisor, process engineer, and management in designing control strategies and generating performance reports. Laboratory exercises are provided for hands-on experience.

Topic Outline

- D/3® Distributed System Architecture
- Operator Console Module Operations
- Database Generation and Management Using the D3Architect
- Drawing Master Devices
- Sequence and Batch Control
- Report Generation
- D3Manager
- Trends
- Reports
- VersaTrend™
- InstAlarm™
- TotalVision® Displays
- Alarm Management
- PVN and ProcessVision Consoles

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M475	Owings Mills, MD	\$1,295 or 3 FACET credits
S475	Aiken, SC	\$1,295 or 3 FACET credits
L475	Denham Springs, LA	\$1,295 or 3 FACET credits
K475	Lenexa, KS	\$1,295 or 3 FACET credits

D/3® INTRODUCTION (WEB-BASED)

Objective

Learn basics of our D/3® and FlexBatch® products.

Prerequisites

Basic familiarity with computers technology and software concepts.

Description

Available 24-hours a day, seven days a week, students can take a look at what our products offer and how they operate. Course consists of a series of on-line lecture, interactive questions and summary quizzes at the end of each unit. Participation in our Product Overview course will accentuate what is learned herein. Certified Instructors are available, during normal business hours, to answer related questions.

Topic Outline

- D/3® System Architecture
- Software Development Overview
- System Configuration
- Operator Console Display Types
- Continuous Control Database Generation
- Tuning Advisor and SPC
- Alarm Generation
- TotalVision® Graphics
- Archiving and Trending Data
- Annunciator Panel Capabilities
- Generating Sequential Control Software
- Managing the D/3®
- D/3® Documentation
- Getting and Sending Data to the D/3®

Now available in English and Spanish.

Course Number	Location	Price (per person)
O538	On-Line	\$475 * (30 day program) or 1 FACET credit

D/3® TOTALVISION® APPLICATIONS I

Objective

Design TotalVision® graphics using both system provided and user created dynamic objects.

Prerequisites

Completion of the D/3® User or D/3® Continuous Control Configuration and D/3® SABL® courses.

Description

A five-day course using D/3® software detailing the creation of D/3® TotalVision® models. Topics covered include how to link system provided dynamic objects such as SGOs and Gismos to D/3® components to create real time models of plant processes. One segment of the class covers the basics of the S/L scripting language which is used in the creation of Smart Graphical Objects. Callback routines and the templating function are also included. Details on the TotalVision® runtime, editor and compiler are also provided. Laboratory exercises are provided for students to gain hands-on experience with all topics.

Topic Outline

- Overview of TotalVision® Graphics
- Features of the Navigator
- Basics of the TotalVision® Editor
- Registering Models
- Using System Provided SGOs
- Using Beginner and Intermediate Level Gismos
- Basic Statements and Syntax of S/L Scripts
- Creation of User-Defined SGOs
- Templating and Defining Variables
- Scripts Using:
 - D3Callback Functions
 - Various Operators and Logic
- User Defined Resource Files
- G File Usage
- TotalVision® Compiler
- System Setup and Associated Files

Course Number	Location	Price (per person)
M419	Owings Mills, MD April 23, October 22	\$2,060 or 5 FACET credits
S419	Aiken, SC July 9, March 25	\$2,060 or 5 FACET credits
L419	Denham Springs, LA January 7	\$2,060 or 5 FACET credits
K419	Lenexa, KS	\$2,060 or 5 FACET credits

D/3® TOTALVISION® APPLICATIONS II

Objective

Design advanced Smart Graphical Objects (SGOs), implement complex Graphical Interactive Screen Management Objects (GISMOs), design High Performance HMI SGOs, and use advanced features of the editor to create TotalVision® Graphics. Students will be able to define, modify and troubleshoot the TotalVision® system configuration.

Prerequisites

Completion of the D/3® User or D/3® Continuous Control Configuration, D/3® SABL® and D/3® TotalVision® Applications I courses and some experience designing TotalVision® Graphics.

Description

A four-day course using D/3® software detailing more advanced features of TotalVision®. Students will develop and implement complex SGOs, and GISMOs. Students will learn advanced features of the editor, use of reserved variables, testing tools, and system configuration.

Topic Outline

- Applications of Scripting
- Animation Scripts Using Reserved Variables
- Using Local and Global Variables
- Configuring and Utilizing Multiple Data Servers
- TotalVision® Related Utilities
- TotalVision® Troubleshooting
- Custom Application Examples
- Preview Function

Course Number	Location	Price (per person)
M473	Owings Mills, MD July 23, October 29	\$1,645 or 4 FACET credits
S473	Aiken, SC May 14, March 18	\$1,645 or 4 FACET credits
L473	Denham Springs, LA	\$1,645 or 4 FACET credits
N473	Lenexa, KS	\$1,645 or 4 FACET credits

D/3® OPERATOR TRAINING

Objective

Use D/3® console displays to monitor and control the process.

Prerequisites

A fundamental knowledge of process control.

Description

A three-day course designed to familiarize operators with the functions of the D/3® Operator Console. The course includes instruction in the architecture of the D/3® Process Control System, console display functions, scan and control block management, loop tuning, digital device blocks, historical trending, and efficient process operation from standard displays or customer generated process graphics. This course emphasizes the operator interface to the D/3® Distributed Control System. Laboratory exercises are provided for hands-on experience.

Topic Outline

- D/3® System Overview
- Windows Environment
- Console Displays and Operations
- Digital and Analog Control
- Traditional D/3® Trend and Alarm Displays
- D/3® Notebook
- VRT Toolbar
- Editing Displays
- TotalVision® Graphics
- VersaTrend™
- InstAlarm™
- Alarm Suppression
- SABL® Displays and Product Tracking
- General Functions

Operator training in a Windows environment includes Basic Windows Concepts, Traditional D/3® System tools, and the new Windows based system tools including ProdMon and PAACs.

Please call about designing custom operator classes at your site.

Course Number	Location	Price (per person)
M437	Owings Mills, MD	\$1,195 or 3 FACET credits
S437	Aiken, SC	\$1,195 or 3 FACET credits
L437	Denham Springs, LA	\$1,195 or 3 FACET credits
K437	Lenexa, KS	\$1,195 or 3 FACET credits

D/3® OPERATOR (WEB-BASED)

Objective

Learn basics of D/3® operation.

Prerequisites

A fundamental knowledge of process control.

Description

Learn the basics of D/3® operations at a time convenient to the student. Course consists of a series of on-line lecture, interactive questions and summary quizzes at the end of each unit.

Topic Outline

- D/3® System Overview
- Windows Environment
- Console Displays and Operations
- Digital and Analog Control
- Traditional D/3® Trends and Alarm Displays
- D/3® Notebook
- VRT Toolbar
- Editing Displays
- TotalVision® Graphics
- VersaTrend™
- InstAlarm™
- Alarm Suppression
- SABL® Displays and Product Tracking
- General Functions
- Certification Test (Optional)

Now available in English and Spanish.

D/3® OPERATOR TEST (WEB-BASED)

This is an actual written test. This is the first phase of becoming certified. The second phase is a hands-on observation test that is held either at our Owings Mills, MD or Aiken, SC facilities. You must achieve a written test score of at least 80 percent to pass. Upon completion of both phases, students will receive written notification from NovaTech. The fee for testing is \$150 per test administered.

Course Number	Location	Price (per person)
O537	On-Line	\$475 * (30 day program) or 1 FACET credit

D/3® HARDWARE MAINTENANCE WITH 16000 I/O

Objective

Perform an initial investigation of system malfunctions and make system repairs such as fuse or board replacements.

Prerequisites

Familiarity with digital multimeters and basic process instrumentation.

Description

A five-day course designed to give plant personnel the ability to recognize and identify malfunctions of the D/3® Distributed Control System using graphics and console displays. The PCM Hardware and 16000 series I/O Hardware is covered in lecture as well as hands-on experience in troubleshooting and repair. This course is specific to D/3® Distributed Control Systems running on D/3® software versions 6.0 and higher with PCM models II, III, 100, 2000, 4100, 4200 and Ethernet communications network with or without token ring nodes. Students should carefully check their D/3® software version and system configuration before enrolling in this course.

Topic Outline

- Overview of D/3® Operation and Terminology
- Operator Console Displays and Alarm Interpretation
- Controlling Analog and Digital EPNs
- PCM MCU Chassis Configuration
- Mux Chassis 16000 Series Analog and Digital I/O Board Configuration and Theory of Operation
- 16000 Series Termination Panel Configuration and Theory of Operation
- 16000 Series I/O Board Replacement
- Power Supply Location and Checks
- Hands-on Troubleshooting using LED Status Indicators, System Displays and Meters

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M444	Owings Mills, MD	\$1,820 or 5 FACET credits
S444	Aiken, SC	\$1,820 or 5 FACET credits
L444	Denham Springs, LA	\$1,820 or 5 FACET credits
K444	Lenexa, KS	\$1,820 or 5 FACET credits

800.253.3842

D/3® HARDWARE MAINTENANCE WITH MODICON QUANTUM I/O

Objective

Investigate system malfunctions and make system repairs such as fuse, microcomputer, communications or Quantum I/O module replacements.

Prerequisites

Familiarity with digital multimeters and basic process instrumentation.

Description

A four-day course designed to give plant personnel the ability to recognize and identify malfunctions of the D/3® Distributed Control System using graphics and console displays. Theory of operation and data flow are discussed as are correct maintenance procedures. The PCM Hardware and Modicon Quantum I/O Hardware modules and configuration are covered as well. Lecture as well as hands-on experience in troubleshooting and repair will be provided. This course is specific to D/3® systems running version 6.0 or higher, with PCM models II, III, 100, 2000, 4100, 4200 and Ethernet communications with or without token ring nodes and Modicon Quantum I/O. Students should carefully check their D/3® software version and system configuration before enrolling in this course.

Topic Outline

- Overview of D/3 Operation and Terminology
- Operator Console Displays and Alarm Interpretation
- Controlling Analog and Digital EPNs
- PCM MCU Chassis Configuration
- Modicon Quantum I/O Rack Configuration
- Modicon Quantum Analog and Digital I/O Module Configuration and Theory of Operation
- Modicon Quantum I/O Module Replacement
- Power Supply Locations and Checks
- Troubleshooting using LED Status Indicators, System Displays and Digital Meters

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M417	Owings Mills, MD	\$1,820 or 4 FACET credits
S417	Aiken, SC	\$1,820 or 4 FACET credits
L417	Denham Springs, LA	\$1,820 or 4 FACET credits
K417	Lenexa, KS	\$1,820 or 4 FACET credits

800.253.3842

D/3® HARDWARE MAINTENANCE WITH NOVATECH® 8000 I/O

Objective

Learn basic operation of PCM 4100/4200 hardware and 8000 I/O devices. Diagnose system malfunctions and make repairs such as hardware setup and fuse and board replacement.

Prerequisites

Familiarity with digital multimeters and basic process instrumentation.

Description

A three-day course designed to give plant personnel the ability to identify malfunctions of the D/3® Distributed Control System using graphics and console displays. The PCM 4100 and 4200 hardware and 8000 I/O hardware are covered in lecture as well as hands-on experience in troubleshooting and repair. This course is specific to D/3® Distributed Control Systems running on software versions 12.2 and higher. Students should carefully check their D/3® software version and system configuration before enrolling in this course.

Topic Outline

- Overview of D/3® Operation and Terminology
- Operator Console Displays and Alarm Interpretation
- PCM 4100/4200 Micro Configuration
- 8000 I/O Rack Configuration and Operation
- 8000 I/O Module Replacement
- Power Supply Indications
- Hands-on Troubleshooting Using Displays, Indicators and Meters
- D/3® Ethernet Diagnostic Tools
- Controlling Analog and Digital EPNs

Course Number	Location	Price (per person)
M415	Owings Mills, MD August 6, January 28	\$1,947 or 3 FACET credits
S415	Aiken, SC May 7, October 29	\$1,947 or 3 FACET credits
L415	Denham Springs, LA September 24	\$1,947 or 3 FACET credits
K415	Lenexa, KS	\$1,947 or 3 FACET credits

D/3® ETHERNET I/O

Objective

Interface Ethernet devices to the D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or a D/3® Hardware Maintenance course.

