Instructor-led Training Courses

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<td>19</td>
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</tbody>
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The Leader in Fiber Optic Training

We provide critical training for your personnel — improving efficiency, reducing costly errors, and lowering operating costs. Since 1987, Light Brigade has trained 60,000 technicians, installers, engineers, designers, and other support staff from a wide variety of industries.

Instructors
Our professional instructors work directly for us. They come from diverse backgrounds and have expertise in many aspects of fiber optics. With practical real-world experience in applications ranging from network design and installation to sensing and fiber characterization, our instructors provide valuable insights for our students.

Hands-on Training
Extensive hands-on training sessions help our attendees to learn skills and best practices by doing the work. Attendees spend class time working with cables, connectors, closures, splicers, and test equipment — whatever is appropriate for their specific course. Our 7:1 ratio of students to instructor ensures the direct personal attention needed for each student during their lab work.

Technology-based
Because we focus on the technology first, students can choose to develop their skills using our equipment, tools, and accessories, or bring their own to class and learn to use them more effectively.

Relevant
Our course materials are regularly updated to stay current with products, best practices, and emerging technologies, and reference the latest applicable standards and codes.

Ongoing Benefits for Our Alumni
Light Brigade alumni receive several valuable benefits, like free phone support. If you have a technical question or need some guidance, our support staff is just a phone call away.

Graduates of our three and four-day courses also qualify for generous discounts on subsequent courses for up to four years after taking class and are eligible for special discount offers on some fiber optic equipment and cleaning supplies.
This instructor-led course provides a fundamental understanding of fiber optics, coupled with the practical hands-on skills training required to install and maintain fiber optic networks. Perfect for those new to fiber or those looking to enhance their current skill set. Two days of classroom time are dedicated to the understanding of fiber technology and network components, followed by two days of hands-on skills training to develop cable preparation, termination, splicing, and testing skills.

**Audience:** Field technicians, installers, IT support staff, engineers, field supervisors, OSP staff, maintenance techs, or technical sales staff

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

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**Course Outline**

### Classroom (2 Days)
- Communications Basics
- Fiber Optic Transmission Theory
- Multimode and Single-mode Fibers
- Fiber Optic Cables
- Fiber Optic Connectors
- Splicing
- Fiber and Cable Management
- Installation
- Test Equipment
- Testing Best Practices
- Restoration
- Safety
- Communication System Basics
- Loss Budgets

### Hands-on (2 Days)
- **Connectors**
  - Prepare Fibers for Termination
  - Hand-polished Anaerobic Connectors
  - Cleaning and Inspection
  - Mechanical Splice-on Connectors
  - Identify Nearby Bends and Breaks
  - Assemble an ETA-compliant Patch-cord

- **Cable Preparation for Termination**
  - Prepare Stranded Cable for Panel Installation
  - Prepare Buffer Tube for a Splice Tray
  - Prepare a Fanout Kit

- **Splicing and OTDRs**
  - Modify Typical OTDR Settings
  - Recognize and Interpret Events
  - Use a Launch Box
  - Modify Typical Splicer Settings
  - Perform Arc Calibration
  - Fusion and Mechanical Splicing

- **Optical Loss Testing**
  - Wet and Dry Cleaning Methods
  - One-, Two- and Three-cord Reference Testing
  - Create a Sample Loss Budget
  - Detect Active Fibers

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**Certification**

**ETA® International Fiber Optics Installer (FOI)**
This certification is designed for those working with both multimode and single-mode fibers. Valid for four years. Certification testing is available to four-day class attendees only.

- 30 BICSI CECs (four-day)
- 15 BICSI CECs (two-day)

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**Early Bird Pricing***

- Four-day course & e-manual.............. $1795
- Two-day classroom only................. $900
- Optional ETA FOI exam................... $155

Printed manual available for purchase.

