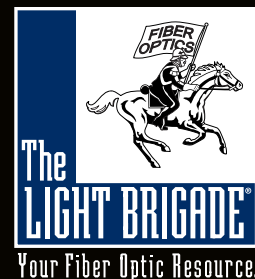


# 2012 Fiber Optic Training Catalog



## Fiber Optics 1-2-3

see page 4

## Advanced Hands-on

see page 5

## Premises/LAN Installation and Maintenance

see page 6

## Fiber Optics for Traffic Systems

see page 7

UPDATED

## Fiber Optics for Mining Applications

see page 8

NEW

## Fiber Optics for Utilities

see page 9

UPDATED

## Certified Fiber to the Home Professional

see page 10

## FTTx for Installers & Technicians

see page 11

UPDATED

## Fiber Optics for Oil/Gas

see page 12

## Fiber Characterization

see page 13

UPDATED

## Custom Fiber Optic Training

see page 14

## Staff Development DVDs

see page 15

# The Very Best in Fiber Optic Training

(206) 575-0404 • (800) 451-7128 • Fax (206) 575-0405 • [www.lightbrigade.com](http://www.lightbrigade.com)

# We are the Leader in Fiber Optic Training

Since 1987, The Light Brigade has trained more than 41,000 technicians, installers, engineers, and designers from a wide variety of industries: telephony, broadband cable, utilities, media broadcast, industrial, manufacturing, mining, aerospace, government, and the various branches of the military.

Whether your application is a long-distance DWDM network, a small local telephone network, a complex fiber to the home network, a sophisticated military facility, or an undersea oil exploration site, The Light Brigade can provide critical training for your personnel to lower operating costs and improve installation efficiency.

## Instructors

Our professional instructors and technicians are highly skilled and have a variety of practical, real world experience in all aspects of fiber optics. With experience in applications such as communications, signaling, security, and network control, our instructors provide valuable insight into the design, installation, and operation of state-of-the-art fiber optic systems.

## Hands-on Training

Extensive hands-on sessions help our attendees to learn fiber optics by performing the tasks themselves in a controlled setting. Attendees spend class time building, testing, or troubleshooting an actual fiber optic system. The ratio of students to technicians during the hands-on sessions ensures that there is direct personal interaction and attention for each student.

## Technology-based

In our training classes, you receive an objective viewpoint, not a sales pitch. We teach fiber techniques that are applicable to any product, and select the best available equipment and supplies from many different manufacturers. You can choose to develop your skills using our state-of-the-art equipment and accessories, or bring your own and learn how to use it more effectively.

## Relevant

Our course materials are regularly updated to stay in step with current and emerging technologies. All of our materials and techniques are written and taught based on the latest standards, recommendations, and codes from ANSI, ITU, TIA/EIA, IEEE, IEC, Telcordia, MSHA, NEC, NESC, and others.

## Continuing Support

To ensure continued long-term support, we offer technical assistance to our class attendees. If you have a question or need assistance after the class is over, our staff is there to help.

# Certification Options

## Light Brigade Certificate of Completion

Everyone who completes one of our courses will receive a Light Brigade Certificate of Completion, signed by the course instructor. This certificate specifies the content and total number of instructional hours for both the classroom and hands-on portions and is traceable to the class attended.

## Third-party Credits and Certification

Many of our classes are eligible for independent certifications through third-party industry organizations and groups. These certifications are typically progressive levels and show competency in hands-on skills and technical knowledge. See individual course details for more information.

In addition, many of our courses are eligible for BICSI Continuing Education Credits (CECs), SCTE Recertification Units (RUs), and IMSA Technical Advancement Recognition Points (TARPs)



Electronics Technicians Association (ETA)



International Municipal Signal Association (IMSA)



Fiber Optic Association (FOA)



Utilities Telecom Council (UTC)



Fiber to the Home Council



Society of Cable Telecommunications Engineers

# 2012 Training Classes

## FIBER OPTICS 1-2-3 DESIGN – INSTALLATION – MAINTENANCE

Riverside, CA	Jan. 10-13	Kansas City, KS	May 1-4	Seattle, WA	Aug. 27-30
Huntsville, AL	Jan. 10-13	Philadelphia, PA	May 8-11	Lexington, KY	Sep. 11-14
Columbia, SC	Jan. 17-20	Baton Rouge, LA	May 8-11	Las Vegas, NV	Sep. 11-14
El Paso, TX	Jan. 17-20	Milwaukee, WI	May 15-18	Washington, DC	Sep. 18-21
Winston-Salem, NC	Jan. 24-27	Raleigh, NC	May 15-18	Chicago, IL	Sep. 18-21
San Bruno, CA	Jan. 24-27	Seattle, WA	May 21-24	Dallas, TX	Sep. 25-28
Omaha, NE	Jan. 31 - Feb. 3	Denver, CO	May 21-24	St., Louis, MO	Sep. 25-28
Boise, ID	Jan. 31 - Feb. 3	Tulsa, OK	Jun. 5-8	Lowell, MA	Oct. 2-5
Little Rock, AR	Feb. 7-10	Anaheim, CA	Jun. 5-8	Austin, TX	Oct. 2-5
San Jose, CA	Feb. 7-10	Spokane, WA	Jun. 12-15	Indianapolis, IN	Oct. 9-12
Spartanburg, SC	Feb. 14-17	Nashville, TN	Jun. 12-15	Reno, NV	Oct. 9-12
Salt Lake City, UT	Feb. 14-17	Portland, OR	Jun. 19-22	San Bernardino, CA	Oct. 16-19
San Antonio, TX	Feb. 21-24	Houston, TX	Jun. 19-22	Richmond, VA	Oct. 16-19
Duluth, MN	Feb. 21-24	Ft. Lauderdale, FL	Jun. 26-29	Anchorage, AK	Oct. 23-26
Lowell, MA	Feb. 21-24	Livermore, CA	Jun. 26-29	Columbus, OH	Oct. 23-26
Seattle, WA	Feb. 28 - Mar. 2	Sioux Falls, SD	Jul. 10-13	Madison, WI	Oct. 30 - Nov. 2
Anchorage, AK	Feb. 28 - Mar. 2	Des Moines, IA	Jul. 10-13	Atlanta, GA	Oct. 30 - Nov. 2
Long Island, NY	Mar. 6-9	Springfield, IL	Jul. 17-20	Tampa, FL	Nov. 6-9
Las Vegas, NV	Mar. 6-9	Idaho Falls, ID	Jul. 17-20	Honolulu, HI	Nov. 6-9
Orlando, FL	Mar. 13-16	Montgomery, AL	Jul. 24-27	Jackson, MS	Nov. 13-16
Washington, DC	Mar. 20-23	Charleston, SC	Jul. 24-27	Denver, CO	Nov. 13-16
Honolulu, HI	Mar. 27-30	Colorado Springs, CO	Jul. 31 - Aug. 3	Richland, WA	Nov. 27-30
Dallas, TX	Mar. 27-30	Sacramento, CA	Jul. 31 - Aug. 3	Topeka, KS	Nov. 27-30
Charlotte, NC	Apr. 2-5	Spartanburg, SC	Aug. 7-10	Salt Lake City, UT	Nov. 27-30
Albuquerque, NM	Apr. 2-5	Helena, MT	Aug. 7-10	Omaha, NE	Dec. 4-7
Atlanta, GA	Apr. 10-13	Louisville, KY	Aug. 14-17	El Paso, TX	Dec. 4-7
Norfolk, VA	Apr. 17-20	Baltimore, MD	Aug. 14-17	Seattle, WA	Dec. 11-14
San Diego, CA	Apr. 17-20	Minneapolis, MN	Aug. 21-24	Jacksonville, FL	Dec. 11-14
Cincinnati, OH	Apr. 24-27	Corpus Christi, TX	Aug. 21-24	Spartanburg, SC	Dec. 17-20
Mobile, AL	Apr. 24-27	Long Island, NY	Aug. 27-30	Birmingham, AL	Dec. 17-20
Savannah, GA	May 1-4	Burbank, CA	Aug. 27-30		