Description

A two-day course explaining the creation and maintenance of the Ethernet I/O database and setup of the EthernetMPC (Multi Protocol Controller) Card. Use software tools to build and load databases and perform diagnostics from operator consoles and D/3 utilities.

Topic Outline

- Ethernet Network Architecture
- Modbus® over Ethernet Protocol
- Modbus® TCP Protocol
- Allen Bradley DF1 Protocol
- Ethernet Devices
- Ethernet I/O Database and String Table
- WinCOD Definition
- MODEL Point Definition
- Loading the PCM
- EthernetMPC2 (Multi Protocol Controller) Card Hardware Layouts
- Ethernet Monitor Task

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M493	Owings Mills, MD	\$1,125 or 2 FACET credits
S493	Aiken, SC	\$1,125 or 2 FACET credits
L493	Denham Springs, LA	\$1,125 or 2 FACET credits
K493	Lenexa, KS	\$1,125 or 2 FACET credits

D/3® HARDWARE MAINTENANCE WITH 505 I/O

Objective

Perform an initial investigation of system malfunctions and make system repairs such as fuse or board replacements.

Prerequisites

Familiarity with digital multimeters and basic process instrumentation.

Description

A four-day course designed to give plant personnel the ability to recognize and identify malfunctions of the D/3® Distributed Control System using graphics and console displays. The PCM Hardware and 505 series I/O Hardware is covered in lecture as well as hands-on experience in troubleshooting and repair. This course is specific to D/3® Distributed Control Systems running on D/3® software versions 6.0 and higher with PCM models II, III, 100, 2000, 4100, 4200, and Ethernet communications network with or without token ring nodes. Students should carefully check their D/3® software version and system configuration before enrolling in this course.

Topic Outline

- Overview of D/3® Operation and Terminology
- Operator Console Displays and Alarm Interpretation
- Controlling Analog and Digital EPNs
- PCM MCU Chassis Configuration
- 505 Series I/O Remote Base Configuration
- 505 Series Analog and Digital I/O Board Configuration and Theory of Operation
- 505 Series I/O Board Replacement
- Power Supply Location and Checks
- Hands-on Troubleshooting using LED Status Indicators, System Displays and Meters

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M445	Owings Mills, MD	\$1,947 or 4 FACET credits
S445	Aiken, SC	\$1,947 or 4 FACET credits
L445	Denham Springs, LA	\$1,947 or 4 FACET credits
K445	Lenexa, KS	\$1,947 or 4 FACET credits

D/3® HARDWARE MAINTENANCE WITH MODBUS® PLUS I/O

Objective

Develop and maintain the Modicon Modbus® Plus PLC Database for a D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or Software Concepts for Hardware Personnel course.

Description

A four-day course explaining the creation and maintenance of the PLC database, and setup of the SST Modbus® Plus board and Modicon Modbus® Plus network.

Topic Outline

- PLC I/O vs. Multiplexer or Remote I/O
- POD Utility
- PLC Database
- Loading the PCM
- MODEL Point Definition
- SST Modbus® Plus Board Hardware Layout
- Modbus® Plus Network Architecture

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M416	Owings Mills, MD	\$1,540 or 4 FACET credits
S416	Aiken, SC	\$1,540 or 4 FACET credits
L416	Denham Springs, LA	\$1,540 or 4 FACET credits
K416	Lenexa, KS	\$1,540 or 4 FACET credits

D/3® HARDWARE MAINTENANCE WITH DATA HIGHWAY PLUS I/O

Objective

Develop and maintain the Allen Bradley Data Highway PLC Database for a D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or Software Concepts for Hardware Personnel course.

Description

A four-day course explaining the creation and maintenance of the PLC database, and setup of the SST Data Highway Plus board and Allen Bradley Data Highway Plus network.

Topic Outline

- PLC I/O vs. Multiplexer or Remote I/O
- POD Utility
- PLC Database
- Loading the PCM
- MODEL Point Definition
- SST Data Highway Plus Board Hardware Layout
- Data Highway Plus Network Architecture

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M461	Owings Mills, MD	\$1,540 or 4 FACET credits
S461	Aiken, SC	\$1,540 or 4 FACET credits
L461	Denham Springs, LA	\$1,540 or 4 FACET credits
K461	Lenexa, KS	\$1,540 or 4 FACET credits

D/3® PROFIBUS I/O

Objective

Interface Profibus devices to the D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or a Hardware Maintenance course.

Description

A three-day course explaining the creation and maintenance of the Profibus database, and setup of the Profibus interface board and Profibus network.

Topic Outline

- Profibus I/O vs. Multiplexer or Remote I/O
- Com Profibus Utility
- Profibus Database
- Loading the PCM
- MODEL Point Definition
- Profibus Interface Board Hardware Layouts
- Profibus Network Architecture

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M447	Owings Mills, MD	\$1,400 or 3 FACET credits
S447	Aiken, SC	\$1,400 or 3 FACET credits
L447	Denham Springs, LA	\$1,400 or 3 FACET credits
K447	Lenexa, KS	\$1,400 or 3 FACET credits

D/3® CONTROLNET AND FOUNDATION FIELDBUS I/O

Objective

Interface ControlNet and Foundation Fieldbus devices to the D/3® Distributed Control System.

Prerequisites

Completion of the D/3® User or a Hardware Maintenance course.

Description

A three-day course explaining the creation and maintenance of the ControlNet database, and setup of the ControlNet interface board and ControlNet network.

Topic Outline

- ControlNet I/O vs. Multiplexer or Remote I/O
- ControlNet Configuration Utilities
- ControlNet Database
- Loading the PCM
- MODEL Point Definition
- ControlNet Interface Board Hardware Layouts
- ControlNet Network Architecture
- Interfacing Foundation Fieldbus Devices to ControlNet
- Foundation Fieldbus Network Architecture

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M469	Owings Mills, MD	\$1,400 or 3 FACET credits
S469	Aiken, SC	\$1,400 or 3 FACET credits
L469	Denham Springs, LA	\$1,400 or 3 FACET credits
K469	Lenexa, KS	\$1,400 or 3 FACET credits

D/3® GENERAL PURPOSE EXTERNAL I/O (GPXIO)

Objective

Develop and maintain the General Purpose External I/O (GPXIO) database for a D/3® Distributed Control System.

Prerequisites

Completion of a D/3® User or Hardware Maintenance course.

Description

A one-day course explaining the creation and maintenance of the External I/O database and setup of the Intel 544 board.

Topic Outline

- External I/O vs. Multiplexer I/O
- XFG Utility
- External I/O Database
- Loading the PCM
- MODEL Point Definition
- Intel 544 Hardware Layout

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M477	Owings Mills, MD	\$575 or 1 FACET credit
S477	Aiken, SC	\$575 or 1 FACET credit
L477	Denham Springs, LA	\$575 or 1 FACET credit
K477	Lenexa, KS	\$575 or 1 FACET credit

D/3® SOFTWARE CONCEPTS FOR HARDWARE PERSONNEL

Objective

Troubleshoot D/3® software problems related to the I/O.

Prerequisites

Completion of a D/3® Hardware Maintenance course or the equivalent required.

Description

A four-day course designed using the latest D/3® software to provide the student with the information behind the software used by the D/3® DCS to interact with the I/O. Hands-on exercises reinforce the students with experience using the operator's keyboard and console to help assess whether a D/3® problem may be hardware or software related. Allows the students to see how hardware devices are used by software.

Topic Outline

- Identify D/3® System Components Used for Communications and Process Control
- D3Architect and D3Manager
- WinCOD
- Identify Database Files
- Describe System Configuration Utilities and Security Measures
- WinMOD and MODEL Utilities
- Identify Analog and Digital Point Components
- Describe Cautions and Concerns for Database Changes

Optional Subjects: XFG, HCU, POD, CommPROFIBUS and the ControlNet Configuration Tools.

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M411	Owings Mills, MD	\$1,995 or 4 FACET credits
S411	Aiken, SC	\$1,995 or 4 FACET credits
L411	Denham Springs, LA	\$1,995 or 4 FACET credits
K411	Lenexa, KS	\$1,995 or 4 FACET credits

D/3® NETWORK ANALYSIS USING DIAGNOSTIC TOOLS

Objective

Design and troubleshoot the physical layer portion of Ethernet and S908 networks for D/3® applications.

Prerequisites

Some basic familiarity with Ethernet and S908 based networks.

Description

A three-day course providing the core foundation of skills needed to support a D/3® network and S908 network. This course presents how to install, configure, customize, integrate, and troubleshoot the physical layers of D/3® Ethernet and S908 networks. Classroom teaching will be followed by hands-on work with the test equipment required for physical layer troubleshooting.

Topic Outline

- Introduction to D/3® Ethernet
- IP Addressing Review
- Installing and Configuring D/3® Ethernet Networks
- Review of Physical Layer Devices Used for D/3® Ethernet
- Copper, Optical Fiber Cabling and Wireless Ethernet
- Introduction to S908 for D/3® Systems
- Installing and Configuring S908 for D/3® Systems
- Copper and Optical Fiber Cabling for S908 Systems
- Metallic Time Domain Reflectometry
- UTP Cable Scanner
- Battery Oscilloscope (to measure electrical noise on communications Systems)
- Optical Test Equipment
- Troubleshooting

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M412	Owings Mills, MD	\$1,695 or 3 FACET credits
S412	Aiken, SC	\$1,695 or 3 FACET credits
L412	Denham Springs, LA	\$1,695 or 3 FACET credits
K412	Lenexa, KS	\$1,695 or 3 FACET credits

D/3® PROCESS CONTROL INSTALLATION AND SITE PREPARATION

Objective

Design and implement a successful installation of the D/3® Process Control System with regards to power, grounding, data communications, lightning and transient protection, and I/O connectivity.

Prerequisites

None.

Description

A five-day course covering the basics of requirements for D/3® system installation into a process plant environment. This course will provide an in-depth review of power and grounding (including measurement and verification techniques), transient protection, Ethernet and S908 network design and implementation (including copper and fiber optic time domain reflectometry and additional fiber optic system troubleshooting techniques), Quantum I/O recommended wiring practice (and subsequent noise level measurement). A copy of the D/3® Site Preparation Manual will be provided to all attendees.

Topic Outline

- Process Control IEEE 1100 Powering and Grounding
- Grounding System Design and IEEE 81 Ground Measurements
- Transient Protection System Recommendations
- Ethernet Systems Design (Copper and Fiber Optic) and Measurement using Cable Scanners and LAN Analyzers
- S908 Quantum Communications System Design and Measurement (Copper and Fiber Optic) using Time Domain Reflectometry
- Quantum I/O Connectivity and Measurement of Noise on I/O Systems
- 8000 I/O Connectivity and Measurement of Noise on I/O Systems

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M490	Owings Mills, MD	\$2,580 or 5 FACET credits
S490	Aiken, SC	\$2,580 or 5 FACET credits
L490	Denham Springs, LA	\$2,580 or 5 FACET credits
K490	Lenexa, KS	\$2,580 or 5 FACET credits

FLEXBATCH® PRODUCTION OPERATOR

Objective

Schedule and execute campaigns and batches based on predefined master recipes. Students will be able to monitor the progress of batches using both FlexBatch® and D/3® displays.

Prerequisites

Plant operations experience is helpful, but not required.

Description

A two-day course covering the use of FlexBatch® to create and execute campaigns and batches. Details of the Production Displays provide students with interactive tools to create, monitor or modify the status of active batches. The D/3® Product Monitor software is presented as another means for operators to monitor active batches. Laboratory exercises compliment the lecture material. All necessary materials and documentation are provided.

Topic Outline

- SP88 Concepts and Terminology
- FlexBatch® Hierarchies
- The Role of the Production Team
- Creating Campaigns and Batches
- Scheduling, Monitoring and Modifying Batches
- Parameter Modifications
- Assigning Equipment to a Batch
- Use of the Schedule View, Batch Overview, and Control View Displays
- Properties - Campaign, Batch, Unit Recipe, Operation, and Phase

Course Number	Location	Price (per person)
M466	Owings Mills, MD July 16, February 18	\$1,350 or 2 FACET credits
S466	Aiken, SC April 16, October 15	\$1,350 or 2 FACET credits
L466	Denham Springs, LA August 27	\$1,350 or 2 FACET credits
K466	Lenexa, KS	\$1,350 or 2 FACET credits

FLEXBATCH® RECIPE DEVELOPER

Objective

Use the Production Display software component to execute batches based on predefined master recipes. Students will be able to use the Configuration Management software to create and modify new master recipes.

