

# Fiber Optics for Utilities

## Foundational

### Level 1 Technician

This three-day instructor-led course teaches basic fiber optic theory and the products used in fiber networks, focusing on the proper installation and maintenance of aerial and underground utility fiber optic systems. Hands-on skills training includes splicing, termination, testing, and troubleshooting to increase efficiency, reliability, and deployment speed in the field.

**Audience:** Installers and technicians in the utility telecom industry

**Prerequisite:** Fiber Foundations is recommended, but not required.



## Intermediate

### Level 2 Designer

This one-day course examines fiber optic design parameters, cable management alternatives, route planning, optical testing requirements, test results interpretation, and cable system design.

**Audience:** Those involved in the design, administration, operation, and supervision of utility-based fiber optic networks

**Prerequisite:** Any Light Brigade foundational course like Fiber Optics 1-2-3, online training, or equivalent field experience



## Advanced

### Level 3 Adv. Designer

This one-day course focuses on DWDM systems and transmission impairments such as PMD and CD that limit the bandwidth and operating rates of fiber optic transmission systems. It covers xWDM theory and applications with a special emphasis on fiber dispersion limits and system design considerations.

**Audience:** Design engineers, or project managers

**Prerequisite:** Knowledge of fiber optic theory, plus field experience or formal training such as Fiber Optics for Utilities Level 2 Designer



Click or scan for detailed course information and upcoming training locations.

## Credentialing



**UTC Fiber Optic Professional**  
Valid for three years.



**Light Brigade Digital Badge**  
Complete this course and receive a Credly digital badge.

“The instructors were great at presenting the material. They showed us better ways to terminate.”

—Travis Buenning, AEP

For training, tools, or equipment:  
1 (206) 575-0404 • 1 (800) 451-7128 • lightbrigade.com



# 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



- 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