## ADVANCED HANDS-ON MODULES

Omaha, NE	Jan. 9-13
Seattle, WA	Jan. 30 - Feb. 3
Anaheim, CA	Mar. 12-16
Long Island, NY	Apr. 9-13
Washington, DC	Apr. 23-27
Las Vegas, NV	May 7 - 11
Seattle, WA	Jun. 4-8
Spartanburg, SC	Jun. 18-22
Denver, CO	Jul. 9-13
Dallas, TX	Jul. 23-27
Kansas City, KS	Aug. 6-10
San Jose, CA	Sep. 17-21
Seattle, WA	Oct. 1-5
Spartanburg, SC	Nov. 12-16
Lowell, MA	Dec. 3-7

## FIBER CHARACTERIZATION: PMD, CD, ORL

Spartanburg, SC	Apr. 3-4
Seattle, WA	May 30-31
Lowell, MA	Aug. 1-2
Dallas, TX	Sep. 5-6
Spartanburg, SC	Nov. 7-8
Seattle, WA	Dec. 18-19

## FTTX FOR INSTALLERS AND TECHNICIANS

Minneapolis, MN	Jan. 17-19
Seattle, WA	Jan. 23-25
Spartanburg, SC	Feb. 28 - Mar. 1
Denver, CO	Apr. 17-19
Ft. Lauderdale, FL	May 14-16
Dallas, TX	May 30 - Jun. 1
Lowell, MA	Jul. 16-18
Seattle, WA	Aug. 13-15
Minneapolis, MN	Sep. 5-7
Spartanburg, SC	Oct. 22-24

## CERTIFIED FIBER TO THE HOME (CFHP)

Seattle, WA	Jan. 26-27
Los Angeles, CA	Mar. 8-9
Dallas, TX	Apr. 26-27
Ft. Lauderdale, FL	May 17-18
Spartanburg, SC	May 30-31
Lowell, MA	Jul. 19-20
Seattle, WA	Aug. 16-17
Spartanburg, SC	Oct. 25-26

## PREMISES/LAN INSTALL & MAINTENANCE

Lowell, MA	Jan. 24-25
Spartanburg, SC	Mar. 13-14
Spartanburg, SC	Jul. 24-25
Lowell, MA	Sep. 18-19
Seattle, WA	Nov. 19-20

## FIBER OPTICS FOR MINING

Seattle, WA	Jan. 10-12
Las Vegas, NV	Feb. 7-9
Knoxville, TN	Apr. 10-12
Pittsburgh, PA	Jul. 31 - Aug. 2
Salt Lake City, UT	Sep. 11-13
St. Louis, MO	Oct. 16-18
Denver, CO	Dec. 11-13

## FIBER OPTICS FOR TRAFFIC SYSTEMS

Kansas City, KS	Feb. 14-17
Denver, CO	Mar. 13-16
Spartanburg, SC	Mar. 27-30
Houston, TX	Apr. 17-20
Chicago, IL	May 1-4
Lowell, MA	Jun. 26-29
Los Angeles, CA	Aug. 21-24
Seattle, WA	Sep. 25-28
Sacramento, CA	Oct. 9-12

## FIBER OPTICS FOR UTILITIES

Spartanburg, SC	Jan. 17-19
Portland, OR	Mar. 20-22
Salt Lake City, UT	Apr. 3-5
Sacramento, CA	Apr. 10-12
Atlanta, GA	Jun. 12-14
Kansas City, KS	Jul. 10-12
Spartanburg, SC	Aug. 28-30
Lowell, MA	Nov. 6-8
Seattle, WA	Nov. 13-15

## FIBER OPTICS FOR OIL/GAS

Baton Rouge, LA	Jan. 4-6
Seattle, WA	Mar. 6-8
Bakersfield, CA	May 22-24
Houston, TX	Jul. 17-19
Spartanburg, SC	Sep. 11-13
Mobile, AL	Oct. 9-11
Tulsa, OK	Oct. 30 - Nov. 1
Houston, TX	Dec. 11-13

## EMERGENCY RESTORATION

Seattle, WA	Jan. 4-5
Spartanburg, SC	Jan. 4-5
Lowell, MA	May 30-31
Seattle, WA	Sep. 5-6
Spartanburg, SC	Sep. 5-6
Lowell, MA	Nov. 19-20

### Training Discounts

- 10% for multiple attendees from the same organization.
- 25% for previous attendees of our three- or four-day courses.
- 15% for IMSA members.
- GSA pricing is available.

Discounts cannot be combined.

# Fiber Optics 1-2-3

## Design – Installation – Maintenance

### Course Description

This four-day class features 16 hours of classroom training and 16 hours of hands-on skills labs that provide the practical understanding and skills required to properly design, install, and maintain fiber optic networks. The content is applicable to fiber optic communications systems in telco, broadband, and premises (LAN) applications. Students will use the latest fiber optic technology and equipment to learn how to splice, connectorize, test, and troubleshoot optical fiber networks in order to increase efficiency, reliability, and on-the-job safety as well as reduce costs and downtime.

### Course Level

Introductory to intermediate. Beginners to experienced fiber technicians find the class and extensive hands on skills training beneficial.

### Course Options

Four days – Classroom lecture and hands-on exercises.

Two days – Classroom only. Ideal for designers and planners.