Prerequisites

Plant operations experience is helpful, but not required.

Description

A three-day course covering the use of FlexBatch® Production Displays to create, execute and monitor campaigns and batches. The Configuration Management component is introduced and the graphical procedure editor is used to design new recipe procedures, which are then added to FlexBatch® database. Newly created recipe procedures are validated through batch execution. D/3® related displays and utilities such as Product Monitor are also covered. Various lab exercises are provided to ensure students have hands-on experience with each topic.

Topic Outline

- SP88 Concepts and Terminology
- FlexBatch® Hierarchies
- The Role of the Production Team, Recipe Developer
- Creating Campaigns and Batches
- Scheduling, Monitoring and Modifying Batches
- Use of the Production Displays, Configuration Manager, and Procedure Editor
- Creating Master Recipes
- Properties - Campaign, Batch, Unit Recipe, Operation, Phase
- FlexBatch® Database Components

Course Number	Location	Price (per person)
M467	Owings Mills, MD July 16, February 18	\$1,840 or 3 FACET credits
S467	Aiken, SC April 16, October 15	\$1,840 or 3 FACET credits
L467	Denham Springs, LA August 27	\$1,840 or 3 FACET credits
K467	Lenexa, KS	\$1,840 or 3 FACET credits

FLEXBATCH® D/3® CONTROL ENGINEER

Objective

Define the elements of a FlexBatch® database, and link them to the D/3® Control System. Students will be able to write phases and define operation classes. Student will be able to build a working FlexBatch® database from a blank database, using the Configuration Management component of FlexBatch®.

Prerequisites

Successful completion of the D/3® User or D/3® Continuous Control Configuration and D/3® SABL® courses. Students should have experience writing SABL® programs and be familiar with the concept of unit relativity.

Description

A five-day course detailing the use of FlexBatch® with a D/3® Distributed Control System. Details on the various Production Displays provide the user with tools to create and monitor campaigns and batches. New recipes are developed and then validated through batch execution. Concepts related to Product Tracking are explained as they relate to FlexBatch®. SABL® code required for batch applications is presented in detail. The course provides details on defining FlexBatch® database elements such as phases, operations, master recipes and aliases. The FlexBatch® Production Displays and Configuration Management Utility are used in laboratory exercises to provide practical experience.

Topic Outline

- SP88 Concepts and Terminology
- Use of the Operator Production Displays
- Creating and Executing Campaigns and Batches
- Use of Configuration Management Utility
- Master Recipe Design
- Properties of Campaigns, Batches, Unit Recipes, Operations, and Phases
- Sequence Database Design
- Product Tracking Concepts
- SABL® Programming Statements
- FlexBatch® Database Configuration

Course Number	Location	Price (per person)
M468	Owings Mills, MD July 16, February 18	\$3,190 or 5 FACET credits
S468	Aiken, SC April 16, October 15	\$3,190 or 5 FACET credits
L468	Denham Springs, LA August 27	\$3,190 or 5 FACET credits
K468	Lenexa, KS	\$3,190 or 5 FACET credits

PRACTICAL ACTIVE DIRECTORY FOR D/3®

Objective

Learn design, configuration and management of Active Directory for the D/3® DCS environment.

Prerequisites

Training on XP and Windows Server basics.

Description

A five day course designed especially for those D/3® users who operate their DCS systems in an **Active Directory**. As such, this course focuses on practical Active Directory configurations for local, wide and corporate networks. Attendees will install, configure, customize, construct practical security policies, and troubleshoot. Laboratory and review exercises are provided for practical hands-on experience.

Who Should Attend

- D/3® **manager** and **supervisory** personnel.
- D/3® support personnel.
- Personnel desiring to learn beyond Microsoft Windows 2008.
- Networking professionals using Microsoft Windows 2008.
- Personnel who use or support Microsoft Windows 2008.
- Candidates for MCITP certification.

Topic Outline

- Microsoft Windows Active Directory Architecture
- Installing Microsoft Active Directory Single Domains
- Configuring and Integrating Practical Multiple Domains for the D/3®
- Managing Users and Groups in an Active Directory
- Customized D/3® Security Templates
- Group Policies in an Active Directory
- Using Group Policy and Security Basics for Support
- D/3 Object Access and Security
- Advanced Security for the D/3®
- Practical Active Directory Security Measures
- Disaster Planning and Recovery
- Troubleshooting

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M494	Owings Mills, MD	\$2,695 or 5 FACET credits
S494	Aiken, SC	\$2,695 or 5 FACET credits
L494	Denham Springs, LA	\$2,695 or 5 FACET credits
K494	Lenexa, KS	\$2,695 or 5 FACET credits

D/3® NETWORK SUPPORT

Objective

Learn Network Essentials, proper configuration, and troubleshooting with network monitoring and troubleshooting tools in order to support a D/3® environment.

Prerequisites

For maximum benefit of this course, completion of a Windows system class or equivalent.

Description

A three-day course providing the foundation skills necessary to configure, customize, integrate, troubleshoot, and support Microsoft network in a D/3® environment. This course employs D/3®, Microsoft and WireShark network tools to analyze and determine proper network operation. Laboratory exercises are provided for hands-on experience.

Who Should Attend

- D/3® support personnel.
- Personnel desiring to learn network basics.
- Network professionals.
- Personnel who use or support Microsoft Windows.
- Candidates for MCITP certification.

Topic Outline

- Network Essentials
- TCP/IP Configuration
- Network Monitoring your D/3®
- Architectural Overview of TCP/IP
- IP Addressing and your D/3®
- Sub Netting and Routing
- Optional Networking Components
- NetBIOS over TCP/IP for D/3®
- Network Support Tools - WINS & DHCP
- Host Name Resolution
- Domain Name Service (DNS)
- Supporting D/3® Client Server Utilities
- D/3® Tools for Analysis and Troubleshooting
- Internet Access and D/3®
- Tools and Utilities for Troubleshooting TCP/IP

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M434	Owings Mills, MD	\$1,995 or 3 FACET credits
S434	Aiken, SC	\$1,995 or 3 FACET credits
L434	Denham Springs, LA	\$1,995 or 3 FACET credits
K434	Lenexa, KS	\$1,995 or 3 FACET credits

D/3® NETWORK MANAGEMENT

Objective

Learn the necessary skills to evaluate, select and install the network support hardware and software to maximize your plant's network communication to your D/3®. Changing out an existing network structure or implementing a new network environment.

Prerequisites

For maximum benefit of this course, completion of the Windows XP / 2003 and D/3 Network Support class or equivalent.

Description

A two-day course designed especially for the D/3® users. This industrial networking environment course presents modules on industrial hubs, KVM(s), switches, routers, VPN(s) and firewalls with a focus on MTBF (mean time between failure). In addition, this course presents modules on Foundation Fieldbus, Industrial Protocol OPC Servers.

Who Should Attend

- D/3® support personnel.
- Personnel desiring to learn **beyond** network basics.
- Networking professionals using Microsoft Windows.
- Personnel who use or support Industrial Networks.

Topic Outline

- Industrial Ethernet Hubs & Switches
- Cabling and KVM(s)
- Fiber Transceivers
- Protocol Conversion
- Industrial Routers and Firewall Appliances
- Wireless IP/Ethernet
- Fieldbus and Fieldbus Gateways
- Industrial Protocol OPC Servers
- Industrial Ethernet Network Management

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M427	Owings Mills, MD	\$1,080 or 2 FACET credits
S427	Aiken, SC	\$1,080 or 2 FACET credits
L427	Denham Springs, LA	\$1,080 or 2 FACET credits
K427	Lenexa, KS	\$1,080 or 2 FACET credits

WINDOWS SECURITY FOR D/3®

Objective

Microsoft operating systems focus on **security**. Ability to use security tools to configure, evaluate and troubleshoot security issues of Microsoft Windows. Study and understand security threats, learn the basics of "hacking" and learn methods to secure the Microsoft environment for a secure D/3® environment.

Prerequisites

For maximum benefit of this course, completion of a Windows system and D/3® Network Support class or equivalent.

Description

A five-day course is "packed" with the latest security information and documentation you need to learn the dangers and defenses you can use to evaluate and support the security of a Microsoft Windows system configured for D/3® operation. See and experience how systems can be "cracked" and what can be done to safeguard your system. Learn and use Microsoft and D/3® tools to "lock down" and protect your D/3® operations. Laboratory exercises are provided for hands-on experience.

Who Should Attend

- D/3® support personnel for Microsoft Windows 2008 R2 operating system.
- Personnel desiring to learn Microsoft Windows 2008 R2 Security issues.
- Networking professionals using Microsoft Windows 2008 R2.
- Personnel who use or support Microsoft Windows 2008 R2.

Topic Outline

- Security Dangers
- D/3® Security Basics
- Operating System Security Basics
- Analyzing Security Risks
- Creating Security Design for Computers
- Creating a Security Design for D/3® Accounts
- Designing an Acceptable D/3® User Policy
- Creating the Security Design for D/3® Usage
- Security Policies
- Creating a Security Design for Network Usage
- Network Attacks - What to Watch
- Network Perimeters - Your Defense
- Security Incidents - Your Response
- Using Tools and Analysis to Evaluate Security Summary

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M435	Owings Mills, MD	\$2,695 or 5 FACET credits
S435	Aiken, SC	\$2,695 or 5 FACET credits
L435	Denham Springs, LA	\$2,695 or 5 FACET credits
K435	Lenexa, KS	\$2,695 or 5 FACET credits

INTRODUCTION TO VISUAL BASIC® .NET 2010

Objective

Write, compile and debug practical Visual Basic® .NET 2010 programs.

Prerequisites

Students should be familiar with basic programming concepts.

Description

A five-day course with Visual Basic® .NET 2010 that presents skills to communicate with Microsoft COM objects and D/3® data. Students will learn by building applications from the first day with Visual Basic® controls, forms and other GUI components. Laboratory exercises are provided for hands-on experience.

Topic Outline

- Visual Basic® .NET Integrated Development Environment
 - Opening and running .NET program
 - Object oriented programming
 - Writing your first program
 - Standard and common controls
 - Working with menus and dialog boxes
 - Building User Interfaces
- Data Types and Procedures
 - Visual Basic .NET variables and operators
 - Using decision structures
 - Using loops and timers
- Debugging Code
 - Visual Basic .NET debugging program tools
 - Trapping errors using structured error handling
- Visual Basic .NET Code
 - Using modules and procedures
 - Using arrays and collections to manage data
 - Exploring text files and string processes
- Deploying Visual Basic .NET Applications
 - Managing windows forms
 - Inheriting forms and creating base classes
 - Construction and use of dynamic linked libraries
 - Working with printers
 - Upgrading Visual Basic programs to Visual Basic .NET 2010
- Database Access and COM
 - Getting started with ado .net
 - D/3® Data Tools for Custom Applications
 - D/3® Interfacing via .NET
 - Data presentation using the DataGrid Control
 - Object oriented Programming
 - Writing practical D/3® Tool Applications

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M428	Owings Mills, MD	\$2,156 or 5 FACET credits
S428	Aiken, SC	\$2,156 or 5 FACET credits
L428	Denham Springs, LA	\$2,156 or 5 FACET credits
K428	Lenexa, KS	\$2,156 or 5 FACET credits

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SQL BASICS

Objective

Administer and maintain SQL databases on the D/3® systems.

Prerequisites

Familiarity with relational databases helpful.

Description

A one-day course explaining the basic theory and operation of Microsoft's SQL server as it is used to support the Alarm Suppression, Dynamic Alarm Management and FlexBatch® databases on the D/3®. An emphasis is placed on administering databases and transferring data. Lab exercises complement the lecture material.

