UTC Fiber Optic Professional Level 2 Designer

Detailed Course Outline

This one-day course has been developed with 8 hours of classroom lecture that will teach students about fiber optic system design parameters, cable management alternatives, route planning, optical testing requirements, test results interpretation, and fiber optic safety concerns. The course is intended for those involved in the design, administration, operation, and supervision of utility-based fiber optic networks.

Prerequisites: This course requires knowledge of fiber optic theory, as well as field experience, equivalent formal training such as the Fiber Optics 1-2-3 course or viewing the Light Brigade DVD set.

Certifications and Credits: UTC Fiber Optic Professional Level 2 Designer certification
Light Brigade Digital Credentialing

Classroom

Switchyards and Substations

- Typical system architecture
- Last mile and line protection
- Control relays
- Potential rise
- Fiber optic transceivers
- General system considerations

Specifying Optical Cables

- Single-mode fiber types
- ITU-T G.652 and G.652D
- ITU transmission bands
- Single-mode fibers for DWDM technology
- Multimode fiber lightwave propagation
- Multimode fiber bandwidth
- Laser-optimized multimode fiber types
- Fiber selection
- Cable materials and structure
- Loose tube cable specifications
- ADSS fiber cable specifications
- Optical ground wire cable
- Indoor/outdoor cables
- Microduct cables
- Cabling options
- Cable design objectives
- Questions to ask

Specifying Terminations

- What to look for in a connector
- Typical connector roles
- Termination techniques
- Single-mode field connectorization issues
- Subscriber connectors (SC)
- BFOC 2.5 (ST) connectors
- LC connectors
- Attenuators
- Terminators
- Good splice requirements
- Outside plant cable management
- Indoor cable management
- Fiber raceway systems
- Splice closures and slack buffer tubes

Testing Requirements & Results Interpretation

- System related problems
- Testing checklist
- Test equipment selection
- Key issues for all OTDRs

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- OTDR acceptance testing
- Optical loss test equipment
- Optical dispersion testers
- System documentation
- Testing documentation
- Effective maintenance postures
- Developing a restoration plan
- Documentation issues

Installation Planning

- Cable route selection
- NESC grounding rules
- NESC clearance rules
- Span length and sag
- Specialized concerns for aerial placement
- Proper aerial route planning and engineering
- ADSS cable system design
- ADSS cable construction
- ADSS stress strain characteristics
- Long span ADSS
- Short span ADSS
- ADSS cable performance and properties
- NESC environmental loading
- ADSS sag and tension considerations
- Electrical stress mechanisms
- Tracking and corona
- Aeolian vibration and vibration dampers
- OPGW cable system design
- OPGW cable construction
- OPGW stress strain characteristics
- OPGW cable performance and properties
- NESC environmental loading
- OPGW sag and tension considerations
- Lightning and short circuit design
- Aeolian vibration and OPGW dampers
- OPGW splicing and enclosure installation
- Underground cable system design
- Pulling and splicing handholes
- Marking underground cable routes
- Microducts for fiber optic cables

Loss Budgets

- System budgets
- Basic components for optical transmission
- Design options
- The electro-optic interface
- LASERs
- VCSELs and LEDs
- Photo diodes
- Materials used in detectors
- Repeaters and regenerators
- Factors for regenerator usage
- Behavior of light pulses
- Wavelength optimization
- Extending optical loss margins
- Loss budget worksheets
- “Not to exceed” values

System Design

- System design flowchart
- Multiplexing basics
- Wavelength division multiplexing
- Typical design objectives
- Roles of the system designer
- Protecting your system
- Link descriptions
- Material lists
- Planning and scheduling
- Routing