### COURSE FEES

- Four-day course \$1595
- Two-day course \$800
- Optional ETA Fiber Optic Installer (FOI) Exam \$150

### Certification

#### ETA Fiber Optic Installer



Complete the four-day Fiber Optics 1-2-3 course and pass the ETA Fiber Optic Installer (FOI) certification exam. The FOI is designed for those working with both multimode and single-mode fibers.

#### Classroom (16 Hours)

##### PHYSICAL PLANT

###### Introduction to Fiber Optics

Standards  
Terminology

###### Fiber Theory/Optical Fibers

Single-mode  
Multimode  
New Generation Fibers

###### Cables

Indoor/Outdoor  
Special Types

###### Connectors

Specifications  
Single-mode Connectors  
Multimode Connectors  
SFF Connector Styles  
Connectorization Techniques  
Connector Polishes and Reflection Issues  
Attenuators and Terminators

###### Splicing

Fusion  
Mechanical  
Cleaving Tools

###### Cable Management

Patch Panels  
Splice Panels  
Distribution Panels  
LAN Panels  
Splice Closures  
Hubs and Pedestals

##### DISCIPLINES

###### Installation

Outside Plant  
Underground • Aerial  
Premises / LAN

###### Test Equipment and Testing

Theory  
Operation and Application  
Documentation

###### Restoration/Maintenance

Planning  
Outside Plant  
Premises  
Emergency Restoration

###### Safety

###### Design

Sources • Detectors  
Repeaters & Regenerators  
Optical Amplifiers  
Passive Devices  
WDM / DWDM / CWDM  
System Design  
Loss Budgets  
Integration  
Standards

###### Systems Overview

Topologies  
Ethernet  
HDTV • CATV • CCTV  
SONET / ATM  
FTTx / PON

#### Hands-on (16 Hours)

##### TRAINING LABS AND CERTIFICATION TESTING

###### Safety Meeting

###### Station #1 – Splicing

Fusion • Mechanical • Pigtail  
Fiber Handling  
Fiber Cleaving

###### Station #2 – Connectorization

Multiple Bonding Methods  
Visual Inspection / Cleaning  
Cable Assembly Testing

###### Station #3 – Cable Preparation

Loose Tube Cables  
Distribution / Breakout Cable  
Patch Panel Preparation  
Splice Closure Preparation  
Mid-entry Practices

###### Station #4 – OTDR Operation

Acceptance Testing  
Span Acceptance • Splice Loss  
Reflection Testing  
Emergency Restoration  
Troubleshooting  
Documentation / Records

###### Station #5 – Optical Loss Testing

Link Loss Measurement  
Transmit and Receive Power  
Identifiers and Tracers  
Reflection Testing  
Variable and Fixed Attenuators  
Documentation / Records

*“The course was presented in a way that both experienced and new installers/technicians could come away with something gained. It was not below or above anyone.” – Jim Inman, MICHELS COMMUNICATIONS*

## Advanced Hands-on Modules

### Course Description

This course features five 8-hour days of instruction and hands-on skills labs, each focused on a specific fiber optic discipline. Developed as the “next level” of training, these classes teach more advanced knowledge and skills to students that have already had formal introductory classes. The course material is focused on fiber installation skills and technology from a technician perspective, and includes content application for FTTx and DWDM systems.

### Course Level

Intermediate to expert. This series of classes requires basic knowledge of fiber optic theory and terminology, as well as field experience or equivalent formal training, such as the Fiber Optics 1-2-3 course.

### Course Options

Each module is one day in duration and can be taken individually, or as a combination of various modules. You choose which modules best address your training needs!

#### Module 1 – Fiber Optic Cable Preparation, Patch Panels and Splice Closures

Learn how to work with different optical cable structures used in indoor and outdoor applications. Properly prepare splice closures, patch panels, and splice trays in our cable labs. Learn how to perform an express (or mid-entry) into cables. Perfect your skills using breakout and fanout kits and learn when to use them. In this module, you can investigate a variety of cable preparation tools and decide which ones work best for your applications.

#### Module 2 – Fiber Optic Connectorization

Learn the latest connecting technology, techniques, and test equipment. We teach you how to increase your yield and get better performance from your terminations. Through extensive hands-on training you will terminate and test various styles of fiber optic connectors used in both multimode and single-mode applications from the factory to the field.

#### Module 3 – Optical Loss Testing, Troubleshooting & Documentation

Effective testing involves not only knowledge of the equipment involved, but the skills required to test and troubleshoot optical links. Become skilled with optical loss testing, system testing, troubleshooting, and techniques that will benefit your applications every day. Other advanced topics include reflection and optical return loss testing.

#### Module 4 – OTDR Theory, Operation and Emergency Restoration

Operating an OTDR is more than pressing buttons. You need to understand OTDR theory and how to apply it. Gain the knowledge and experience required for acceptance testing, maintenance and restoration. Test multiple categories of single-mode and multimode fiber. We welcome you to bring in your own OTDR for enhanced training on your equipment.

#### Module 5 – Fiber Optic Splicing (Fusion and Mechanical)

Perform fusion and mechanical splicing for single-mode and multimode applications. Clean, cleave, and splice multiple fiber types quickly and correctly using both V-groove and core alignment fusion splicers. Perform inline and pigtail splicing for both single strand and ribbon fiber.

### Certification



#### ETA Fiber Optic Technician—Outside Plant

Complete all five Advanced Hands-on Modules and pass the ETA Fiber Optic Technician—Outside Plant (FOT-OSP) certification exam. The FOT-OSP is designed for those installing outside plant single-mode fiber optic networks.

### COURSE FEES

- Individual Modules \$500
- Five-day Course \$1650
- Optional ETA Fiber Optic Technician (FOT-OSP) Exam \$150

*“...an excellent job instructing. All questions were answered. These instructors did a superb job ensuring that I understood the material before the end of the day. The class was a lot better organized and taught in a level I could understand.”* – Ken Reynolds, SKAGIT VALLEY CASINO



# Premises/LAN Installation and Maintenance

## Course Description

This two-day class features 8 hours of classroom training and 8 hours of hands-on skills labs that provide the practical understanding and skills required to properly design, install, and maintain premises-based local area networks (LANs). Students will use the latest fiber optic technology and equipment to learn how to splice, connectorize, test, and troubleshoot premises-based optical fiber networks in order to increase efficiency, reliability, and on-the-job safety as well as reduce costs and downtime.

## Course Level

Introductory to intermediate. Beginners to experienced fiber technicians find the class and extensive hands-on skills training beneficial.

## Course Options

Two days – Classroom lecture and hands-on exercises.

## Certification

**FOA Certified Fiber Optic Technician**

**FOA Advanced Fiber Optic Technician**



Complete the two-day Premises/LAN Installation and Maintenance course and pass the Fiber Optic Association's Certified Fiber Optic Technician (CFOT) or Advanced Fiber Optic Technician (AFOT) exam.

