

# Delta Plc Programming

## Course outline

### **Module 1: Introduction to Delta Plc Programming**

Module 1: Introduction to Delta Plc Programming is an introductory course designed to provide students with a basic understanding of the fundamentals of Delta Plc Programming. This module covers topics such as the basic structure of a Delta Plc program, the different types of instructions, and the different types of data used in Delta Plc Programming. Students will also learn how to create and debug a basic Delta Plc program.

#### ***Lessons***

- Overview of Delta Plc Programming
- Basic Concepts of Delta Plc Programming
- Understanding Delta Plc Programming Language
- Working with Delta Plc Programming Software
- Programming Structures in Delta Plc Programming
- Troubleshooting Delta Plc Programming
- Advanced Delta Plc Programming Techniques
- Interfacing with Other Systems using Delta Plc Programming
- Networking with Delta Plc Programming
- Security and Safety Considerations in Delta Plc Programming

#### **After completing this module, students will be able to:**

- Understand the basic concepts of Delta Plc Programming
- Be able to write basic Delta Plc programs
- Be able to debug and troubleshoot Delta Plc programs
- Be able to use Delta Plc programming software to create and modify Delta Plc programs.

### **Module 2: Basic Programming Concepts**

Module 2 of the Delta Plc Programming course covers the fundamentals of programming, including data types, variables, operators, control structures, and functions. It also introduces the Delta Plc programming language and provides an overview of the development environment. This module is designed to give students a solid foundation in programming concepts and prepare them for more advanced topics in the course.

#### ***Lessons***

- Introduction to Programming
- Variables and Data Types
- Control Flow Statements
- Functions and Subroutines
- Debugging and Troubleshooting
- Arrays and Strings
- Object-Oriented Programming
- File Input/Output
- Database Connectivity
- Network Programming
- Graphics Programming
- Multithreading
- Mobile Application Development
- Web Development
- Security and Cryptography

### **After completing this module, students will be able to:**

- Understand the fundamentals of programming languages such as C, C++, and Java.
- Develop basic algorithms and data structures to solve problems.
- Utilize debugging techniques to identify and fix errors in code.
- Create basic programs using Delta Plc Programming language.

## **Module 3: Ladder Logic Programming**

Module 3 of the Delta Plc Programming course covers the fundamentals of ladder logic programming. It provides an introduction to the basic concepts of ladder logic programming, including the use of logic gates, timers, counters, and other programming elements. It also covers the use of the Delta PLC software to create and debug ladder logic programs.

### ***Lessons***

- Introduction to Ladder Logic Programming
- Basic Ladder Logic Programming Concepts
- Ladder Logic Programming Syntax
- Ladder Logic Programming Instructions
- Ladder Logic Programming Examples
- Troubleshooting Ladder Logic Programming
- Advanced Ladder Logic Programming Techniques
- Ladder Logic Programming for Delta PLCs
- Interfacing with Other Devices Using Ladder Logic Programming
- Best Practices for Ladder Logic Programming

### **After completing this module, students will be able to:**

- Understand the fundamentals of Ladder Logic Programming and its application in Delta Plc Programming.

- Develop the ability to create and debug Ladder Logic programs for Delta Plc Programming.
- Utilize the Ladder Logic programming language to create complex logic and control systems.
- Implement Ladder Logic programming techniques to optimize the performance of Delta Plc Programming.

## **Module 4: Sequential Function Chart Programming**

Module 4 of the Delta Plc Programming course covers Sequential Function Chart (SFC) programming. This module provides an introduction to SFC programming, including the basics of SFC programming, the different types of SFCs, and how to create and debug SFC programs. It also covers the use of SFCs in automation systems and how to integrate SFCs with other programming languages.

### ***Lessons***

- Introduction to Sequential Function Chart Programming
- Understanding the Basics of SFC Programming
- Working with SFC Programming Instructions
- Creating and Debugging SFC Programs
- Advanced SFC Programming Techniques
- Troubleshooting SFC Programs
- Optimizing SFC Programs
- Integrating SFC Programs with Other PLC Programming Languages
- Best Practices for SFC Programming
- Security Considerations for SFC Programming

### **After completing this module, students will be able to:**

- Understand the fundamentals of Sequential Function Chart (SFC) programming and its application in Delta Plc Programming.
- Develop the ability to create and debug SFC programs for Delta Plc Programming.
- Utilize the SFC programming language to create complex logic and control systems.
- Implement SFC programming techniques to optimize the performance of Delta Plc Programming.

## **Module 5: Structured Text Programming**

Module 5 of the Delta Plc Programming course focuses on Structured Text Programming. This module covers the fundamentals of Structured Text Programming, including the syntax, data types, and programming structures. Students will learn how to create and debug programs using Structured Text, as well as how to use the language to create complex programs.