Topic Outline

- SQL Server 2005 Overview
- Database Engine and SQL Server Agent
- Enterprise Manager
- Backing Up and Recovering Databases
- Database Maintenance Plan Wizard
- Importing and Exporting Data
- Replicating Databases
- Setting Up Security
- Introduction to Retrieving Data on the D/3®

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M491	Owings Mills, MD	\$895 or 1 FACET credit
S491	Aiken, SC	\$895 or 1 FACET credit
L491	Denham Springs, LA	\$895 or 1 FACET credit
K491	Lenexa, KS	\$895 or 1 FACET credit

800.253.3842

LINUX UTILITIES AND COMMANDS

Objective

Students will learn fundamentals of Linux utilities and operations. Students will learn how to use Linux command shells to navigate the Linux architecture, file system and shell scripting.

Prerequisites

Familiarity with computer technology and software concepts.

Description

A five-day course that will enable the student to describe the structural components of Linux Open Source Software perform basic system operations, such as the Linux installation configurations, disk management and file systems. The course will enable the attendee to perform Linux shell commands for file, disk and network communication, using streams, pipes, filters and redirection. Laboratory exercises are provided for hands-on experience.

Who Should Attend

- Personnel who use, work with or support Linux.

Topic Outline

- Linux Overview
 - Short History
 - Architecture Basics
 - Access Shell Environment
- Linux Processes
 - Process Login
 - Shells
 - Shell Scripts
 - Environment Variables
 - Super User
 - Single User
 - Multi-User
- Linux File System
 - Resources
 - Files and Directories
 - Viewing and Creating
 - Accessing
 - Permissions
 - Linking
- Commands
 - Redirection
 - Filtering
 - Piping
- Networks
 - TCP/IP
 - Configuration
- AWK Utility
- Text Editing - vi editor
- Communication
- Executing Processes
- Using Disks and Tapes
- Managing System from User View
- Troubleshooting Tools

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
M478	Owings Mills, MD	\$2,156 or 5 FACET credits
S478	Aiken, SC	\$2,156 or 5 FACET credits
L478	Denham Springs, LA	\$2,156 or 5 FACET credits
K478	Lenexa, KS	\$2,156 or 5 FACET credits

OSHA GENERAL INDUSTRY 10 HOUR SAFETY TRAINING

Objective

Learn and discuss the OSHA 10 Hour General Industry mandatory requirements and those additional requirements which provide an introduction for safety awareness and practices in the process control industry.

Prerequisites

None.

Description

This two-day course provides a general industry employee understanding of their rights under the Federal Law 29 CFR 1910. The course comprises of the mandatory hour each dedication to the OSH Act, Walking Working Surfaces, Egress, and Electrical Safety. To address the safety needs of process control, this course includes HAZMAT communication, Personal Protective Equipment, Flammable and Combustible liquids, and OSHA 10 hour electives in electrical safety, Lock Out Tag Out and ergonomics.

Who Should Attend

Any personnel who work in areas subjective to Federal Law 29 CFR 1910 and those personnel who are required by their job to work with power tools, hand tools and powered test equipment.

Topic Outline

- OSH Act Introduction
- Electrical Safety
- Lock Out Tag Out
- Electrical Hazards
- Biological Hazards
- Fire Safety and Egress
- First Aid Response
- HAZMAT Communication
- MSDS
- Personal Protective Equipment
- Electrical Static Discharge
- Ergonomics
- Blood Pathogens
- High Voltage
- Asbestos

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
OSHA	Owings Mills, MD	\$200 or 1 FACET credit
OSHA	Aiken, SC	\$200 or 1 FACET credit
OSHA	Denham Springs, LA	\$200 or 1 FACET credit



UTILITIES TRAINING Summary of Offerings



Utility Product Courses	Page	Duration	Required Pre-requisite Course or Experience
OrionLX / LXm Automation Platform (Full Course)	27	1 1/2 days	None
OrionLX / LXm (Short Course)	27	4 hours	None
Orion I/O (Full Course)	28	1 1/2 days	None
Orion I/O (Short Course)	28	4 hours	OrionLX / LXm Automation Platform (Full Course)

Utility Application Operation Courses	Page	Duration	Required Pre-requisite Course or Experience
Orion DA-Master Design, Operation and Maintenance (Full Course)	29	1 day	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion DA-Master Design, Operation and Maintenance (Short Course)	29	4 hours	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion WEBserver/SVG Graphics and Design Application	30	1 day	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion Math and Logic (.bas) Design and Application (plus LogicPak)	30	1 day	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion Advanced Math and Logic (.lua) Design and Application (plus LogicPak)	31	1 day	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion Protocols for SEL® Relay Integration Design and Application	31	6 hours	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion IEC 61131-3 Math and Logic Design and Application	32	2 days	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
OrionLX / LXm Cyber Security Design and Application	33	2 days	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
OrionLX / LXm Alarm-Archive-Retentive Configuration and Application (AAR)	33	4 hours	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
OrionLX / LXm Email Configuration and Application	34	4 hours	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
Orion LX / LXm Redundancy	34	4 hours	OrionLX / LXm or Orion I/O Full Course, or equivalent experience
IEC 61850 on the Orion Automation Platform	35	1 day	IEC 61850 Technology Course plus OrionLX / LXm or Orion I/O Full Course or equivalent experience

Utility Technology Courses	Page	Duration	Required Pre-requisite Course or Experience
DNP3.0 Protocol and Application including Serial and Ethernet Communication Basics	35	1 1/2 days	None
Broadband Networking	36	1 day	None
IEC 61850 Technology	36	1 1/2 days	None

Bitronics® Courses	Page	Duration	Required Pre-requisite Course or Experience
Utilities Power Specialist	38	2 days	Electrical substation knowledge and basic knowledge of disturbance records and power quality principles.
Utilities Communication Specialist	39	1 day	Utilities Power Specials is optional.

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OrionLX/OrionLXm Automation Platform (Full Course)

Objective

Train students on how to specify OrionLX and OrionLXm hardware and firmware configurations and to create OrionLX / LXm configurations for typical RTU and Communication Processor applications, using NovaTech Configuration Director (NCD) software. Review OrionLX / LXm web-based online operations to transfer files and diagnose OrionLX / LXm operation and communications. Review OrionLX / LXm physical connections and hardware modules.

Prerequisites

Exposure to or experience with RTUs and IEDs is preferred. Understanding of the data required from substations is preferred. Understanding of SCADA controls is preferred.

Description

A one and a half-day course to provide instruction in the specification, configuration, application, and real-time monitoring of the OrionLX / LXm automation processor. Students will be introduced to OrionLX / LXm hardware and firmware options and their various uses and applications. NCD will be discussed and utilized throughout the course to familiarize the student with the options and applications that the OrionLX family can serve. Laboratory exercises will complement the lecture material, allowing each student to build an OrionLX / LXm configuration file, transfer it to an OrionLX / LXm, make the configuration active, and then monitor the functionality of the OrionLX / LXm running their configuration. Utilization of basic security functions available in the OrionLX / LXm is also summarized.

Topic Outline

- OrionLX and OrionLXm Hardware
- OrionLX / LXm Operating System and Protocol Firmware Architecture
- NovaTech Configuration Director (NCD) Installation
- NCD Usage - Configuring Communications Ports
- NCD Usage - Logic
- Using, Modifying, and Creating Default Files
- Transferring Files Between PC and OrionLX / LXm
- Monitoring OrionLX / LXm Operation in Real-Time
- Summary of Basic and Advanced Applications for OrionLX / LXm
- Updating Firmware

Course Number	Location	Price (per person)
M700	Owings Mills, MD	\$1,350 or 2 FACET credits
S700	Aiken, SC	\$1,350 or 2 FACET credits
L700	Denham Springs, LA	\$1,350 or 2 FACET credits
K700	Lenexa, KS June 12, September 11, December 4, March 5	\$1,350 or 2 FACET credits

OrionLX/OrionLXm (Short Course)

Objective

Enable users of the Orion5/Orion5r to quickly come up to speed on use of the OrionLX or Orion LXm Automation Platform by highlighting and focusing training on the hardware and software differences.

Prerequisites

Experience and familiarity in the use of the Orion5/Orion5r Automation Platform.

Description

A half-day course to provide instruction on the differences between the Orion5/Orion5r and the OrionLX and OrionLXm, including: USB ports, expanded/redundant power supply, open database, web-based online operations, security front end, expanded diagnostics and other new options. NCD will be discussed and utilized throughout the course. Laboratory exercises will complement the lecture material, allowing each student to build an OrionLX / LXm configuration file, transfer it to an OrionLX / LXm, make the configuration active, and then monitor the functionality of the OrionLX / LXm running their configuration.

Topic Outline

- Review of New OrionLX / LXm Hardware and Diagnostics
 - Wide-range Power Supplies
 - Redundant Power Supply Option with Diagnostics
 - Fiber-optic Ethernet Port Option
 - Expanded Memory for Data Archiving
 - Diagnostic LEDs for Firewall and Communications
 - USB Ports
- Review of New OrionLXm Hardware and Diagnostics
 - Banks of (4) Serial Ports
 - Wide-range Power Supplies
 - Ethernet Ports
 - Diagnostic LEDs
- Review of New OrionLX and Orion LXm Web-Based Online Operations
 - Web-based online operations
 - Online Configuration Requirements
 - Transferring Files Between PC and OrionLX / LXm
 - Monitoring OrionLX / LXm Operation in Real-Time
 - OrionLX / LXm Security Overview
 - Multiple Users with Levels of Access
 - Remote Authentication Support
 - Firewall Support
 - VPN and Encryption Protocol Support
 - Key Management
 - Logging
- Review of New OrionLX / LXm Software and Options
 - "Cascaded Orion" Software
 - Email Remote Reporting Option
 - Point Aliasing
 - Open Source SQL-Compliant Database

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
701	ALL	\$450

Orion I/O (Full Course)

Objective

Train students on how to specify Orion I/O hardware and firmware configurations and to create Orion I/O configurations for typical RTU applications, using NovaTech Configuration Director (NCD) software. Review Orion I/O web-based online operations to transfer files and diagnose Orion I/O operation and communications. Review Orion I/O physical connections and I/O Cards.

Prerequisites

Exposure to or experience with RTUs and SCADA is desirable. Understanding of the different discrete and analog measurement, monitoring and control circuits in electrical substations is desired.

Description

A one and a half-day course (12 hours) to provide instruction in the specification, configuration, application, and real-time monitoring of the Orion I/O module and its constituent I/O cards. Students will be introduced to Orion I/O hardware and firmware options and their various uses and applications. NCD will be discussed and utilized throughout the course to familiarize the student with the options and applications that the Orion I/O can serve. Laboratory exercises will complement the lecture material, allowing each student to build an Orion I/O configuration file offline in NCD, transfer it to an Orion I/O, make online web-based settings (including security settings), make the configuration active, and then monitor real, attached inputs and outputs.

Topic Outline

- Orion I/O Module hardware and I/O Cards:
 - 16 DI Card Configuration and Wiring
 - 16 DI Wetted Card Configuration and Wiring
 - 16 DO Card Configuration and Wiring
 - 8 AI Card Configuration and Wiring
- I/O Card Orion I/O operating system and protocol firmware architecture
- NovaTech Configuration Director (NCD) Installation
- NCD Usage - Configuring I/O Cards
- NCD Usage - Software options: Brief review of Math & Logic, LogicPak and Cascaded Orions
- Configuring Advanced User Interface
- Transferring files between PC and Orion I/O
- Online settings through browser, including firewall and other basic security configuration
- Monitoring Orion I/O in real time; diagnostics
- Updating Firmware
- Adding or moving I/O Cards in the field

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
719	ALL	\$1,350

800.253.3842

Orion I/O (Short Course)

Objective

Enable users of the OrionLX or OrionLXm to quickly come up to speed on use of the Orion I/O by focusing on the new I/O Cards and on specific hardware options and configuration of the Orion I/O.

Prerequisites

OrionLX / LXm Automation Platform (Full Course) or experience and familiarity in the use of the OrionLX or OrionLXm Automation Platform.

Exposure to or experience with RTUs and SCADA is desirable.

Understanding of the different discrete and analog measurement, monitoring and control circuits in electrical substations is desirable.