**NEW**

## Fiber Optics for Pro-AV

Ask about our **Fiber Optics for Pro-AV** custom course, which is designed to teach fiber optics to the audio/video industry.



## COURSE FEES

- Two-day Course \$995
- Optional FOA CFOT or AFOT Exam \$60

### Classroom (8 Hours)

#### Introduction to Fiber Optics

Development Timeline  
Advantages of Optical Fiber Media

#### Fiber Optic Transmission Theory

Structure of Optical Waveguides  
Types of Optical Fibers  
Basic Fiber Parameters  
Operating Wavelengths

#### Optical Fiber Manufacturing

#### Fiber Optic Cable Technology

Cable Design Objectives  
OSP Cables and Loose Buffer Protection  
ISP Cables and Tight Buffer Protection

#### Fiber Optic Cable Installation Methods

Comparison to Metallic Cable  
Basic Installation Parameters  
Underground, Aerial, and Direct Buried Installations

#### Termination and Splicing of Optical Fiber

Connector Types  
Installation Methods  
Field Installable versus Factory Termination  
Splicing Methods

#### Field Testing and Troubleshooting

Types of Field Tests  
Visual Continuity and Connector Inspection  
Insertion Loss Test Measurements  
Optical Time Domain Reflectometer Testing

#### Standards and Codes

#### System Design Parameters

Insertion Loss Values  
System Dynamic Range  
Restoration Margin

### Hands-on (8 Hours)

#### TRAINING LABS AND CERTIFICATION TESTING

#### Safety Meeting

#### Station #1 – Fiber Optic Cable Preparation

Loose Tube Cable Preparation  
Tight Buffer Cable Preparation  
Fanout Kit Installation  
Pulling Grip Set Up

#### Station #2 – Fusion Splicing

Fiber Cleaning and Preparation  
Fiber Optic Cleaving Process  
Core Alignment Splicers  
V-groove Alignment Splicers  
Splicing 250- $\mu$ m to 900- $\mu$ m Fiber  
Equipment Maintenance and Cleaning

#### Station #3 – Fiber Connectorization

Fiber Cleaning and Preparation  
Anaerobic (Epoxy) Field Connector Installation  
Cleave and Crimp Field Connector Installation  
250- $\mu$ m Fiber Fan Termination  
900- $\mu$ m Tight Buffer Termination  
2-mm and 3-mm Cordage Termination

#### Station #4 – Field Testing and Troubleshooting

Cleaning Connectors  
Evaluation of Connector Endfaces  
Continuity Test with Visual Fault Locator  
Bidirectional Insertion Loss Methods  
Launch Conditions for Multimode Systems  
Bidirectional OTDR Traces  
OTDR Event Analysis  
Compute Link Loss Budget and Test Acceptance  
Testing and Troubleshooting Tips  
Documentation Requirements

*"This course went beyond my expectations. This was my first exposure to fiber optics and it brought me completely up to my expectation of being able to talk to my customers and know what products to look at buying."* – Gary Weber, G N REPAIR & TECHNOLOGY

# Fiber Optics for Traffic Systems

## Course Description

This four-day class offers 16 hours of classroom training and 16 hours of hands-on skills labs that provide the practical understanding and skills required to properly design, install, and maintain modern fiber-optic intelligent transportation systems (ITS). Students will cover essential learning objectives for the International Municipal Signal Association (IMSA) Level I and Level II certification requirements.



## Course Level

Introductory to intermediate. Beginners to experienced fiber technicians find the class and extensive hands on skills training beneficial.

## Course Options

### Fiber Optics for ITS Level I

Two days of classroom training covering fiber optic theory, installation, splicing, system design, testing, and maintenance disciplines. In addition, the course includes four chapters on video transmission, real-time video, traffic control systems, and next generation systems that are key to the evolution from analog to digital ITS applications. The class also includes optical multiplexing (WDM, CWDM), bidirectional transmission, and bandwidth considerations.

#### Level I Classroom (16 Hours)

##### Introduction to Fiber Optics

Fiber Theory and Optical Fibers  
Cables • Connectors • Splicing  
Panels, Trays, and Closures  
Installation Methods and Tools  
Testing and Test Equipment  
Maintenance and Restoration  
Fiber and Laser Safety  
Light Sources and Detectors  
Repeaters and Regenerators  
Digital and Analog Transmission  
Passive Devices

##### System Standards

##### System Design

##### Video Transmission

Transmission Formats  
Data Transport Systems

##### Real-time Video

Multi-channel • High-density  
Digital and FM Transmission

##### Traffic Control Systems

Traffic Controllers  
Data Modem Protocols

##### Next Generation Systems

All-IP • Hybrid • Legacy

### Fiber Optics for ITS Level II

Two days of in-depth hands-on training on fiber optic splicing, cable preparation, OTDR operation, optical loss testing, and system design.

#### Level II Hands-on (16 Hours)

##### Station #1 – Splicing

Fusion and Mechanical  
Restoration Scenarios  
Fiber Handling and Cleaving  
Terminating No-polish Connectors

##### Station #2 – Cable Preparation

Loose Tube Cables  
Indoor/Outdoor Cables  
Patch Panel Preparation  
Splice Closure Preparation  
Mid-entry Practices

##### Station #3 – OTDR Operation

Acceptance Testing  
Span Acceptance • Splice Loss  
Reflection Testing  
Emergency Restoration  
Troubleshooting

##### Station #4 – Optical Loss Testing

Cleaning and Inspection  
Link Loss Measurement  
Identifiers and Tracers  
Documentation

##### Station #5 – Systems

CCTV Video Systems  
Multi-drop Data Networks  
Measure Tx and Rx Power  
Variable and Fixed Attenuators

## COURSE FEES

- Fiber Optics for ITS Level I \$735
- Fiber Optics for ITS Level II \$830
- Optional IMSA Level I or Level II Certification \$125 each



#### Attention IMSA Members

The Light Brigade and the International Municipal Signal Association (IMSA) are working closely to offer the Fiber Optics for ITS course at locations around the country. IMSA members have two options for attending this course:

1. Attend a public offering of the course at one of our previously-scheduled locations. Contact The Light Brigade directly to register.
2. Host a private offering of the course at the location of your choice and on the dates of your choice. Contact your local IMSA chapter if you are interested in sponsoring a course near you.

**IMSA members are eligible for a 15% discount on all Light Brigade training courses.**

## Certification

### IMSA Fiber Optics for ITS Levels I and II



For Level I certification, complete the Fiber Optics for ITS Level I course and pass the Level I certification exam.

For Level II certification, complete the Fiber Optics for ITS Level II course and pass the Level II certification exam. Level I certification is required to be eligible for Level II.