### ***Lessons***

- Introduction to Structured Text Programming
- Working with Variables and Data Types
- Conditional Statements and Loops
- Working with Arrays and Strings
- Subroutines and Functions

- Debugging and Troubleshooting
- Advanced Structured Text Programming Techniques
- Interfacing with Other Devices
- Optimizing Structured Text Programs
- Best Practices for Structured Text Programming

### **After completing this module, students will be able to:**

- Understand the fundamentals of Structured Text programming language and its syntax.
- Develop and debug Structured Text programs for Delta Plc Programming.
- Create and modify Structured Text programs for Delta Plc Programming.
- Utilize Structured Text programming language to create complex logic for Delta Plc Programming.

## **Module 6: Function Block Diagram Programming**

Module 6 of the Delta Plc Programming course covers Function Block Diagram Programming, which is a graphical programming language used to program programmable logic controllers (PLCs). This module will teach students how to create and use function blocks to control the behavior of a PLC, as well as how to debug and troubleshoot their programs. Additionally, students will learn how to use the Delta PLC software to create and debug their programs.

### ***Lessons***

- Introduction to Function Block Diagram Programming
- Understanding the Basics of Function Block Diagram Programming
- Working with Function Blocks
- Creating and Debugging Programs
- Advanced Function Block Programming Techniques
- Troubleshooting and Optimizing Function Block Diagrams
- Interfacing with Other Devices
- Working with Timers and Counters
- Working with Math and Logic Functions
- Working with Data Storage and Retrieval

### **After completing this module, students will be able to:**

- Understand the basic principles of Function Block Diagram (FBD) programming.
- Be able to create and modify FBD programs for Delta PLCs.
- Be able to debug and troubleshoot FBD programs.
- Be able to integrate FBD programs with other PLC programming languages.

## **Module 7: Advanced Programming Techniques**

Module 7 of the Delta Plc Programming course covers advanced programming techniques, such as using structured programming, object-oriented programming, and debugging. It also covers topics such as data types, variables, and functions. Students will learn how to create efficient and reliable code, as well as how to debug and troubleshoot their programs.

## ***Lessons***

- Object-Oriented Programming
- Design Patterns
- Refactoring
- Unit Testing
- Debugging Techniques
- Memory Management
- Algorithm Design and Analysis
- Data Structures
- Software Architecture
- Software Design Principles
- Software Performance Optimization
- Software Security
- Software Quality Assurance
- Software Project Management
- Software Version Control

## **After completing this module, students will be able to:**

- Understand the principles of object-oriented programming and be able to apply them to create efficient and maintainable code.
- Develop an understanding of the principles of software engineering and be able to apply them to create robust and reliable software.
- Be able to use advanced programming techniques such as recursion, dynamic programming, and data structures to solve complex problems.
- Be able to use debugging techniques to identify and fix errors in code.

## **Module 8: Troubleshooting and Debugging**

Module 8 of the Delta Plc Programming course covers troubleshooting and debugging techniques for Delta Plc systems. It covers topics such as identifying and resolving common errors, using debugging tools, and understanding the debugging process. It also provides hands-on exercises to help students practice their troubleshooting and debugging skills.

## ***Lessons***

- Identifying and Resolving Common Delta Plc Programming Errors
- Debugging Delta Plc Programming Code
- Troubleshooting Delta Plc Programming Issues
- Analyzing Delta Plc Programming Logs
- Using Delta Plc Programming Debugging Tools
- Understanding Delta Plc Programming Error Messages
- Locating and Fixing Delta Plc Programming Bugs
- Optimizing Delta Plc Programming Performance
- Troubleshooting Delta Plc Programming Network Connectivity
- Resolving Delta Plc Programming Security Issues

## **After completing this module, students will be able to:**

- Identify and resolve common programming errors in Delta PLCs.
- Utilize the Delta PLC debugging tools to identify and fix errors.
- Understand the importance of troubleshooting and debugging in the programming process.
- Develop strategies for debugging and troubleshooting Delta PLC programs.

## **Module 9: Networking and Communications**

Module 9 of the Delta Plc Programming course covers the fundamentals of networking and communications. It covers topics such as network topologies, protocols, and communication media, as well as how to configure and troubleshoot networks. It also covers the basics of Ethernet, TCP/IP, and other network technologies.

### ***Lessons***

- Introduction to Networking and Communications
- Network Topologies and Protocols
- Network Security and Firewalls
- Network Troubleshooting and Maintenance
- Network Design and Implementation
- Network Performance Monitoring and Optimization
- Network Virtualization and Cloud Computing
- Wireless Networking and Mobile Communications
- Network Programming and Automation
- Network Management and Administration

## **After completing this module, students will be able to:**

- Understand the fundamentals of networking and communication protocols.
- Develop the ability to configure and troubleshoot network devices.
- Learn how to design and implement secure networks.
- Develop the skills to create and manage virtual private networks.