*See page 17 for more information.
Upcoming 2020 Class Locations

**JANUARY 7-10**
Anchorage, AK

**JANUARY 14-17**
Huntsville, AL
St. Louis, MO

**JANUARY 21-24**
Columbus, OH
Vancouver, BC

**JANUARY 28-31**
Atlanta, GA
Sacramento, CA
Santa Fe, NM

**FEBRUARY 11-14**
Richmond, VA
San Diego, CA

**FEBRUARY 18-21**
Orlando, FL
Seattle, WA
Salt Lake City, UT

**FEBRUARY 25-28**
Dallas, TX
Denver, CO
Minneapolis, MN

**MARCH 3-6**
Helena, MT
Memphis, TN

**MARCH 10-13**
Kansas City, MO
Lowell, MA
Madison, WI

**MARCH 17-20**
Houston, TX
Sioux Falls, SD

**MARCH 24-27**
Lansing, MI
Mobile, AL

**MARCH 31-APRIL 3**
Des Moines, IA
Fargo, ND

**APRIL 6-10**
Morristown, NJ
Portland, OR

**APRIL 14-17**
Pittsburgh, PA
Seattle, WA
Spartanburg, SC

**APRIL 21-24**
Buffalo, NY
Calgary, AB
Reno, NV

**APRIL 28-MAY 1**
Geneva, IL

**MAY 5-8**
Miami, FL
Spokane, WA

**MAY 12-15**
Charleston, SC
Washington, DC

**MAY 18-21**
Boise, ID
Charlotte, NC
Colorado Springs, CO

**JUNE 2-5**
Oklahoma City, OK

**JUNE 9-12**
Little Rock, AR
Walnut Creek, CA

**JUNE 23-26**
Jackson, MS
Seattle, WA

**JUNE 29-JULY 2**
Omaha, NE

**JULY 7-10**
Spartanburg, SC

**JULY 14-17**
Burbank, CA
Denver, CO

**JULY 21-24**
Tampa, FL

**JULY 28-31**
Baltimore, MD
Sacramento, CA

**AUGUST 4-7**
Austin, TX
Seattle, WA

**AUGUST 11-14**
Cleveland, OH
Louisville, KY

**AUGUST 18-21**
Kansas City, MO
Montgomery, AL

**AUGUST 25-28**
Sterling, VA
Tulsa, OK

**AUGUST 31-SEPT. 3**
Albany, NY
Jacksonville, FL

**SEPTEMBER 15-18**
Atlanta, GA
Worcester, MA

**SEPTEMBER 22-25**
Colorado Springs, CO
Vancouver, BC

**SEPTEMBER 29-OCT. 2**
Bismarck, ND
Chattanooga, TN
Raleigh, NC

**OCTOBER 6-9**
Ft. Lauderdale, FL
Seattle, WA
Spartanburg, SC

**OCTOBER 13-16**
Las Vegas, NV
Nashville, TN

**OCTOBER 20-23**
San Diego, CA
Salt Lake City, UT

**OCTOBER 27-30**
New Orleans, LA

**NOVEMBER 3-6**
Burbank, CA
Hartford, CT
Indianapolis, IN

**NOVEMBER 10-13**
Birmingham, AL
Philadelphia, PA

**NOVEMBER 17-20**
Bellingham, WA
Rochester, MN

**NOVEMBER 24-27**
Saskatoon, SK

**DECEMBER 1-4**
Morristown, NJ
Portland, OR

**DECEMBER 8-11**
St. Louis, MO

**DECEMBER 15-18**
Dallas, TX
Lowell, MA
Seattle, WA

Specifications and class dates are subject to change without notice

For training, tools, or equipment:
206.575.0404 • 800.451.7128
www.lightbrigade.com
Light Brigade offers a virtual option that brings our Fiber Optics 1-2-3 classroom learning directly to you, making it easier than ever to get the knowledge you need without the inconvenience and expense of travel.

This instructor-led course gives attendees a fundamental understanding of fiber technology, network components, and equipment that is perfect for those new to fiber or those looking to enhance their current knowledge base.