*"This class was completely unbelievable. I was totally blown away by the knowledge of [the instructor]. How he remembers all the numbers and data is truly amazing. It's not often that you meet someone so smart, but yet manages to teach a class on a level that we could all understand."* – Gail Hannaford, MISSOURI DOT

# Fiber Optics for Mining Applications


 NEW

## Course Description

This three-day class has been developed with 12 hours of classroom training and 12 hours of hands-on skills labs that provide the practical understanding and skills required to properly design, install, and maintain fiber-optic systems in underground and surface mines. Attendees will use the latest fiber optic technology and equipment to learn how to splice, connectorize, test, and troubleshoot harsh-environment optical fiber networks in order to increase efficiency, reliability, and on-the-job safety as well as reduce production costs and downtime.

## Course Level

Introductory to intermediate. Novices to experienced fiber technicians find the class and extensive hands-on skills training beneficial.

## Course Options

Three days – Classroom lecture and hands-on exercises.



## COURSE FEES

- Three-day course \$1500
- Optional ETA Fiber Optic Installer (FOI) Exam \$150

## Certification

### ETA Fiber Optic Installer



Complete the three-day Fiber Optics for Mining course and pass the ETA Fiber Optic Installer (FOI) certification exam. The FOI is designed for those working with both multimode and single-mode fibers.

### Classroom (12 Hours)

**Introduction to Fiber Optics**  
Standards and Terminology  
Fiber Optic Applications

**Fiber Theory**  
Basic Optical Theory  
Attenuation, Reflection, Dispersion

**Optical Fibers**  
Single-mode Fiber Types  
Multimode Fiber Types  
Fiber Selection

**Fiber Optic Cable**  
Cable Design and Types  
MSHA-rated Cables  
Cable Specifications

**Connectors**  
Connector Types  
Termination Techniques  
Inspection and Cleaning

**Splicing**  
Fiber Optic Cleaving  
Fusion Splicing  
Splice Protection

**Cable Management**  
Panels and Closures

**Installation**  
Route Planning  
Cable Handling  
General Guidelines

**Optical Testing**  
OTDRs  
Optical Loss Testing  
Testing Terminal Equipment  
Visual Inspection

**Restoration/Maintenance**  
Typical Causes of Failure  
Restoration Planning  
Underground Restoration

**Safety**  
Light Sources • Fibers  
Chemicals • Installation

**Active and Passive Devices**  
Lasers, VCSELs, and LEDs  
Detectors  
Repeaters  
Couplers and Switches

**Analog and Digital**  
Reflection Issues

**System Design**  
Design Objectives  
Optical Loss Budgets  
Safety Margins  
Material Lists

**System Standards**  
IEEE 802 Standards  
CCTV Specifications

### Hands-on (12 Hours)

**Station #1 – Cable Preparation**  
MSHA-rated Distribution Cables  
MSHA-rated Breakout Cables  
MSHA-rated Loose Tube Cables  
Cable Mid-entries  
Closure and Panel Preparation

**Station #2 – Splicing**  
Splice 250- and 900- $\mu$ m Fibers  
Fiber Handling and Cleaving  
Fusion Splicing  
Fusion Splicer Adjustments

**Station #3 – OTDR Operation**  
Operate an OTDR  
Reflection Testing  
Acceptance Testing  
Splice and Span Loss Testing  
Maintenance and Restoration  
Documentation

**Station #4 – Connectorization**  
Terminate LC, ST and SC  
Connectors  
Inspect Fiber Endfaces  
Troubleshoot Terminations  
Test and Inspect TFOCA Connectors

**Station #5 – Optical Loss Testing**  
Test Tx and Rx Power Levels  
Link Loss Measurements  
Troubleshooting using Test Sets,  
Visual Fault Finders, Identifiers  
Documentation

*"This will be very beneficial to me in the future. It has definitely expanded my knowledge of fiber. I wish I would have taken it years ago."* – Matt Duszka, ARCH COAL

# Fiber Optics for Utilities



## Course Description

This three-day class has been developed with 12 hours of classroom training and 12 hours of hands-on skills labs that provide the 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 how to splice, terminate, test, and troubleshoot fiber-optic utility networks in order to increase deployment speed, network efficiency, system reliability and on-the-job safety as well as reduce operating costs.

## Course Level

Introductory to intermediate. Beginners to experienced fiber technicians find the class and extensive hands-on skills training beneficial.

## Course Options

Three days – Classroom lecture and hands-on exercises.

## COURSE FEES

- Three-day course \$1500
- Optional UTC Level 1 Exam
  - Member Rate \$175
  - Non-member Rate \$275

## Certification

Utilities Telecom Council



Complete the three-day Fiber Optics for Utilities course and pass the UTC Level 1 Technician certification exam. The UTC Level 1 Technician is designed for technicians installing utility-based fiber optic networks.

### Custom Utilities Course

A custom Fiber Optics for Utilities course can include UTC Level 2 and Level 3 certification exams.

### Classroom (12 Hours)

**Introduction to Fiber Optics**  
Standards and Terminology  
Fiber Optic Applications

**Fiber Theory and Optical Fibers**  
Basic Optical Theory  
Attenuation, Reflection, Dispersion  
Optical Fiber Types

**Fiber Optic Cable**  
Cable Design and Types  
ADSS and OPGW Cable  
Cable Preparation

**Connectors**  
Connector Components  
SC and LC Connectors  
Termination Techniques  
Inspection and Cleaning

**Splicing**  
Fiber Optic Cleaving  
Fusion and Pigtail Splicing  
Splice Protection

**Cable Management**  
Panels and Closures

**Installation Basics**  
Route Planning and Engineering  
Cable Handling  
General Guidelines

**Aerial Placement**  
Typical Pole Placement  
Aerial Installation Methods

**Underground Installation**  
Trenching and Plowing  
Conduits and Ducts

**ADSS Installation**  
Dry Band Arcing and Corona  
Travelers  
EHV Lines  
Low Voltage Lines

**OPGW Installation**  
OPGW Cable Design  
Existing Electric Tower Lines  
Equipment and Tooling  
Anti-rotation Devices  
Splicing Concerns

**Optical Testing**  
OTDRs  
Optical Loss Testing  
Testing Terminal Equipment

**Restoration**  
Typical Causes of Failure  
Restoration Planning  
Aerial Restoration  
Underground Restoration

**Safety**

**Active and Passive Devices**

**System Design**  
Loss Budgets

### Hands-on (12 Hours)

**Safety Practices**

**Station #1 – Handling & Installation**  
Cable Bend Radii  
Pulling Grip Installation  
Cable Storage

**Station #2 – Cable Preparation**  
Loose Tube/ADSS Preparation  
Mid-entry Loose Tube/ADSS  
OPGW Preparation

**Station #3 – Closure Preparation**  
Cable Entry and Retention  
Fiber Unit Routing  
Fanout Kits  
Slack Storage for Splice Points

**Station #4 – Splicing**  
Pigtail Splicing  
FuseConnect  
In-line Splicing

**Station #5 – OTDR Testing**  
Acceptance Testing  
Span Acceptance • Splice Loss  
Reflection Testing  
Emergency Restoration  
Troubleshooting  
Documentation / Records

**Station #6 – Optical Loss Testing**  
Link Loss Measurement  
Transmit and Receive Power  
Identifiers and Tracers  
Documentation / Records

*“The instructor and tech were both very professional and very knowledgeable. When asked they always provided answers and if [they did] not know right away, [they] found the answer. They also stayed late for extra help.” – Joel Edgardo Alfaro, GRUPA CABLE SULA*

# Certified Fiber to the Home Professional

## Course Description

This two-day class has been developed with 16 hours of classroom training that provide a broad base of knowledge and familiarity with FTTH architecture, network design, deployment, and operational skills.