Description

A half-day (4-hour) course to provide instruction on the configuration, wiring, diagnostics and field replacement of the I/O Cards in the Orion I/O and configuration of the Advanced User Interface option on the Orion I/O (note all other configuration of the Orion I/O is the same as the OrionLX and the OrionLXm). Also, to provide a brief review of commonly-used software options on the Orion I/O (Cascading and Logic), and to review a new firmware update method for the Orion I/O.

Topic Outline

- Orion I/O Module hardware and I/O Cards:
 - 16 DI Card Configuration and Wiring
 - 16 DI Wetted Card Configuration and Wiring
 - 16 DO Card Configuration and Wiring
 - 8 AI Card Configuration and Wiring
- Adding or moving I/O Cards in the field
- NCD Usage - Configuring I/O Cards
- NCD Usage - Software options: Brief review of Math & Logic, LogicPak and Cascaded Orions
- Configuring Advanced User Interface
- Monitoring Orion I/O in real time; diagnostics
- Updating Firmware

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
720	ALL	\$450

UTILITY APPLICATION AND OPERATION COURSES

Orion DA-Master Design, Operation and Maintenance (Full Course)

Objective

Train engineers to configure and simulate automatic feeder isolation and restoration schemes using the DA-Master option on the Orion Automation Platform.

Prerequisites

Completion of Orion5/Orion5r/OrionLX/OrionLXm Automation Platform course, or equivalent experience.

Familiarity with distribution feeder topologies and apparatus.

Understanding of feeder isolation and restoration control scenarios.

Familiarity with typical use of a PC – setting IP addresses, using spreadsheets, terminal emulators, browsers, etc.

Description

A one-day course to provide instruction on the operation, troubleshooting, and application configuration of the DA-Master firmware module for Orion Automation Platforms. NCD will be discussed and utilized throughout the course. Laboratory exercises will complement the lecture material, allowing each student to view online operations of the DA-Master, including the event file for identifying the sequence of events for an automated DA operation, build simple DA configurations, make the configurations active, and then monitor the functionality of the Orion running the configuration.

Topic Outline

- Understand Basic Application of DA-Master
 - Isolation
 - Sectionalization
 - Restoration
 - Safety Interlocks and DA Zone Statuses
 - Local/Remote Switches
 - Auto/Manual Switches
 - Zone Normal Mode
 - Zone Limited Mode
 - Zone Lockout Mode
- Connect to Orion Diagnostics with Serial or Ethernet Connection
- View Communications and System Info
- View DA Log for Sequence of Events
- Discuss and Understand Basic DA Application and Configuration Concepts
 - DA Devices
 - Zones or Pods
 - Zone Steps for Isolation/Restoration
- Addition of Free-form Logic for Advanced Applications
- Testing Techniques

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
704	ALL	\$895

Orion DA-Master Design, Operation and Maintenance (Short Course)

Objective

Train operators and technicians to operate and troubleshoot Orion when applied in DA-Master schemes.

Prerequisites

Completion of Orion5/Orion5r/OrionLX/OrionLXm Automation Platform course, or equivalent experience.

Familiarity with distribution feeder topologies and apparatus.

Understanding of feeder isolation and restoration control scenarios.

Familiarity with typical use of a PC – setting IP addresses, using spreadsheets, terminal emulators, browsers, etc.

Description

A half-day course to provide instruction on the operation and troubleshooting configuration for Orion Automation Platforms. NCD will be discussed and utilized throughout the course. Laboratory exercises will complement the lecture material, allowing each student to view online operations of the DA-Master, including the event file for identifying the sequence of events for an automated DA operation, build simple DA configurations, make the configurations active, and then monitor the functionality of the Orion running the configuration.

Topic Outline

- Understand Basic Application of DA-Master
 - Isolation
 - Sectionalization
 - Restoration
 - Safety Interlocks and DA Zone Statuses
 - Local/Remote Switches
 - Auto/Manual Switches
 - Zone Normal Mode
 - Zone Limited Mode
 - Zone Lockout Mode
- Connect to Orion Diagnostics with Serial or Ethernet Connection
- View Communications and System Info
- View DA Log for Sequence of Events

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
705	ALL	\$450

Orion WEBserver / SVG Graphics Design and Application

Objective

Learn how to develop customized Scalable Vector Graphic (SVG) HMI screens and serve them out from OrionLX to a standard browser, using WEBserver and the Inkscape graphics development package. Also learn how to set up the pre-configured Orion web pages for Archived Sequence of Events (SOE) and Alarm Annunciation.

Prerequisites

Completion of Orion5/Orion5r/OrionLX Automation Platform course, or equivalent experience.

Understanding of substation apparatus and operation.

Understanding of need for and use of substation HMI.

Familiarity with use of a PC – setting IP addresses, use of browsers, etc.

Description

A one-day course to provide instruction to develop SVG HMI screens and serve them out from Orion. The course includes configuration of WEBserver protocols (HTTP and XML) and the Inkscape graphics development package. A library of sample screen elements and sample screens will be provided to students. The course also covers the set up of two pre-configured Orion web pages: one to display Archived Orion data (including sequence of events data and load profile data) and the other to display real-time alarms: Alarm Annunciation. Laboratory exercises will complement the lecture material, allowing each student to develop a one-line diagram with real-time data displayed and with breaker control, and to load screens into Orion and to serve the screen out to browser. Web pages for SOE and Alarm Annunciation will also be developed and served out.

Topic Outline

- Description of Required Software Modules
 - OCXs, Base Template File and Docs in NCD
- Documentation
 - FTP and Inkscape Third-Party S/W
- Obtain and Load Inkscape Graphical Development Package
- Set up XML Server and HTTP Server in Orion
- Develop Customized Web Pages
- Link Pages with Real-Time Data in Orion
- Set Up Preconfigured SOE and Alarms Web Pages

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
706	ALL	\$895

Orion Math and Logic (.bas) Design and Application (plus LogicPak)

Objective

Learn how to develop customized math and logic in the Orion Automation Platform using the optional "Math and Logic" (.bas) software module #83. Note this course is different than the course on "Advanced Math and Logic" (.lua) which is option code #99. Learn how to diagnose problems using Logic Simulator and other printing and logging tools.

Prerequisites

Completion of Orion5/Orion5r/OrionLX/OrionLXm Automation Platform course, or equivalent experience.

Experience in writing logic in PLCs, relays or other automation devices.

Some Basic or Visual Basic experience is preferred.

Understanding of substation operations is preferred.

Understanding of data flow in substation automation.

Description

A one-day course to provide instruction to develop customized math and logic in Orion. Examples of working code running in substations will be provided to students. Laboratory exercises will complement the lecture material, allowing each student to develop logic routines to add, average, and compare data and to turn on outputs in response to changing real-time inputs. Logic routines will be loaded into Orion simulators and exercised with real inputs and outputs. The preconfigured "OR" and "Primary-Backup IED" functions in LogicPak will also be covered.

Topic Outline

- Review of Syntax
 - Visual Basic - based
- Math and Logic "Events"
 - Data Change Event
 - Load Event ("Default Start-up Event")
 - Timer Event
- Review of Commands
- Database Read and Write Functions
- Diagnostics
 - Check Syntax Button
 - Print Statement
 - PrintLog Statement
- Development Guidelines
- Math and Logic Examples
- Math and Logic Simulator
- Also includes review of available LogicPak Modules
 - "OR" and "AND" Function
 - "Primary-Backup IEDs" Function
 - "Delay" Functions
 - "Local/Remote" Function
 - "Negate" Function

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
707	ALL	\$895

Orion Advanced Math and Logic (.lua) Design and Application (plus LogicPak)

Objective

Learn how to develop customized math and logic in the Orion Automation Platform using the optional "Advanced Math and Logic" (.lua) software module #99. Note this course is different than the course on "Math and Logic" (.bas) which is option code #83. Learn how to diagnose problems using Logic Simulator and other printing and logging tools.

Prerequisites

Completion of Orion5/Orion5r/OrionLX/OrionLXm Automation Platform course, or equivalent experience.

Experience in writing logic in PLCs, relays or other automation devices.

Some LUA experience is preferred.

Understanding of substation operations is preferred.

Understanding of data flow in substation automation.

Description

A one-day course to provide instruction to develop customized math and logic in Orion. Examples of working code running in substations will be provided to students. Laboratory exercises will complement the lecture material, allowing each student to develop logic routines to add, average, and compare data and to turn on outputs in response to changing real-time inputs. Logic routines will be loaded into Orion simulators and exercised with real inputs and outputs. The preconfigured functions in LogicPak will also be covered.

Topic Outline

- Review of Syntax
- Math and Logic "Events"
 - Data Change Event
 - Load Event ("Default Start-up Event")
 - Timer Event
- Review of Commands
- Database Read and Write Functions
- Diagnostics
 - Check Syntax Button
 - Print Statement
 - PrintLog Statement
- Review of Advanced Functions: String Manipulation, File I/O, poll modification, SCADA port poll monitoring
- Development Guidelines
- Math and Logic Examples
- Math and Logic Simulator
- Also includes review of available LogicPak Modules
 - "OR" and "AND" Function
 - "Primary-Backup IEDs" Function
 - "Delay" Functions
 - "Local/Remote" Function
 - "Negate" Function

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
717	ALL	\$895

Orion Protocols for SEL[®] Relay Integration Design and Application

Objective

Learn how to retrieve real-time SCADA data and non-operational data from SEL[®] relays using the suite of SEL[®] protocols available in the Orion Automation Platform. Learn how to configure Orion to emulate the SEL20xx Communication Processor. Learn how to retrieve and display Event data from SEL[®] relays.

Prerequisites

Completion of Orion5/Orion5r/OrionLX/OrionLXm Automation Platform course, or equivalent experience.

Experience configuring, installing or maintaining SEL[®] relays in substations.

Some experience in retrieving and interpreting SEL[®] Event Reports is preferred.

Familiarity with use of a PC – setting IP addresses, using spreadsheets, terminal emulators, browsers, etc.

Description

A six-hour course to provide instruction to configure Orion to retrieve operational and non-operational data from SEL[®] relays, including real-time SCADA data (analog and discrete data), breaker wear, fault distance, History and Short and Long Events. The I-Dial software option will be set up in Orion to emulate the SEL20xx Communications Processor in Ethernet and dial-up applications. The I-Log and NT-FTP options will be set up in Orion and in a PC to retrieve, parse and disseminate SEL[®] Full-Length Event Reports. The ASCII IED Web option will be set up in Orion to serve out web pages containing SEL[®] Event Report data. Laboratory exercises will complement the lecture material, allowing each student to connect Orion to an SEL[®] relay to try out all of the retrieval and access mechanisms described above.

Topic Outline

- Overview of Protocols used with SEL[®] Relays
 - SEL[®] Master
 - Fast Messaging
 - Fast Operate
 - ASCII
 - FastSER
 - DNP3.0
 - Data Logger (I-Log)
 - I-Dial
- Physical Connections to SEL[®] Relays
 - RS232, RS485
- Configuration and Application of SEL[®] Master Protocols
- Configuration and Application of I-Dial
- Description Techniques for SEL[®] Event Record Retrieval
 - Pass-Through Orion with SEL[®] s/w tools
 - Use of NT-FTP, SEL[®] Master and I-Log
 - Use of WEB IED Data Server

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
708	ALL	\$675

Orion IEC 61131-3 Math and Logic Design and Application

Objective

Enable an OrionLX / LXm User to program logic constructs using the NCD Configuration tool and programming environment using IEC 61131-3 languages supported with the OrionLX / LXm. Hands-on utilization of OrionLX / LXm, DDIO/DCIO, Logic Simulators, and NCD will be employed during the class exercises using online and offline simulation and debugging tools.

Prerequisites

This advanced course requires familiarity with the OrionLX / LXm NCD configuration package and knowledge of the OrionLX / LXm architecture. A quick refresher will be undertaken to re-familiarize attendees with the OrionLX / LXm core elements and database interoperability as it applies to OrionLX / LXm Applications. However, it is required that each attendee is able to configure applications outside of the core 61131-3 application. Each attendee is required to have:

- A Personal Computer
- NCD Installed on their PC
- A Personal Computer with an SVG Capable Browser Installed
- A Personal Computer with Administrator Access Allowing Changing of Ethernet Port Parameters

Description

A two-day course designed to acquaint the user with OrionLX / LXm utilization and application of the five languages Instruction List (IL), Function Block Diagram (FBD), Structured Text (ST), Ladder Diagram (LD) and Sequential Function Chart (SFC). This course utilizes substation common IED's and simulators within the learning and workshop environment.