**Audience:** Field technicians, installers, IT support staff, engineers, field supervisors, OSP staff, maintenance techs, or technical sales staff

**Prerequisites:** Fiber Foundations recommended, but not required

We've transformed the Fiber Optics 1-2-3 course’s two days of classroom learning into four half-day online sessions with a live Light Brigade instructor. Remote students get the same in-depth knowledge and insights as attendees of our in-person course — including interacting with the instructor and participating in interactive exercises — all from the comfort of their own home or office. In addition to receiving valuable insights from our senior instructor, students will have access to a technologist who will answer their questions in real-time.

Two days of hands-on skills training can be added later to develop cable preparation, termination, splicing, and testing skills and to qualify for ETA certification.

### Course Outline

- Fiber Basics
- Fiber Optic Transmission Theory
- Multimode and Single-mode Fibers
- Fiber Optic Cables
- Fiber Optic Connectors
- Splicing
- Fiber and Cable Management
- Installation
- Test Equipment
- Testing Best Practices
- Restoration
- Safety
- Communication System Basics
- Loss Budgets

### Benefits of Remote Classes

- Learn in the comfort of your own home or office.
- Never be turned away from a full class.
- Less time away from work.
- Save on travel expenses.

### 2020 Remote Classroom Sessions

<table>
<thead>
<tr>
<th>Month</th>
<th>Dates</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 11</td>
<td>11-14, 8 am</td>
<td>Noon PT</td>
</tr>
<tr>
<td>June 9</td>
<td>9-12, 8 am</td>
<td>Noon PT</td>
</tr>
<tr>
<td>September 8</td>
<td>8-11, 8 am</td>
<td>Noon PT</td>
</tr>
<tr>
<td>November 17</td>
<td>17-20, 8 am</td>
<td>Noon PT</td>
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</table>

### Certificate

**Light Brigade Certificate of Completion**

Complete this course and receive a Light Brigade Certificate of Completion.

15 BICSI CECs

### Pricing*

- Remote training class .................. $900
- plus Fiber Foundations .................. $975
- plus Future Hands-on Labs ........... $1795

Advanced OSP Technician

This four-day instructor-led course features one day of classroom theory that delivers a quick refresher on fiber terminology and technology before diving into FTTx, emergency restoration, fiber characterization, and how the latest industry trends may impact field practices. This is followed by three days of hands-on skills training, where attendees build and troubleshoot a passive optical network from patch panel to patch panel through various splice closures with multiple drops.

**Audience:** Fiber optic technicians, team leaders, installers, outside plant maintenance staff, or staff engineers

**Prerequisite:** Any Light Brigade introductory courses like Fiber Optics 1-2-3 or equivalent field experience

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**Course Outline**

### Classroom (1 Day)

- Safety
- Terminology and Concept Review
- Trends in Fiber Optics
- FTTx Fundamentals
- Emergency Restoration
- Introduction to Fiber Characterization

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### Hands-on (3 Days)

#### Cable Preparation
- OSP Cable and Closure Preparation
- Mid-entry Practices on OSP Loose Tube Cables

#### Splicing
- Fusion, Mechanical, and Ribbon Splicing
- Splice-on Terminations
- Connector Testing and Inspection

#### Loss Testing
- Building LAN Panels
- Total Span Testing
- Reflection and Optical Return Loss Testing

#### OTDRs
- Interpreting OTDR Results
- Span Troubleshooting and Restoration

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**2020 Class Locations**

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
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<tr>
<td>Spartanburg, SC</td>
<td>January 7-10</td>
</tr>
<tr>
<td>Anchorage, AK</td>
<td>February 4-7</td>
</tr>
<tr>
<td>Austin, TX</td>
<td>March 3-6</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>March 17-20</td>
</tr>
<tr>
<td>Lowell, MA</td>
<td>April 6-9</td>
</tr>
<tr>
<td>Dallas, TX</td>
<td>May 5-8</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>May 12-15</td>
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<tr>
<td>Atlanta, GA</td>
<td>June 16-19</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>June 23-26</td>
</tr>
<tr>
<td>Las Vegas, NV</td>
<td>July 7-10</td>
</tr>
<tr>
<td>New Orleans, LA</td>
<td>July 28-31</td>
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<tr>
<td>Salt Lake City, UT</td>
<td>August 4-7</td>
</tr>
<tr>
<td>Sacramento, CA</td>
<td>August 25-28</td>
</tr>
<tr>
<td>Minneapolis, MN</td>
<td>September 22-25</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>October 27-30</td>
</tr>
<tr>
<td>San Antonio, TX</td>
<td>November 10-13</td>
</tr>
<tr>
<td>Walnut Creek, CA</td>
<td>December 8-11</td>
</tr>
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</table>