This course is focused towards network designers, network planners, supervisors, and project managers that will be involved in deploying and maintaining FTTH networks. Students will cover specific learning objectives in preparation for the FTTH Council's Certified Fiber-to-the-Home Professional (CFHP) certification exam.

## Course Level

Introductory to intermediate. Beginners to experienced fiber designers and planners find the class beneficial.

## Course Options

Two days – Classroom lecture only.

In addition to the dates and locations listed on page 3, this course is offered at the FTTH Council's quarterly meetings. Visit our website for more information.



## COURSE FEES

- Two-day course \$850
- Optional FTTH Council CFHP Exam \$150 (Online Only)

## Certification

### Certified Fiber to the Home Professional (CFHP)



Complete the two-day Certified Fiber to the Home Professional course and pass the online CFHP examination. There is a \$150 examination and certification fee, which is payable online directly to the FTTH Council. The FTTH Council will administer the online examinations and maintain the CFHP database. The certification is valid for three years.

### Classroom (16 Hours)

#### Applications

Drivers behind FTTP  
Basic FTTP Terminology  
Today's Applications

#### Bandwidth Issues

Analog to Digital Video  
IP Video Delivery  
Future Trends

#### Economics CAPEX / OPEX

Design Impacts  
Migration Path Considerations  
Maintenance and Operations Issues

#### FTTH Evolution

FTTH Origins and Field Trials  
The Impact of FSAN

#### Theory and Fibers

Attenuation, Dispersion, and Reflectance  
Optical Fiber Characteristics  
Single-mode Optical Fiber Types

#### Fiber Cable Installation

System Standards  
Feeder, Distribution, and Drops  
Physical Plant Standards

#### FTTH Architectures

G-PON • B-PON • 10G-PON • WDM-PON  
Active Ethernet • EPON • 10GE PON  
RF Overlay and RFOG

#### FTTH Network Topologies

Physical Topologies for FTTH and FTTB  
Point to Point • Point to Multipoint • Home Run  
Centralized • Distributed • Tapered

#### Network Components

Lasers and Detectors  
Splitters, Filters, and WDM  
OLT • ONT • Ethernet Switches

#### Cables

Cable Designs and Structures  
Cable Handling

#### Cable Management

Panels • Hubs • Pedestals • Closures  
FDH • FAT • MST  
FTTB / MDU Premises Installations

#### Cable and Fiber Termination Options

Common FTTx Termination Options  
Fusion • Pigtail • Mechanical Splicing  
No-polish Connectors  
Hardened Terminations

#### Splitter Placement

Central Office • FDH • FAT • MST  
OSP Closures

#### Network Design and Loss Budgets

Loss Budgets for FTTP Networks  
Density and Planning  
"Not to Exceed" Charts

#### Test Disciplines and Equipment

Network Tests and Equipment  
Testing Challenges  
System Related Problems

#### Review Summary

FTTH Planning  
FTTH Design Engineering  
Construction Planning

"There is a lot of information that my company did not know that will improve our operations. This course will help us to... improve the quality of our services being offered to our customers/subscribers." – Joel Edgardo Alfaro, GRUPA CABLE SULA

# FTTx for Installers & Technicians



## Course Description

This three-day class has been developed with 12 hours of classroom training and 12 hours of hands-on skills labs that provide the practical understanding and hands-on skills required to properly install and maintain Fiber-to-the-User (FTTx) networks. This course is focused towards installers, technicians, and supervisors that are involved with building, maintaining, and troubleshooting FTTx networks. Students will learn about all aspects of FTTx deployments including specific issues—such as testing splitters, WDM devices, measuring reflectance, and bidirectional testing—that are unique to FTTx networks.

## Course Level

Introductory to intermediate. Beginners to experienced FTTx technicians find the class and extensive hands on skills training beneficial.

## Course Options

Three days – Classroom lecture and hands-on exercises.

## COURSE FEES

- Three-day course \$1500
- Optional ETA FOT-OSP Exam \$150

## Certification

### ETA Fiber Optic Technician—Outside Plant



Complete the three-day FTTx for Installers and Technicians course and pass the ETA Fiber Optic Technician—Outside Plant (FOT-OSP) certification exam. The FOT-OSP is designed for those installing outside plant single-mode fiber optic networks.

### Classroom (12 Hours)

#### FTTx Introduction

Fiber Optic Basics  
Standards & Standards Groups

#### FTTx Methodology

Passive Optical Networks  
B-PON • G-PON • 10G-PON  
EPON • 10GEPON  
Active Ethernet  
RF Overlay • NG-PON

#### Systems

FTTx / FTTH / FTTB / FTTP  
RF over Glass  
Active Ethernet

#### Fiber Theory for FTTx

##### Optical Fiber

Fiber Specifications  
Single-mode Fiber (ITU G.652)

##### Optical Cable

Cable Structures  
Loose Tube Cables  
Feeder, Distribution, and Drop Cables  
Indoor / Outdoor Cables

##### Termination Options

Types and Polishes  
Hardened Terminations

##### Splitters

Types and Specifications

#### Panels, Closures and Cabinets

Patch / Distribution / Splice  
Entrance Enclosures  
Fiber Distribution Hubs and Pedestals  
Splice Closures and MST

#### WDM in FTTx Applications

#### Active Devices

Lasers  
Detectors

#### OLTs and ONTs

#### Loss Budgets

#### Cable Installation Techniques

Direct Burial / Duct / Aerial  
Codes and Specifications  
Termination Options  
FTTB techniques and Options

#### Testing FTTx Systems

OTDR Testing  
Optical Loss Testing  
Testing Splitters  
Fiber Identifiers  
Visual Tracers  
Documentation

#### Maintenance and Restoration

Typical Causes of Failure  
Troubleshooting Techniques  
Emergency Restoration Planning