Topic Outline

- Introduction
 - Classroom Topology and Connectivity
 - Internal OrionLX / LXm Architecture - Why Review Internal Architecture
 - Port Polling
 - Tag Structures
 - Tag Attributes
 - Data Storage/Application Update
 - Application Update vs. Dedicated Bus (Programmable Logic Programming) Scan Rates
- Lab Setup
 - Downloading the NCD Base Application
 - Configuration, Connection, Interoperability of the DDIO/DCIO
 - Connection, Operational Verification of the DDIO/DCIO Simulator Modules
 - Configuration of the Bitronics M650 Simulator Module
 - Downloading, Configuration and Verification of the XML Browser/HMI Update
- NCD 61131-3 and IEC 61131-3 Programming Concepts
 - Inputs
 - Outputs
 - Virtual Inputs
 - Virtual Outputs
 - Variables
 - Variable Types (Int, Dint, Bool, Real...)
 - Retention (Retentive vs. Non Retentive)
 - Local vs Global Variables
 - Structures and Their Implementation
 - Constant Expressions and Their Declaration
 - Cycle Management and Scan Time Update
 - Cycle Time
 - Period
 - Phase

800.253.3842

- IED 61131-3 and NCD Programming Environment
 - Editor Window
 - Functions Window
 - Variables Window
- Language Programming Environment
 - Structured Text
 - Typical Use-age
 - Visual Basic Counterpart
 - Documentation
 - Assignment
 - Conditional Statements
 - Loop Control Constructs
 - Block Calls
 - Troubleshooting
 - Compilation Errors - Runtime Log
 - Breakpoints
 - Step Execution
 - Function Block Diagram
 - Typical Use-age
 - User Defined Function Blocks
 - Documentation Commenting
 - Function Block Execution
 - Function Block Instructions and Interconnections
 - Ladder Diagram
 - Typical Use-age
 - Documentation and Commenting
 - Power Rail
 - Execution
 - Contacts
 - Coils
 - Transition-Jump
 - Operations and Function Blocks
 - Instruction List
 - Typical Use-age
 - Documentation and Commenting
 - Assembly Language Complement
 - Sequential Function Chart
 - Typical Use-age
 - Step Characteristics
 - Initial - Block and Timeout Characteristics
 - Subsequent
 - Actions
 - Initialization
 - Execution
 - Post Transfer Termination
 - Branches
 - Parallel
 - Subsequent
 - Error
 - Transitions
 - Convergences
 - Divergences
 - Parent and Child Blocks
 - Running, Resetting and Killing a Block

NovaTech Lab Station Hardware

The NovaTech IEC 61131-3 learning environment is dependent upon base core logic competencies further strengthened by a course workstation. The class is limited to 3 workstation setups with each workstation allowing 1 – 3 students per workstation. The maximum class capacity is limited to 9 attendees, allowing 3 students per workstation. Each workstation consists of a NovaTech supplied :

- OrionLX / LXm Supporting DNP Master/Slave, XML and IEC 61131-3, and LogicPak Applications
- NovaTech DDIO/DCIO I/O Module
- NovaTech Digital/Analog Simulator
- Bitronics M650 Meter Simulating Unscaled Meter Inputs

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
718	ALL	\$1,850

OrionLX / LXm Cyber Security Design and Application

Objective

Review the latest cyber security guidelines for critical utility infrastructure (including NERC CIP), review threats to the Utility infrastructure, review current approaches to making IT infrastructures secure and train the utility engineer on how to configure the security features in the OrionLX / LXm.

Prerequisites

Experience or training in the use of the OrionLX / LXm Automation Platform.

Some knowledge of and experience with security hardware and software desirable.

Description

A two-day course to provide instruction on a range of security technologies and practices impacting the Utility industry, including: impending NERC and IEEE guidelines and standards for infrastructure protection, nature of Utility security threats, current IT security practices and configuration of the OrionLX / LXm Automation Platform security features. Laboratory exercises will complement the lecture material, allowing each student to build a secure OrionLX / LXm front end.

Topic Outline

- Review of NERC CIP Guidelines, including latest Version 5 requirements
- Nature of Security Threats to the Critical Utility Infrastructure
- Remote Authentication Theory and Practice
- Firewall Theory and Practice
- VPN and Encryption Theory and Practice
- Public Key Cryptography Theory and Practice
- Security Log Files Review
- Laboratory Exercise: Configuration of OrionLX / LXm Security Features, including:
 - Setting Passwords for Multiple User Groups with Varying Privileges
 - Defining Password Strength
 - Configuring OrionLX / LXm to Client to Remote RADIUS and LDAP Authentication Servers
 - Configuring Firewall Rules
 - Configuring VPN and Encryption Protocols
 - Managing Public and Private Keys
 - Viewing and Sorting Logs
 - Transferring Secure Configurations

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
716	ALL	\$1,500

OrionLX / LXm Alarm-Archive-Retentive Configuration and Application (AAR)

Objective

Learn how to archive data in Orion memory, setup the Orion SQL database, create web pages to serve out 1mS Sequence of Events Tables, create web pages to serve out Alarm Annunciation Tables and create and transfer .csv files containing archived data.

Prerequisites

Completion of OrionLX / LXm Automation Platform course, or equivalent experience. Understanding of the application high resolution sequence of event and alarm annunciation; where it is used, why it is used, how utilities use the data.

Description

A half-day course to learn how to configure and apply the OrionLX / LXm AAR software module. Laboratory exercises include creation of Sequence of Events web pages, Alarm Annunciation web pages, Trending pages retrieval of .csv SER records and making SQL queries.

Topic Outline

- New format NCD Setup of Alarm-Archive-Retentive Module
 - General Tab
 - Set Capabilities and Intervals
 - Inputs Tab
 - Add Points
 - Configure Archive Parameters
 - Configure Alarm Parameters
 - Min/Max Values
 - Alarm Messages
 - Outputs Tab
- Implementation of the PostgreSQL Database
 - Tables
 - Archive
 - Archive Partitioning
 - Retentive
 - Alarm Archive
 - Retentive Alarm
 - SQL Queries
 - Windows and Interactive Terminal Interface
 - Data Storage Requirements
- Web Page Viewing and Online Menus
 - Enabling the Database
 - Alarms
 - Alarm Archive
 - Archive
 - Trending
 - Filter Options

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
713	ALL	\$450

OrionLX / LXm Email Configuration and Application

Objective

Learn how to configure and send out email alarm messages, configure and send emails with attached SEL* Event Reports, and create email groups.

Prerequisites

Completion of OrionLX / LXm Automation Platform course, or equivalent experience.

Description

A half-day course to learn how to configure and apply the OrionLX / LXm Email software module. Laboratory exercises include creation and sending of emails with alarm messages, and with SEL event reports (as attachments and in the body of email).

Topic Outline

- NCD Setup of Email Module
 - General Tab
 - Sender/Server Parameters
 - Encryption and Security Parameters
 - Recipients Tab
 - Email Groups Tab
 - Inputs Tab
 - Outputs Tab
- Attachment of SEL Events
 - Full Length Event Reports
 - Histories
- Integration with Orion Alarm-Archive-Retentive, Alias, Text Capabilities and SEL Master
- Lab Exercises to send emails to student cellphones

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
714	ALL	\$450

OrionLX / LXm Redundancy

Objective

Learn how to apply, configure, operate and diagnose Orion Redundancy.

Prerequisites

OrionLX / LXm Automation Platform (Full Course) or experience and familiarity in the use of the OrionLX Automation Platform.

Exposure to or experience with RTUs and SCADA is desirable.

Understanding of the needs and requirements for redundancy in substation RTUs, substation HMIs and SCADA is desirable.

Description

A half-day (4-hour) course to provide class instruction and lab exercises on Orion Redundancy application, configuration, operation and diagnostics. The application portion of this course will review how Orion Redundancy is configured for typical RTU, HMI, Alarming, SOE and Math & Logic applications. Lab exercises will include executing manual and automatic throwover operations during simulated failures and firmware upgrades. Course will include review of the three available Lua routines for force automatic throwover, monitor SCADA polls and block IED polling. Also included is review of the Redundancy Status and Diagnostic webpage, and how to edit it.

Topic Outline

- Review Orion Redundancy Application
 - RTU
 - HMI
 - Alarming and SOE
 - Math and Logic
- Redundancy Configuration
- Lab exercises to manually and automatically force throwover
- Review Lua routines to force automatic throwover, monitor SCADA polls and block IED polling
- Review and edit Redundancy Status and Diagnostics Webpage

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
721	ALL	\$450

IEC 61850 on the Orion Automation Platform

Objective

Learn how to configure, operate and diagnose IEC 61850 Client and Server on the OrionLX, OrionLXm or Orion I/O (Server only).

Prerequisites

IEC 61850 Technology Course (two days).

OrionLX / LXm Automation Platform (Full Course) or experience and familiarity in the use of the OrionLX Automation Platform.

Exposure to or experience with RTUs and SCADA is desirable.

Description

A one-day (8-hour) course to provide class instruction and lab exercises on IEC 61850 Client and Server on the OrionLX, OrionLXm or Orion I/O (Server only). Included in the course: configuration, operation and diagnostics. Three mechanisms for data transfer will be reviewed: Polling, GOOSE and Report Blocks. Configuration of Orion Model Builder will be detailed for Server applications. Lab exercises will include use of Wireshark in diagnosing operation and identifying error conditions. An OrionLX and three IEDs (SEL relay, Bitronics M871 and Orion I/O) will also be set up to create, transfer and diagnose data interchanges.

Topic Outline

- Using CID files from attached IEDs, Configure OrionLX in 61850 Client Applications
 - Polling
 - GOOSE
 - Report Blocks
- Configure Orion Model Builder for 61850 Server applications
- Use Wireshark to diagnose operation and identify error conditions
- Set up network with OrionLX and three IEDs (SEL relay, Bitronics M871 and Orion I/O)

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
722	ALL	\$895

UTILITY TECHNOLOGY COURSES

DNP3.0 Protocol and Application including Serial and Ethernet Communications Basics

Objective

Learn how the DNP3.0 protocol is structured and applied in electrical substations between IEDs, and between substations and control centers. Also learn the basics of serial and Ethernet communications in substations.

Prerequisites

Experience configuring, installing or maintaining substations IEDs.

Understanding of how protocols and networks are used in substations to access data from IEDs.

Description

A one and a half-day course to provide instruction on how the DNP3.0 protocol is structured, how DNP3.0 Master and Slave devices exchange messages and return responses, how to optimize the design of a serial or Ethernet-based DNP3.0 network and how to diagnose communications and problems. Serial communications basics covering RS232, RS485 and serial fiber optic, and Ethernet communications basics covering hubs, routers, switches, network design and diagnostics, are also provided. Laboratory exercises will complement the lecture material, allowing each student to set up both serial and Ethernet DNP3.0 communication between a Master Orion and Slave IEDs, and then monitor and diagnose communications with test set software.

Topic Outline

- Introduction
- History of DNP3.0
- Device Identification
- Physical Interface Attachment
- Device Configuration
- Device Profile / Data Link Layer
- Transport Layer
- Application Layer
- Object Header
- Binary Objects
- Word-based Objects
- Class Data
- Ethernet and the Future

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
709	ALL	\$1,350

Broadband Networking

Objective

Learn the basics of broadband networking including layers in the OSI model, addressing, protocols and network components. Also review the Wireshark network diagnostic tool.

Prerequisites

Familiarity with Ethernet networking and prior use of broadband network diagnostic tools are desirable.

Description

A one day (8-hour) course to provide class instruction and lab exercises on broadband networking. See topics below. Lab exercise will include use of Wireshark to view traffic and diagnose problems.