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**Certification**

**ETA® International Fiber Optics Technician—Outside Plant**

This certification is for those installing outside plant single-mode fiber optic networks. Valid for four years.

26 BICSI CECs

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**Early Bird Pricing***

Four-day course & e-manual........... $1850

Optional ETA FOT-OSP exam............. $155

Printed manual available for purchase.

*See page 17 for more information.
# Emergency Restoration

This two-day instructor-led course focuses on fault location, troubleshooting, and test equipment with a heavy emphasis on hands-on skills training that simulates actual field restorations for both retrievable and non-retrievable slack scenarios. Attendees will gain the knowledge and skills necessary to help their organizations to better deal with outages.

**Audience:** Fiber optic technicians, engineers, or managers who work in the OSP environment

**Prerequisite:** Any Light Brigade introductory courses like Fiber Optics 1-2-3, Utilities Level 1 Technician, or equivalent field experience

## Course Outline

<table>
<thead>
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<th>Hands-on (1.5 Days)</th>
<th>2020 Class Locations</th>
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<td><strong>Optical Network Failures</strong></td>
<td><strong>Build a Network</strong></td>
<td><strong>Denver, CO</strong> January 21-22</td>
</tr>
<tr>
<td>Potential points of failure</td>
<td>Build a fiber optic system consisting of two panels, one closure, and 200 feet of cable.</td>
<td><strong>Jackson, MS</strong> February 25-26</td>
</tr>
<tr>
<td><strong>Planning</strong></td>
<td><strong>Build an Emergency Restoration Kit</strong></td>
<td><strong>Tulsa, OK</strong> April 28-29</td>
</tr>
<tr>
<td>The network lifecycle</td>
<td>Build an emergency restoration kit with a splice closure and 100 feet of cable</td>
<td><strong>Seattle, WA</strong> June 30-July 1</td>
</tr>
<tr>
<td>Route management</td>
<td><strong>Test and Repair a Failed Network</strong></td>
<td><strong>Spartanburg, SC</strong> September 22-23</td>
</tr>
<tr>
<td>Route marking and documentation</td>
<td>Measure span loss with an optical loss test set</td>
<td><strong>Dallas, TX</strong> October 27-28</td>
</tr>
<tr>
<td>GIS data</td>
<td>Use a visual fault locator to find a stressed or broken fiber</td>
<td></td>
</tr>
<tr>
<td><strong>Identifying and Locating</strong></td>
<td>Identify and locate events with an OTDR</td>
<td></td>
</tr>
<tr>
<td>Fault location</td>
<td>Use ERK to locate and fix the simulated failure</td>
<td></td>
</tr>
<tr>
<td>OTDR usage and event interpretation</td>
<td></td>
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<tr>
<td>Helix factor</td>
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<td></td>
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<tr>
<td>Outage restoration</td>
<td></td>
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<tr>
<td><strong>Post Restoration Tasks</strong></td>
<td></td>
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</tr>
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</table>

## Certificate

**Light Brigade Certificate of Completion**

Complete this course and receive a Light Brigade Certificate of Completion.

## Early Bird Pricing*

| Two-day course & e-manual | $1100 |

Printed manual available for purchase.

* See page 17 for more information.
OTDR & Testing Deep Dive Workshop

This two-day instructor-led course focuses on field testing and troubleshooting fiber optic spans/links and explains the various types of equipment and tools needed for acceptance testing, documenting performance, and finding problems in a fiber physical plant. The emphasis is on understanding proper OTDR settings, overall testing, and evaluating results.

