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