Topic Outline

- 7-Layer OSI Model Overview
 - Link Layer Addressing
 - Protocols Overview
 - MAC Discovery with IP
 - TCP Connection
 - COTP Connection
 - MMS Associate
- Wireshark Overview
- Network Components
 - End Nodes, Media Converters, Switches, Routers
 - Physical Layers: 10/100 MB Copper, 10 MB Fiber, 100 MB Fiber, Exotic
 - L2 and L3 Switches and Routers
 - Establishment of an Ethernet Session, Connection and
- IP Layer Addresses
- TCP/UCP Layer
- TCP Disconnect
- Higher Layers
- Common Protocols
- Link-Level Architectures
 - Hub and Spoke
 - Tree Architecture
 - Bumpless Redundancy and PRP
- View Traffic
 - Use Wireshark to View Conversation
 - Multicast Traffic on Wireshark

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
723	ALL	\$895

IEC 61850 Technology

Objective

Learn the underlying structure of IEC 61850 and how to design, operate and diagnose IEC 61850-based systems.

Prerequisites

Exposure to or experience with RTUs and SCADA is desirable. Prior use of broadband network diagnostic tools is desirable.

Description

A one and one half-day (12-hour) course to provide class instruction and lab exercises on IEC 61850 Client and Server Technology. A portion of the course will review broadband networking, including layers, protocols and addressing. Lab exercise will include inspection of XML files and use of Wireshark to view IEC 61850 traffic and diagnose problems.

Topic Outline

- Overview of broadband networking, including layers, protocols and addressing
- Thorough review of all of the elements of a 61850 system, including file types
- Review the mechanisms for data transfer in IEC 61850, including:
 - Polling
 - GOOSE
 - Report Blocks
 - File Transfer
- Use Wireshark to diagnose operation and identify error conditions

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
724	ALL	\$1,350

BITRONICS® COURSES

Utilities Power Specialist

Objective

Learn how to operate, use and read data logged by the Bitronics® Utility Industry Meters and IED(s) (Intelligent Electronic Devices).

Prerequisites

Electrical substation knowledge and a basic knowledge of disturbance records and power quality principles.

Description

A two-day course designed to enable a Utility Power Specialist to use Bitronics® Meters and IED(s) for utility power analysis and monitoring. Laboratory exercises are provided for hands-on experience.

Topic Outline

- 70 Series Hardware Overview
- Application Software Overview
- Fundamental Application of WaveWin as a Comtrade Viewer
- Fundamentals of Oscillography Recording on the M871/M571
- Fundamentals of Disturbance Recording on the M871/M571
- Fundamentals of Trend Recording on the M871/M571
- Fundamentals of Sequence of Events Logging on the M871/M571
- Breaker Monitor
- Transformer Monitor
- Cap bank Monitor
- Remote Synchronization of Generator
- Distributed Recording

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
P711	Bethlehem, PA	\$1,080

Utilities Communication Specialist

Objective

Learn how to install, configure, operate and perform operation verification of Bitronics® Utility Industry Meters and IED(s) (Intelligent Electronic Devices).

Prerequisites

Utilities Power Specialist course is optional.

Description

A one-day course designed to enable a Utilities Communication Specialist to install, configure and verify readiness of Bitronics® Meters and IED(s) for utility power analysis and monitoring. Laboratory exercises are provided for hands-on experience.

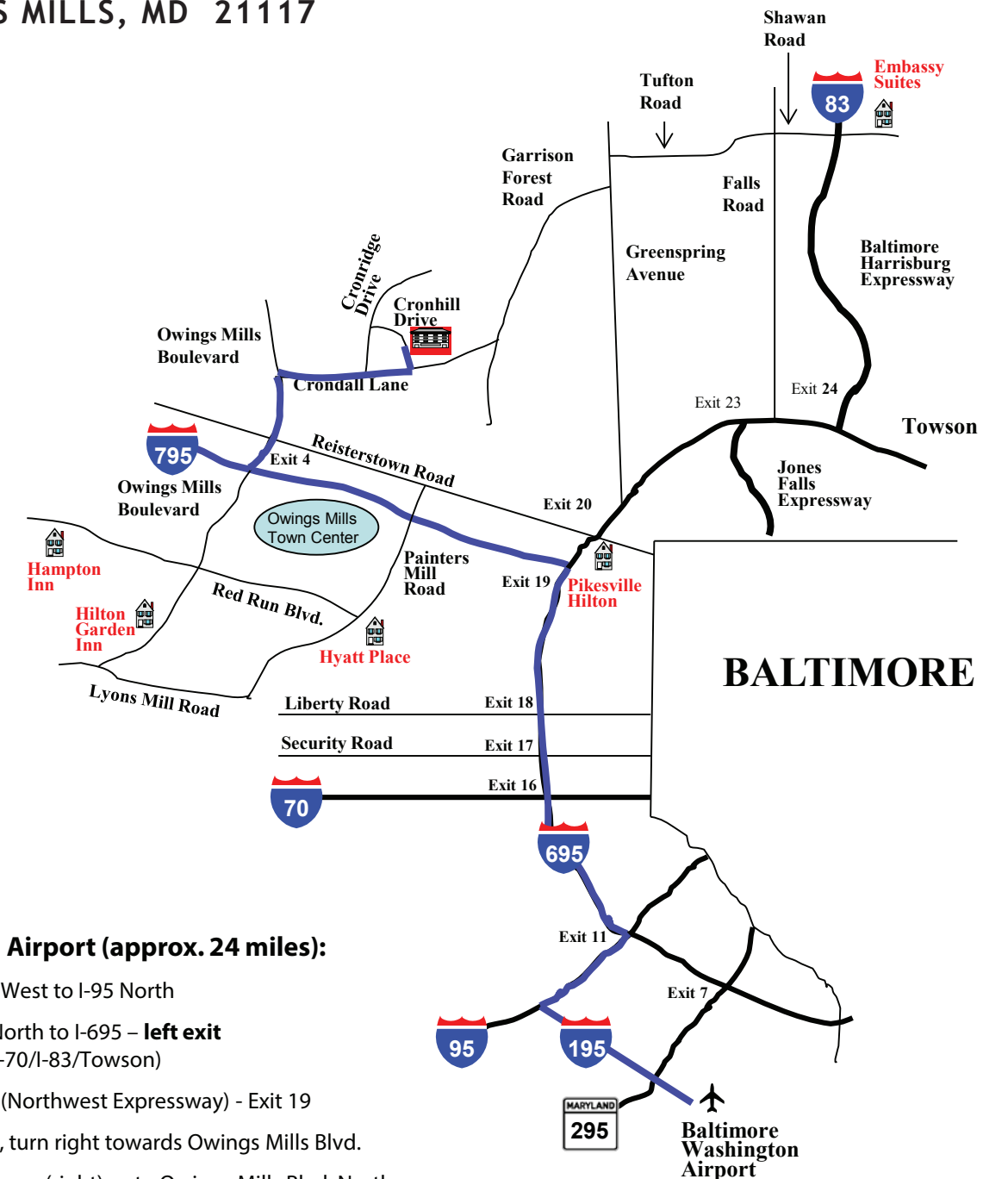
Topic Outline

- Application of BiView v2 SW to Real-Time Data
- Application of BiView v2 SW to File Transfer
- Configurator Overview
- Application of Mdbus as a Modbus Client and a Basic HMI
- Applications of Terminal Emulation Software to the use of M871/M571
- Fundamentals of Serial Interfacing with the M871/M571
- Fundamentals of Ethernet Interfacing to the M871/M571
- Configuration of Scaling Factors to Maximize Resolution in Modbus and DNP
- Application of the Digital I/O Option to Accomplish Remote Status and Control
- Modbus Register Mapping
- DNP Register Mapping
- Remote Displays: M870D and M570D
- Analog Outputs to Interface with Legacy Monitoring Equipment (Optional)
- Modems & Port Switches to Facilitate Remote Access to Data (Optional)
- PPP to Facilitate Dial-up Access via TCP/IP
- Time Synchronization in the M871/M571

Not currently on schedule - contact Educational Services to set up a class.

Course Number	Location	Price (per person)
P712	Bethlehem, PA	\$540

DIRECTIONS TO NOVATECH, LLC EDUCATIONAL SERVICES 11425 CRONHILL DRIVE OWINGS MILLS, MD 21117



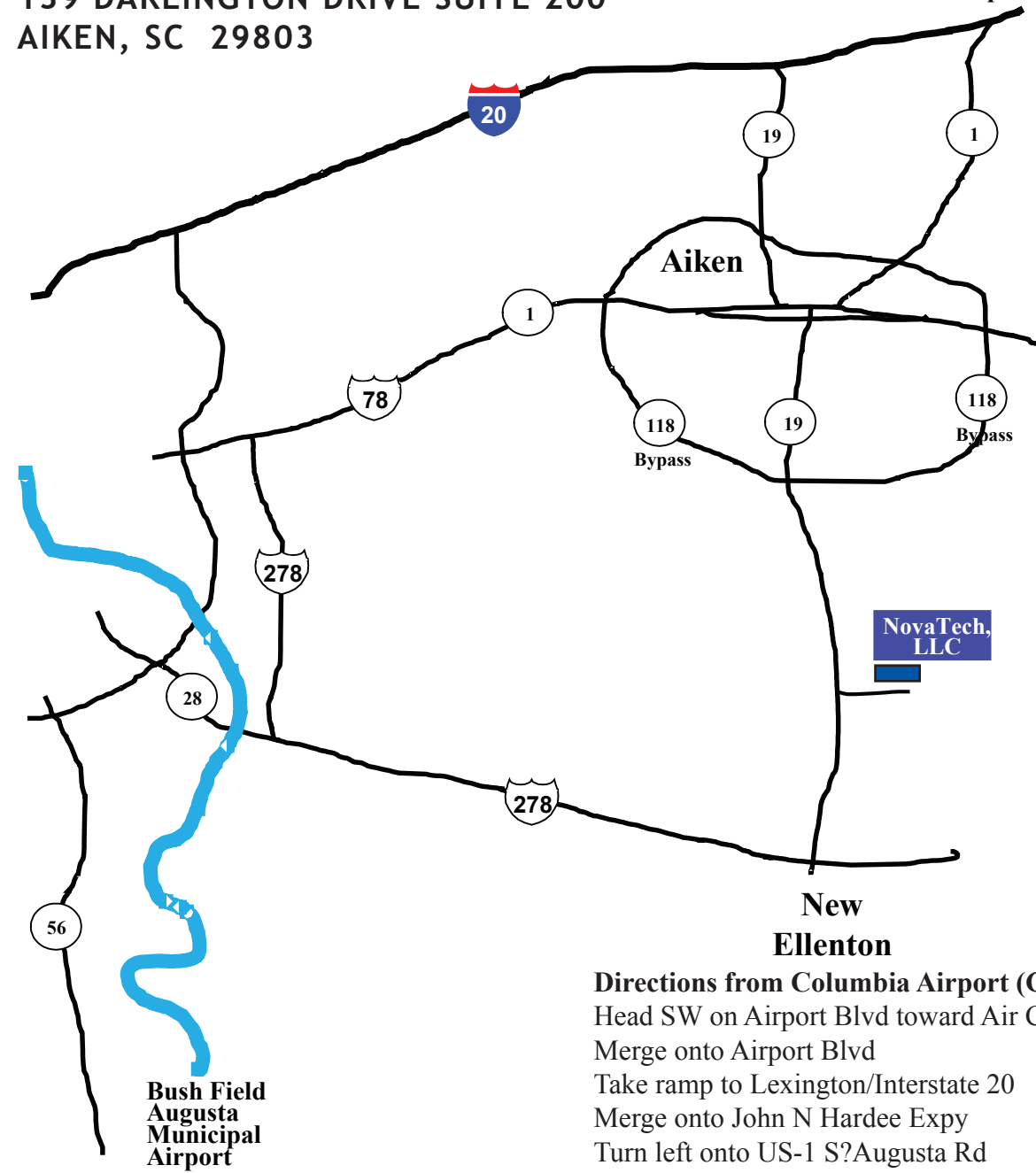
From BWI Airport (approx. 24 miles):

- Take I-195 West to I-95 North
- Take I-95 North to I-695 – **left exit** (towards I-70/I-83/Towson)
- Take I-795 (Northwest Expressway) - Exit 19
- Take Exit 4, turn right towards Owings Mills Blvd.
- Take the Ramp (right) onto Owings Mills Blvd. North
- Turn right onto Cronhill Lane
- Turn left onto Cronhill Drive
- Turn right into 2nd driveway; enter at corner of building

This map is not to scale.

