DAY 1

Data Communication and Basic Communication Principles

- Historical Background and Perspective on Data Communication and Fieldbus Systems
- Physical Standards
- Data Communication with Respect to Modern Instrumentation, Control Systems and Smart Equipment
- The Breakdown of the Digital Communication Signal *(bits, nibbles, bytes, etc.)*
- Communication Modes and Principles, and Asynchronous and Synchronous Data Communication
- Error Detection
- Transmission Characteristics and Data Coding
- The Universal Asynchronous Receiver / Transmitter (UART)

DAY 2

Serial Data Communication Standards, Error Detection and Communication Media

- Standards Organizations
- Interface Standards *(including the 232, 423, 422 and 485)*
- Troubleshooting Serial Data Communication Systems, and Test Equipment
- Serial Interface Converters
- The General Purpose Interface Bus (GPIB) and the Universal Serial Bus (USB)
- Factors that can Influence Signal Propagation
- Error Detection, Control and Correction
- Communication Media *(including copper, microwave, fiber, etc.)*

DAY 3

Electrical Noise, Modems & Multiplexors and Communication Protocols

- Possible Sources of Electrical Noise, in the Modern Plant
- Shielding, Earthing and Grounding requirements
- Interchange Circuits Pertinent to Modems and Multiplexors
- Flow Controls that Need to be Considered
- Modulating Techniques *(including, but not limited to ASK, FSK, PSK and QAM)*
- Types of Modems Available

- Modem Standards, Selection Criteria and Concepts Specific to Multiplexing
- Flow Control, Binary-synchronous, HDLC and SDLC as well as File Transfer Protocols

DAY 4

The OSI Model, Industrial Protocols and HART Equipment

- The Open Systems Interconnection (OSI) Model
- The Simplified OSI Model
- ASCII-based Protocols
- The MODBUS Protocol
- The Data Highway (Plus) Protocol
- MAP / TOP Protocols
- Highway Addressable Remote Transducers (HART)

DAY 5

Assorted Fieldbus Devices and Local Area Networks

- Benefits of the Modern Fieldbus System
- Various Classes of Fieldbus Networks
- Fieldbus Choices *(including ASI, Seriplex, Canbus, Devicenet, SDS, Interbus-S, Profibus, FIP, WorldFip and Foundation Fieldbus)*
- Assorted Network Topologies
- Control Mechanisms used for Media Access, as well as Transmission Techniques
- Standards Associated with Local Area Networks (LANs)
- Ethernet and Aspects Associated with It
- Internetwork Connections, Network Operating Systems and Network Architectures and Protocols