**Audience:** Installers, OSP technicians, maintenance techs, field supervisors, or senior technicians

**Prerequisite:** Fiber Optics 1-2-3 or field experience with fiber optic testing. Fiber Foundations recommended, but not required

### Course Outline

#### Classroom (1 Day)

- **Introduction**
  - Optical Loss Test Sets
  - Proper Cleaning and Inspection Tools
  - Visual Fault Finders
  - Optical Fiber Identifiers
  - OTDR Theory and Operation

- **Testing Demonstrations**

#### Hands-on (1 Day)

- **OTDR Testing**
  - Reading OTDR Signatures
  - Selecting the Correct Pulsewidth
  - Using Launch and Receive Cables or Terminators
  - Determining Helix Factor
  - Testing Close-in Events
  - Bidirectional Testing
  - Locating Breaks
  - Advanced Trace Analysis
  - Acceptance Testing

- **Optical Loss Testing**
  - Connector Cleaning and Inspection
  - Connector Endface Evaluation
  - Testing Transmit and Receive Power
  - Calculating Dynamic Range
  - Setting Up Tier 1 Testing
  - Dual Wavelength Bidirectional Optical Loss Testing
  - Creating Multimode Launch Conditions
  - Identifying Live Fibers and Tone Identification
  - Creating a System Loss Budget

#### 2020 Class Locations

<table>
<thead>
<tr>
<th>City</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle, WA</td>
<td>January 7-8</td>
</tr>
<tr>
<td>Huntsville, AL</td>
<td>January 14-15</td>
</tr>
<tr>
<td>Salt Lake City, UT</td>
<td>February 18-19</td>
</tr>
<tr>
<td>Dallas, TX</td>
<td>February 25-26</td>
</tr>
<tr>
<td>Kansas City, KS</td>
<td>March 10-11</td>
</tr>
<tr>
<td>Mobile, AL</td>
<td>March 24-25</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>May 19-20</td>
</tr>
<tr>
<td>Tampa, FL</td>
<td>July 21-22</td>
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<td>Atlanta, GA</td>
<td>September 15-16</td>
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<tr>
<td>Las Vegas, NV</td>
<td>October 13-14</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>December 8-9</td>
</tr>
</tbody>
</table>

#### Certificate

Light Brigade Certificate of Completion

Complete this course and receive a Light Brigade Certificate of Completion.

12 BICSI CECs

#### Early Bird Pricing*

Two-day workshop

$1100

* See page 17 for more information.

For training, tools, or equipment:
206.575.0404 • 800.451.7128
www.lightbrigade.com

Specifications and class dates are subject to change without notice
FTTx for Installers and Technicians

This four-day instructor-led course is designed to provide useful technical knowledge of fiber optics relating to FTTx applications, as well as the skills needed to install and test the physical layer for active Ethernet and passive optical networks (PON). Students will gain practical knowledge and hands-on skill in 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.

**Audience:** Beginner and experienced technicians, or supervisors

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

### Course Outline

#### Classroom (2 Days)

- FTTx Introduction
- FTTx Methodology
  - Passive Optical Networks
  - Active Ethernet
  - RF Overlay • RFOG
- Fiber Theory for FTTx
- Optical Fiber
- Optical Cable
  - Outside Plant Cables
  - Indoor/Outdoor Cables
- Termination Options
  - Connector Types and Polishes
- Splitters
  - Splitter Types
  - Splitter Scenarios
- Panels and Closures
  - Outside Plant Storage
  - Inside Plant Storage
- WDM in FTTx Applications
- Active Devices
- OTNs and ONTs
- Loss Budgets
- Cable Installation Techniques
- Testing FTTx Systems
  - OTDR Testing
  - Optical Loss Testing
- Maintenance and Restoration
  - Typical Causes of Failure
  - Troubleshooting Techniques