**DIRECTIONS TO NOVATECH, LLC
EDUCATIONAL SERVICES
AIKEN COMERCIAL CENTER
139 DARLINGTON DRIVE SUITE 200
AIKEN, SC 29803**

To:
CAE
Columbia
Metropolitan
Airport



Directions from Columbia Airport (CAE):
Head SW on Airport Blvd toward Air Commerce Dr
Merge onto Airport Blvd
Take ramp to Lexington/Interstate 20
Merge onto John N Hardee Expy
Turn left onto US-1 S/Augusta Rd
Use right lane to merge onto I-20 W toward Augusta
Take exit 22 for US-1 toward Aiken
Turn left onto US-1 S, Hopeland Gardens/U.S.C. Aiken/Aiken
Turn left onto SC-118/Rudy Mason Pkwy
Turn left onto SC-19/Whiskey Rd

Directions from Bush Field Airport (AGS):
Turn right at Doug Barnard Pkwy
Turn left to merge onto I-520 E
Take exit 17 for US-1 toward Aiken/N Augusta
Turn right at US-1 N/US-278 E/US-78 E
Turn right at S Carolina 118/S Carolina 19 Truck/Hitchcock Pkwy
Turn right onto SC-19 S/Whiskey Rd
Turn left at Aiken Commercial Center, Darlington Drive
NovaTech is on the left

This map is not to scale.

**DIRECTIONS TO NOVATECH, LLC
EDUCATIONAL SERVICES
138 ASPEN SQUARE
SUITE A
DENHAM SPRINGS, LA 70726**

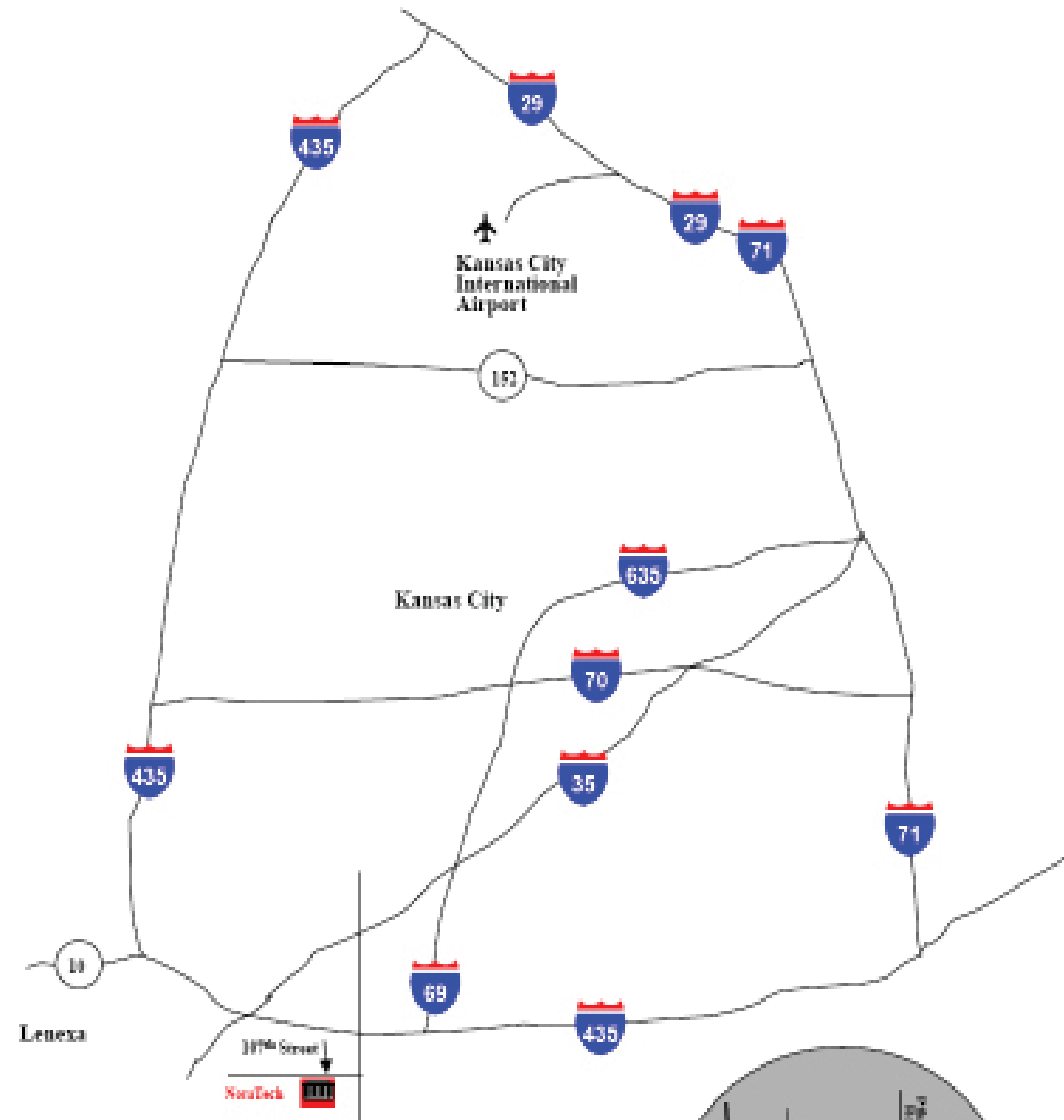


Directions to NovaTech, LLC (Denham Springs, Louisiana):

- Depart Jackie Cochran Drive going North toward Sally Ride Drive
- Turn slight right onto Sally Ride Drive
- Turn left onto Veterans Memorial Blvd
- Turn right onto LA-408 West / Harding Blvd
- Merge onto I-110 South toward Baton Rouge
- Merge onto I-10 East via Exit 11 on the LEFT toward New Orleans
- Merge onto I-12 East via Exit 159 on the LEFT toward Hammond
- Take the Range Avenue exit - Exit 10
- Turn left onto Range Avenue
- Turn right onto Aspen Square
- Arrive at 138 Aspen Square, Suite A

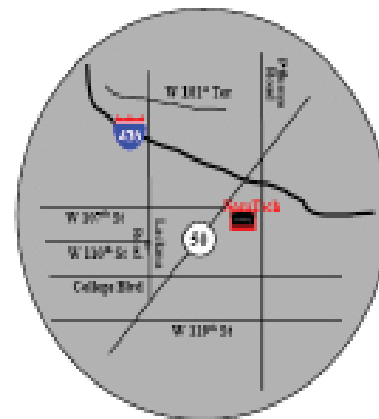
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**DIRECTIONS TO NOVATECH, LLC
EDUCATIONAL SERVICES
13555 W. 107TH STREET
LENEXA, KS 66215**



Directions to NovaTech, LLC (Lenexa, Kansas):

- Start out going South on International Circle toward Terminal A
- Stay straight to go onto LP Cookingham Drive
- Merge onto US-71 S/I-29 South toward Kansas City
- Merge onto I-635 South via exit number 3B toward Kansas
- Merge onto I-35 South via exit number 1A toward Wichita
- Merge onto I-495 East
- Take exit for Quivira Road exit number 32
- Turn right onto Quivira Road
- Turn right onto College Blvd
- Turn right onto Pflumm Road
- Turn left onto 107th Street



This map is not to scale.



Educational Services Training Courses April 2018 - March 2019

D/3®	Date	Location	Course Number
User.....	May 14-25, 2018	Aiken, SC	A452
	July 23-August 3, 2018	Denham Springs, LA	L452
	September 10-21, 2018	Owings Mills, MD	M452
	November 5-16, 2018.....	Aiken, SC.....	S452
Continuous Control Configuration (CCC).....	January 14-25, 2019	Owings Mills, MD	M452
	April 2-6, 2018	Owings Mills, MD	M451
	June 18-22, 2018	Aiken, SC	S451
	October 1-5, 2018.....	Owings Mills, MD	M451
SABL®	February 4-8, 2019	Denham Springs, LA	L451
	April 9-13, 2018	Owings Mills, MD	M456
	June 25-29, 2018	Aiken, SC	S456
	August 20-24, 2018	Denham Springs, LA	L456
Application Design Techniques	October 8-12, 2018	Owings Mills, MD	M456
	December 17-21, 2018.....	Aiken, SC	S456
	February 11-15, 2019.....	Aiken, SC.....	S456
	June 4-8, 2018	Owings Mills, MD	M441
Utilities Upgrade	July 16-20, 2018	Aiken, SC.....	S441
	October 15-19, 2018	Denham Springs, LA	L441
	March 18-22, 2019	Owings Mills, MD	M441
	June 6-8, 2018	Denham Springs, LA	L482
System Management.....	October 3-5, 2018.....	Aiken, SC.....	S482
	February 6-8, 2019	Owings Mills, MD	M482
	April 30-May 2, 2018	Aiken, SC	S450
	August 13-15, 2018	Owings Mills, MD	M450
Alarm Management.....	December 3-5, 2018	Denham Springs, LA	L450
	March 11-13, 2019	Aiken, SC.....	S450
	May 3-4, 2018	Aiken, SC.....	S492
	August 16-17, 2018	Owings Mills, MD	M492
TotalVision® Applications I	December 6-7, 2018	Denham Springs, LA	L492
	March 14-15, 2019.....	Aiken, SC.....	S492
	April 23-27, 2018	Owings Mills, MD	M419
	July 9-13, 2018.....	Aiken, SC.....	S419
TotalVision® Applications II	October 22-26, 2018	Owings Mills, MD	M419
	January 7-11, 2019.....	Denham Springs, LA	L419
	March 25-29, 2019.....	Aiken, SC.....	S419
	May 14-17, 2018	Aiken, SC.....	S473
.....	July 23-26, 2018	Owings Mills, MD	M473
	October 29-November 1, 2018.....	Owings Mills, MD	M473
	March 18-21, 2019.....	Aiken, SC.....	S473

D/3® Hardware	Date	Location	Course Number
D/3® Hardware Maintenance - 8000 I/O	May 7-9 2018	Aiken, SC	S415
	August 6-8, 2018	Owings Mills, MD	M415
	September 24-26, 2018	Denham Springs, LA	L415
	October 29-31, 2018	Aiken, SC	S415
D/3® 8000 I/O Configuration	January 28-30, 2019.....	Owings Mills, MD	M415
	May 10-11, 2018	Aiken, SC.....	S413
	August 9-10, 2018	Owings Mills, MD	M413
	September 27-28, 2018	Denham Springs, LA	L413
.....	November 1-2, 2018.....	Aiken, SC.....	S413
	January 31-February 1, 2019.....	Owings Mills, MD	M413



Educational Services Training Courses April 2018 - March 2019

D/3® FlexBatch®	Date	Location	Course Number
Production Operator	April 16-17, 2018	Aiken, SC	S466
	July 16-17, 2018	Owings Mills, Md.....	M466
	August 27-28, 2018	Denham Springs, LA	L466
	October 15-16, 2018	Aiken, SC	S466
Recipe Developer.....	February 18-19, 2019	Owings Mills, Md.....	M466
	April 16-18, 2018	Aiken, SC.....	S467
	July 16-18, 2018	Owings Mills, Md.....	M467
	August 27-29, 2018	Denham Springs, LA	L467
Control Engineer.....	October 15-17, 2018	Aiken, SC	S467
	February 18-20, 2019.....	Owings Mills, Md.....	M467
	April 16-20, 2018	Aiken, SC	S468
	July 16-20, 2018	Owings Mills, Md.....	M468
.....	August 27-31, 2018	Denham Springs, LA	L468
	October 15-19, 2018.....	Aiken, SC	S468
	February 18-22, 2019.....	Owings Mills, Md.....	M468

Utility	Date	Location	Course Number
OrionLX / OrionLXm Automation Platform	June 12-13, 2018	Lenexa, KS.....	K700
	September 11-12, 2018	Lenexa, KS.....	K700
	December 4-5, 2018	Lenexa, KS.....	K700
	March 5-6, 2019	Lenexa, KS.....	K700

NOTE: If a class you are looking for is not on the schedule, contact Educational Services (800) 253-3842 x 8326 to add a class.

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