### Hands-on (12 Hours)

#### TRAINING LABS AND CERTIFICATION TESTING

##### Safety Meeting

##### Station #1 – Cable Management

Cable Preparation  
Mid-entry Practices  
Closure Preparation  
Panel Dressing  
Splitter Installation  
Splice Tray Fiber Routing

##### Station #2 – Splicing

Strip and Cleave Processes  
Inline and Pigtail Splicing  
FTTx Splicing Equipment  
Fixed V-groove and Core  
Alignment Splicers

##### Station #3 – OTDR Testing

Theory and Operation  
OTDR Use in FTTx Installations  
FTTx OTDR Signatures  
Measuring Reflectance  
Testing Splitters

##### Station #4 – Optical Loss Testing

FTTx Test Equipment  
Testing OLT / ONT Power Levels  
Test Points in FTTx Installations  
Upstream / Downstream Testing  
Troubleshooting  
FTTx Documentation

*“The instructor’s expertise was clearly evident.... Excellent job of presenting the material and applying it to situations we are dealing with in our daily activities.” – Mike Bounds, PIONEER TELEPHONE*

# Fiber Optics for Oil/Gas

## Course Description

This three-day class has been developed with 12 hours of classroom training and 12 hours of hands-on skills labs that provide the practical understanding and skills required to properly design, install, and maintain fiber optics systems in petrochemical environments such as offshore drilling, pipeline, refineries, and process plants. Students will use the latest fiber optic technology and equipment to learn how to splice, connectorize, test, and troubleshoot petrochemical-based optical fiber networks in order to increase efficiency, reliability and on-the-job safety as well as reduce overall production costs and facilities downtime.

## Course Level

Introductory to intermediate. Beginners to experienced oil and gas technicians find the class and extensive hands on skills training beneficial.

## Course Options

Three days – Classroom lecture and hands-on exercises.



## COURSE FEES

- Three-day course \$1500
- Optional ETA Fiber Optic Installer (FOI) Exam \$150

## Certification

### ETA Fiber Optic Installer



Complete the three-day Fiber Optics for Oil/Gas course and pass the ETA Fiber Optic Installer (FOI) certification exam. The FOI is designed for those working with both multimode and single-mode fibers.

### Custom Classes for Oil and Gas

Ask about custom fiber optic training for offshore and topside refineries.

### Classroom (12 Hours)

#### Introduction to Fiber Optics

Fiber Optic Applications  
Drivers Behind Oil/Gas Applications  
Pipeline  
Offshore & Subsea  
Refineries & Storage  
Bandwidth Demand

#### Optical Fiber Theory

Properties of Fiber  
Attenuation & Insertion Loss  
Reflection & Optical Return Loss  
Dispersion & Bandwidth  
Optical Fiber Types

#### Fiber System Design

Physical Architecture  
Fiber System Standards  
Safety & Design Concerns  
Fiber Optic Sensors  
Passive Device Technologies  
Loss Budget Calculations

#### Fiber Optic Cable

Cable Design & Types  
Aerial Self-supporting  
Underground Conduit  
Petrochemical Resistances  
Undersea Requirement

#### Fiber Optic Cable Installation

Route Planning & Layout  
Cable Handling & Bend Radii  
Pulling or Payout  
Cable Preparation

#### Fiber Optic Termination

Connector Types  
Termination Methods  
Breakout & Pigtails  
Inspection & Cleaning

#### Fiber Optic Splicing

Fiber Cleaning  
Fiber Cleaving  
Fusion & Mechanical Splicing  
Splice Protection & Fiber Routing

#### System Testing & Troubleshooting

Optical Loss Testing  
Optical Time Domain Reflectometers (OTDRs)  
Fault Location  
Visual Inspection  
Testing Terminal Equipment  
Typical Causes of Failures  
Restoration Planning

### Hands-on (12 Hours)

#### Cable & Fiber Preparation

Fiber Preparation & Handling  
Cable Preparation  
Mid-entry Techniques  
Closure & Panel Preparation

#### Mechanical & Fusion Splicing

Fiber Cleaning & Preparation  
Splicing 250- $\mu$ m & 900- $\mu$ m fibers  
Fiber Handling & Cleaving  
Fusion Splicing

#### Connectorization & Termination

SC • ST • LC • Breakout  
Field Installable • Factory Pigtails  
Connector Cleaning & Inspection  
Troubleshooting Connectors

#### Optical Loss Testing

Test Tx & Rx Power Levels  
Troubleshooting Using OLTS, VFIs  
Event Loss Analysis  
Documentation & Records

#### Optical Time Domain Reflectometers

OTDR Setup & Operation  
Reflectance Testing  
System Acceptance Testing  
Splice & Span Loss Testing  
Maintenance & Restoration

# Fiber Characterization

## PMD, CD and ORL



### Course Description

This two-day class has been developed with 8 hours of classroom training and 8 hours of hands-on skills labs that provide a practical understanding of the principles behind building and maintaining high-speed optical networks. Theoretical limits and practical field measurement techniques are demonstrated. Key critical parameters such as polarization mode dispersion (PMD), chromatic dispersion (CD), and optical return loss (ORL) are calculated and measured in order to evaluate system capabilities and network upgradability for higher bit rate systems.

### Course Level

Intermediate to advanced. System designers and experienced fiber technicians find the class and extensive hands-on skills training beneficial.

### Course Options

Two days – Classroom lecture and hands-on exercises.

## COURSE FEES

- Two-day Course  
\$1200

Classroom (8 Hours)	CD/PMD Training (8 Hours)
<p><b>Introduction</b> Fiber Theory Fiber and System Standards</p> <hr/> <p><b>Single-mode Fibers</b></p> <hr/> <p><b>Connectors</b></p> <hr/> <p><b>Test Equipment</b></p> <hr/> <p><b>Installation</b></p> <hr/> <p><b>System Overview</b></p> <hr/> <p><b>Dispersion Compensation</b></p> <hr/> <p><b>Chromatic Dispersion</b></p> <hr/> <p><b>Polarization Mode Dispersion</b></p>	<p><b>Dispersion Testing</b> Build an 80-km Span with G.655 Fiber Build a 50-km Span with G.652 Fiber Polarization Mode Dispersion Testing Chromatic Dispersion Testing Optical Fiber Mismatches Dispersion Compensating Modules</p> <hr/> <p><b>Cleaning Practices</b></p> <hr/> <p><b>Reflection Testing</b></p> <hr/> <p><b>Documentation</b></p>

*“This is the second time I have attended your training and both classes far exceeded my expectations. I have been working in the field for 15 years and I thought I knew everything...to my surprise I learned a lot.” – Aram Lewis, PREMIER CABLING SOLUTIONS*

## Fiber Optic Tool Kits and Hand Tools

As the leader in fiber optic training, The Light Brigade understands the special tool needs of technicians and what it takes to do the job in a safe, efficient, and effective manner. Our tool kits were developed with the insight and feedback from experts in the industry. We include options for these tool kits that allow technicians to order variations based on personal preferences without driving the cost of the kits up with unnecessary or redundant tools.