#### Hands-on (2 Days)

- Safety Meeting
- Cable Management
- Cable Preparation
- Mid-Entry Practices
- Closure Preparation
- Panel Dressing
- Splitter Installation
- Splice Tray Fiber Routing
- Splicing
  - Strip and Cleave Processes
  - Inline and Pigtail Splicing
  - FTTx Splicing
  - Fixed V-groove Splicers
  - Core Alignment Splicers

- OTDR Testing
  - OTDR Use in FTTx Installations
  - FTTx OTDR Signatures
  - Measuring Reflectance
  - Testing Splitters

- Optical Loss Testing
  - FTTx Test Equipment
  - Testing OLT/ONT Power Levels
  - Test Points in FTTx Installations
  - Upstream/Downstream Testing
  - Troubleshooting

### Certification

**ETA® International Fiber Optics Technician—Outside Plant**

This certification is for those who install outside plant single-mode fiber optic networks. Valid for four years.

30 BICSI CECs

### 2020 Class Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Lake City, UT</td>
<td>January 14-17</td>
</tr>
<tr>
<td>Tampa, FL</td>
<td>March 17-20</td>
</tr>
<tr>
<td>St. Louis, MO</td>
<td>July 21-24</td>
</tr>
<tr>
<td>Nashville, TN</td>
<td>August 18-21</td>
</tr>
<tr>
<td>Baltimore, MD</td>
<td>November 17-20</td>
</tr>
</tbody>
</table>

### Early Bird Pricing*

Four-day course & e-manual: **$1795**

Optional ETA FOT-OSP exam: **$155**

Printed manual available for purchase.

* See page 17 for more information.

For training, tools, or equipment:
206.575.0404 • 800.451.7128
www.lightbrigade.com

Specifications and class dates are subject to change without notice.
Certified Fiber to the Home Professional

This course — available as either an online course or instructor-led training — is designed for those involved in deploying and maintaining FTTH and FTTB networks. Students will gain a broad base of knowledge and familiarity with FTTH architecture, network design, deployment technology, and operational skills.

**Audience:** Network designers, network planners, supervisors, and project managers

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

---

**CFHP Online Training Program**

This interactive online course features 16 modules that offer a broad base of knowledge around FTTH architecture, network design, deployment technology, and operational skills. Ideal for remote and international students looking for the comprehensive material found in CFHP instructor-led course, without the added expense of travel. These topics include:

- Bandwidth and Economic Issues
- Evolution of Fiber-to-the-Home Networks
- Basic Fiber Optic Theory
- FTTH Architectures and Topologies
- Network Components
- Fiber and Cable Management
- Termination Options
- Network Design
- Loss Budgeting
- Test Equipment and Test Procedures

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

This two-day instructor-led course focuses on the fundamentals of FTTH architecture, network design, deployment technology, and operational skills. It covers everything from FTTx systems to FTTx components, including discussion around the business issues involved with planning FTTx deployments.

**Classroom (2 Days)**

<table>
<thead>
<tr>
<th>Applications</th>
<th>Network Topologies</th>
<th>Network Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth Issues</td>
<td>Network Components</td>
<td>Fiber to the Building</td>
</tr>
<tr>
<td>Economics</td>
<td>Cable Management</td>
<td>Loss Budgets</td>
</tr>
<tr>
<td>Theory and Fibers</td>
<td>Cable and Fiber Termination</td>
<td>Test Disciplines</td>
</tr>
<tr>
<td>FTTH Standards</td>
<td>Splitter Placement</td>
<td></td>
</tr>
</tbody>
</table>
Network & Design

Certification

OTT Certified Optical Network Associate

2020 Class Locations

Seattle, WA  April 20-24
Spartanburg, SC  November 2-6

FTTx OSP Design

This three-day instructor-led course begins with fundamental fiber and network component information relating to FTTH network design considerations. The course then covers best practices for product selection and ideal placement for point-to-point, distributed and centralized split network options.