## **Module 10: Data Acquisition and Control**

Module 10 of the Delta Plc Programming course covers the fundamentals of data acquisition and control. It covers topics such as data acquisition systems, data acquisition hardware, data acquisition software, data acquisition techniques, and data control systems. It also covers the use of Delta PLCs for data acquisition and control.

### ***Lessons***

- Introduction to Delta PLCs
- Connecting to a Delta PLC

- Programming Basics
- Data Acquisition and Control
- Working with Inputs and Outputs
- Working with Timers and Counters
- Working with Math and Logic Instructions
- Working with Data Tables
- Working with Communication Protocols
- Troubleshooting and Maintenance

**After completing this module, students will be able to:**

- Understand the principles of data acquisition and control systems.
- Design and implement data acquisition and control systems using Delta PLCs.
- Troubleshoot and debug data acquisition and control systems.
- Develop and implement strategies for data acquisition and control system optimization.

## **Module 11: HMI and SCADA Integration**

Module 11 of the Delta Plc Programming course covers the integration of Human Machine Interface (HMI) and Supervisory Control and Data Acquisition (SCADA) systems. It provides an overview of the different types of HMI and SCADA systems, their components, and how they can be used to create a comprehensive automation system. It also covers the integration of Delta PLCs with HMI and SCADA systems, as well as the programming of Delta PLCs for HMI and SCADA applications.

### ***Lessons***

- Overview of HMI and SCADA Integration
- Understanding Delta Plc Programming
- Configuring HMI and SCADA for Delta Plc Programming
- Troubleshooting HMI and SCADA Integration Issues
- Developing Custom HMI and SCADA Applications
- Integrating HMI and SCADA with Other Systems
- Security Considerations for HMI and SCADA Integration
- Best Practices for HMI and SCADA Integration
- Case Studies of HMI and SCADA Integration
- Future Trends in HMI and SCADA Integration

**After completing this module, students will be able to:**

- Understand the principles of Human Machine Interface (HMI) and Supervisory Control and Data Acquisition (SCADA) systems.
- Develop the ability to integrate HMI and SCADA systems with Delta PLCs.
- Design and implement user-friendly graphical interfaces for monitoring and controlling Delta PLCs.
- Utilize Delta PLCs to create automated systems with HMI and SCADA integration.

## **Module 12: Safety and Security**

Module 12 of the Delta Plc Programming course focuses on safety and security. It covers topics such as safety systems, safety standards, and safety protocols. It also covers security systems, security protocols, and security best practices. The module provides an overview of the different safety and security measures that can be implemented in a PLC system.

## ***Lessons***

- Introduction to Safety and Security in Delta Plc Programming
- Understanding the Basics of Delta Plc Programming Security
- Implementing Security Protocols in Delta Plc Programming
- Best Practices for Securing Delta Plc Programming
- Troubleshooting Security Issues in Delta Plc Programming
- Security Auditing for Delta Plc Programming
- Security Testing for Delta Plc Programming
- Security Monitoring for Delta Plc Programming
- Security Compliance for Delta Plc Programming
- Security Risk Management for Delta Plc Programming

## **After completing this module, students will be able to:**

- Understand the importance of safety and security protocols when programming Delta Plc systems.
- Implement safety and security measures to protect Delta Plc systems from unauthorized access.
- Identify and troubleshoot potential security vulnerabilities in Delta Plc systems.
- Develop strategies to ensure the safety and security of Delta Plc systems.

## **Module 13: Maintenance and Upgrades**

Module 13 of the Delta Plc Programming course covers the topics of maintenance and upgrades. It provides an overview of the different types of maintenance and upgrades that can be performed on a PLC system, as well as the tools and techniques used to perform them. It also covers the importance of preventive maintenance and how to troubleshoot and diagnose problems.

## ***Lessons***

- Understanding the Basics of Maintenance and Upgrades
- Troubleshooting Common Issues with Maintenance and Upgrades
- Best Practices for Scheduling Maintenance and Upgrades
- Automating Maintenance and Upgrades
- Security Considerations for Maintenance and Upgrades
- Optimizing Performance with Maintenance and Upgrades
- Managing Resources for Maintenance and Upgrades
- Troubleshooting Delta Plc Programming Issues
- Upgrading Delta Plc Programming Software
- Testing and Validating Maintenance and Upgrades

## **After completing this module, students will be able to:**

- Understand the importance of regular maintenance and upgrades for Delta Plc Programming.
- Identify and troubleshoot common issues with Delta Plc Programming.
- Perform basic maintenance and upgrades on Delta Plc Programming.
- Implement best practices for maintaining and upgrading Delta Plc Programming.