Fiber Optics for Utilities

Foundational | Intermediate | Advanced

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.

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

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

Light Brigade®

For training, tools, or equipment:

1 (206) 575-0404 • 1 (800) 451-7128 • lightbrigade.com

UTC Fiber Optic Professional Level 1 Technician

Detailed Course Outline

Light Brigade®
FIBER OPTIC TRAINING

This three-day class features 12 hours of classroom lecture and 12 hours of hands-on skills labs to provide practical understanding and skills required to properly design, install and maintain aerial and underground fiber optic systems in investor-owned and municipal power networks. Students will use the latest fiber optic technology and equipment to learn to splice, terminate, test, and troubleshoot fiber-optic-based utility networks in order to increase network efficiency, system reliability, deployment speed, and safety, as well as reduce operating costs.

Prerequisites: None. Entry level.

Certifications and Credits: UTC Fiber Optic Professional Level 1 Technician certification
Light Brigade Digital Credentialing

Classroom

Introduction

- Basic fiber optic terminology
- Optical fiber transmission systems
- Fiber comparison
- Typical transmission rates
- Service providers of communications
- System topologies
- Advantages and disadvantages of fiber optics
- Standards committees

Transmission Theory

- Attenuation, refraction, and reflection
- Numerical aperture
- The electromagnetic spectrum
- Lightwave transmission
- Single-mode systems
- Mode field diameter
- Multimode systems
- Optical dispersion

Optical Fibers

- Optical fiber characteristics
- Typical fiber specifications
- Single-mode fiber types
- Multimode fiber types

Fiber Optic Cables

- Cable designs
- Loose tube outside plant cables
- Aerial fiber optic cables
- ADSS fiber cable
- ADSS cable preparation
- Optical ground wire cable
- OPGW cable preparation
- Plenum and riser cables
- Distribution cables
- Breakout cables
- Fiber optic cable cordage

Connectors

- Main connector components
- Connector types
- What to look for in a connector
- Typical connector roles
- Subscriber connectors (SC)
- BFOC/2.5 (ST) connectors
- LC connectors
- Multifiber connectors
- Connector polishes
- Endface inspection
- Connector cleaning

Splicing
- Splicing concerns
- Loss variations
- Good splice requirements
- Fiber cleaving
- Common fiber optic cleavers
- Fusion splicing methods
- Pigtail splicing

Cable Management
- Outside plant cable management
- Fiber optic interconnect hardware
- Patch panels
- Premises panels
- Fiber distribution units
- Splice panels
- Optical entrance enclosures
- Splice closures
- Utility closures
- Splice tray recommendations
- Fan out and breakout kits
- Vaults and handholes
- Pedestals

Installation Basics
- Optical cable installation
- Cable handling
- General guidelines
- Standards and regulations
- Cable bonding and grounding
- Fiber optic cable system maintenance
- Fiber installation inspection reports

Underground Installation
- Underground construction
- Underground installation techniques
- Cable trenching
- Plowing
- Directional boring
- Boring requirements
- Conduit length, diameter and color
- Underground cable storage
- Conduit and duct installation
- Cable pulling methods
- Tension monitoring
- High air speed blown
- Slack storage methods
- Underground cable installation apparatus

Aerial Placement
- Aerial cable types
- Clearances
- Utility applications of fiber optics
- Fiber optic cable types for utilities
- Aerial installation alternatives

ADSS Installation
- ADSS for long span EHV lines
- ADSS low voltage underbuild installation
- Back-pull method
- Drive-off method
- Traveler dimensions
- ADSS cable support hardware
- Sagging of ADSS
- Installation of downleads
- Splice enclosures and trays
- Cable storage products
- ADSS cable maintenance
- ADSS installation equipment
- What not to do during ADSS installation

OPGW Installation
- OPGW stringing
- Traveler dimensions
- Hardware and assemblies
- Optical ground wire sagging
- Vibration damper installation
- Downlead installation
- Splicing and enclosure installation
- OPGW cable maintenance
- OPGW installation tooling
- What not to do during OPGW installation

Optical Testing
- How the OTDR works
- OTDR deadzone
- Reading OTDR signatures
- Index of refraction
- Sequential markings
- Acceptance testing

- Reflection testing
- Optical loss testing
- Insertion loss method
- Testing Tx and Rx power
- Testing with VOA and OPM
- Visual testing
- Optical talk sets

Emergency Restoration

- Identify – locate – resolve
- Typical causes of failure
- Types of fiber optic damage
- Frequently encountered problems
- Pre-emergency planning activities
- Initial response
- Field check of interruption
- Execute emergency repairs
- Execute permanent repairs
- Post-restoration recommendations
- Restoration reports and records
- Restoration equipment
- Restoration planning
- Troubleshooting flow chart
- Aerial restorations
- OTDR correction factor
- Cable repair options
- Emergency restoration jump kits
- OPGW restorations
- Outside plant restorations
- Restoration equipment

Standards and Codes

- Fiber optic standards groups
- Related standards
- National Electrical Code
- Fiber optic symbols

Safety Best Practices

- Fiber optic safety concerns
- Visual safety using fiber optic sources
- Wavelength and the eye
- Laser classifications
- Working with lasers
- Safety eyewear
- Working with optical fibers
- Personal protective equipment
- Chemicals
- Safety data sheets (SDS)
- The work area
- Installation practices
- Cable installation safety issues
- Aerial safety issues

Wrap-up and Review

Hands-on Skills Learning

Cable Handling and Installation

- Cable bend radii
- Cable storage
- Pulling grip installation

Cable Preparation

- ADSS preparation
- OPGW preparation

Closure Preparation

- Cable entry and retention
- Fiber unit routing
- Fanout kits
- Slack storage for splice points

Splicing

- Pigtail splicing
- Inline splicing
- Splice-on connectors

OTDR Testing

- Acceptance testing
- Reflection testing
- Span acceptance / splice loss
- Emergency restoration and troubleshooting

Optical Loss Testing

- Link loss measurement
- Transmit and receive power