The Light Brigade currently offers the following tool kits:

Part #	Description	Pieces
T-KCP	Cable preparation tool kit	18
T-KERM	Emergency restoration tool kit	22
T-KMS	Master splicer tool kit	23

We also offer customized tool kits that can be tailored to meet your specific tooling needs. For more information or to receive our custom tool kit brochure, please call, email, or visit our website.

## Custom Fiber Optic Training

### Advantages of a Light Brigade Custom Course

The Light Brigade can develop and deliver a custom course specific to your needs and application. Let us create a course to meet your desired skill level and to focus on specific subject matter. We have produced thousands of customized courses, DVDs, videos, and other training materials.

**Convenience:** The course can be taught at your site and scheduled to meet your business needs.

**Cost and time savings:** Eliminate travel time and expense to and from a public class. Also, your employee's time will only be spent on issues critical to your company's business.

**Develop expertise:** Use your own equipment in our training or have us bring our extensive inventory of supplies and equipment. You decide!

**Critical emphasis:** You pick the points, products, and techniques of particular importance to your operations, and our skilled instructors and technicians will tailor a custom course to meet your requirements.

**Scheduling flexibility:** A custom course can be any length: one day, one week, or longer. It can be scheduled during or after normal business hours. There can be sessions spread out throughout the year and delivered at different company locations. You choose what makes sense for your organization.



### Emergency Restoration

#### Two days: One day of classroom, one day of hands-on

Available as a custom course, or at the scheduled locations listed on page 3.

Whether the fiber cable network is above or below ground, inside or outside a building, the words "emergency restoration" strike fear in any network or outside plant manager. Network outages can cost tens of thousands of dollars every hour your system is offline. When (not if) a problem occurs, it is critical not only to have a recovery program in place, but to have staff that is trained to deal with the emergency in timely, cost-efficient manner. The Emergency Restoration advanced training course will help your organization to develop its own ongoing restoration program. It places heavy emphasis on fault location, troubleshooting, and test equipment, then culminates in a second day of hands-on drills that simulate actual field restorations for both retrievable and non-retrievable slack scenarios.



### Subjects We Teach

- Fiber to the User (FTTx)
- Fiber Characterization
- Restoration / Maintenance
- PMD, CD, and ORL
- Premises / Enterprise Networks
- Network Maintenance
- DWDM
- 40G / 100G Systems
- ROADM / Switched Networks
- Advanced Fiber Optic Systems
- Long Haul and MANs

### Industries We Train

- |                  |                     |
|------------------|---------------------|
| • Telephone      | • Transportation    |
| • Utilities      | • Pro-AV            |
| • Broadband/CATV | • Security          |
| • Government     | • Industrial        |
| • Military       | • Oil and Gas       |
| • Aerospace      | • Mining            |
| • Manufacturing  | • Natural Resources |



# Staff Development DVDs

Our series of menu-selectable Staff Development DVDs feature high-quality video, animations and graphics to enhance the learning experience and allow for visual identification of theoretical concepts and “inside” topics.

## Fiber Optic System Design NEW

Learn to design a fiber optic transmission system that suit your requirements now and for years to come, from simple point-to-point networks to more advanced DWDM, ROADM, and FTTH/FTTB systems.

- Part #W-6D-211 (First edition) • 112 min

## Introduction to Fiber Optics

This comprehensive overview of fiber optics contains 14 introductory chapters from other Light Brigade DVDs. Learn and appreciate everything this amazing technology has to offer. • Part #W-6D-101 (First edition) • 105 min

## Fundamentals of Fiber Optics

Learn how fiber optics is applied in today’s voice, video, and data communication systems. Learn fiber theory, terminology, and how various types of fiber are manufactured. • Part #W-6D-112 (Second edition) • 80 min

## OTDR Theory and Operation

The OTDR is a crucial instrument for acceptance testing and troubleshooting. Learn how to use an OTDR in various testing scenarios including FTTx, PMD, LAN, and OSP applications. • Part #W-6D-121 (First edition) • 86 min

## Fiber Optic Test Equipment and Testing Fiber Optic Links

Explore the wide variety of test equipment from simple hand-held devices to modular OTDRs that are used in the acceptance testing and maintenance of today’s fiber optic systems and links. • Part #W-6D-131 (First edition) • 81 min

## Troubleshooting A Fiber Optic Link

Proper selection and usage of fiber optic test equipment is key to an effective maintenance program. Learn how to choose the best equipment and technique for the task at hand, including acceptance testing and restoration. • Part #W-6D-141 (First edition) • 90 min

## Fiber Optic Cable

Outside plant, utility, and premises applications employ many types of fiber optic cable. Learn how these cables are structured, manufactured, prepared for splicing, terminated, and then deployed. • Part #W-6D-151 (First edition) • 106 min

## Fiber Optic Splicing

Low loss splicing is the cornerstone of optimal network performance. Learn to correctly perform mechanical and fusion splicing to produce high quality, low loss splices in any fiber application. • Part #W-6D-161 (First edition) • 95 min

## Fiber Optic Patch Panels, Splice Closures and Pedestals

Cable management products have evolved greatly over the years and fulfill many roles today. Learn how they are typically employed in today’s networks, and how they are integrated with optical cable. • Part #W-6D-171 (First edition) • 100 min

## Fiber Optic Connectors

Proper connectorization is critical to the success of a fiber link, and ultimately lies in the hands of the technician. From polishing to cleaning to visual inspection, a technician must be able to properly terminate each fiber and ensure it provides the lowest loss possible to achieve optimum performance. • Part #W-6D-181 (First edition) • 118 min

## Fiber Optic Active Devices

A fiber optic system cannot function without light sources and detectors. Learn what these devices are, how they function, and how they are tested and integrated into transmission systems. • Part #W-6D-191 (First edition) • 121 min

## Fiber Optic Passive Devices

DWDM, FTTx and ROADM fiber optic systems incorporate an enormous amount of optical passive devices. Learn about the many types of passive devices and how they are integrated to increase network bandwidth and reliability, while simultaneously lowering costs. • Part #W-6D-201 (First edition) • 118 min



These DVDs have been filmed by professional cinematographers and provide an unbiased, international perspective. The close-up filming allows small, difficult-to-see components, as well as installation content to be presented in a clear, easy-to-see manner.

The content is formatted for easy presentation either by menu-selectable chapters or in continuous play mode. Each DVD includes a quiz, along with an answer sheet, in Word format.

Make these valuable tools a part of your training library!