Audience: Outside plant and network engineers

Prerequisite: Knowledge of fiber theory and basic network engineering concepts

Classroom and Design Exercises (3 Days)

- FTTH Fiber Planning
- Futureproofing
- PON Design Options
- Take Rate / Splitter Location
- Fundamental Design Steps
- Campus Style Apartments
- High Rise Buildings
- Subdivisions
- Rural Areas
- WDM-PON Considerations
- General Design Steps
- Home Run Strategies
- Splitter Cabinets
- Distributed Split Design
- Design Exercises

OTT Certified Optical Network Associate (CONA)

This five-day instructor-led course examines how to design, plan, and implement cost-effective, high-speed networks from single channel systems to multiple channel options using CWDM and DWDM. Attendees will work together on interactive design projects to establish requirements for proper system performance and determine how the network can be affected by the properties of the physical infrastructure.

Audience: Outside plant and network engineers

Prerequisite: Knowledge of fiber theory and basic network engineering concepts

Early Bird Pricing*  🌞

Three-day course .......................... $1695
Optional FTTx OSP exam .................. $150

* See page 17 for more information.

2020 Class Locations

Raleigh, NC  January 21-23
Dallas, TX  April 21-23
Nashville, TN  June 3-5
Denver, CO  September 15-17
Raleigh, NC  November 10-12

Specifications and class dates are subject to change without notice
Fiber Characterization Fundamentals

This two-day instructor-led course focuses on the principles behind building and maintaining high-speed optical networks where key parameters such as polarization mode dispersion and chromatic dispersion must be calculated to evaluate system capabilities and potential upgrades to higher bit rates.

**Audience:** Those involved with equipment or systems where fiber characterization is needed to ensure proper operation of 10 Gb/s or higher data rates

**Prerequisite:** Previous experience with fiber optics and some knowledge of OTDR testing

<table>
<thead>
<tr>
<th>Classroom (1 Day)</th>
<th>Hands-on (1 Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Fiber and Connectors</td>
<td>Build Spans and Test for PMD and CD</td>
</tr>
<tr>
<td>Components Overview</td>
<td>Reflection Testing</td>
</tr>
<tr>
<td>Regeneration</td>
<td>PMD and CD Documentation</td>
</tr>
<tr>
<td>Optical Multiplexing</td>
<td></td>
</tr>
<tr>
<td>Dispersion and Polarization</td>
<td></td>
</tr>
<tr>
<td>Test Equipment</td>
<td></td>
</tr>
<tr>
<td>The Future</td>
<td></td>
</tr>
</tbody>
</table>

**OTT Certified Fiber Characterization Engineer (CFCE)**

This five-day instructor-led course focuses on mastering the tests required to verify that an infrastructure can support high data rate (10+ Gb/s) applications, Raman amplification, and extended wavelength ranges for CWDM and DWDM systems, as well as those typically required to prove that the fiber will operate properly when dark fiber contracts are signed.

**Audience:** OSP and network engineers, senior technicians, or designers

**Prerequisite:** Previous experience with fiber optics and some knowledge of OTDR testing

<table>
<thead>
<tr>
<th>Classroom and Hands-on Exercises (5 Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidirectional Loss Testing</td>
</tr>
<tr>
<td>OTDR Testing</td>
</tr>
<tr>
<td>Documentation and Reporting</td>
</tr>
</tbody>
</table>

**Certificate**

**Light Brigade Certificate of Completion**

**Early Bird Pricing***

Two-day course .......................  $1100

*See page 17 for more information.

**2020 Class Locations**

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle, WA</td>
<td>April 28-29</td>
</tr>
<tr>
<td>Dallas, TX</td>
<td>July 7-8</td>
</tr>
<tr>
<td>Portland, ME</td>
<td>June 15-19</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>September 14-18</td>
</tr>
<tr>
<td>Spartanburg, SC</td>
<td>November 9-13</td>
</tr>
</tbody>
</table>

For training, tools, or equipment: 206.575.0404 • 800.451.7128

www.lightbrigade.com

Specifications and class dates are subject to change without notice
This three-day, instructor-led course provides the practical knowledge and hands-on skills training required to properly design, install, and maintain fiber optic premises and data center networks. Attendees will use the latest fiber optic technology and equipment to splice, connectorize, test, and troubleshoot multimode and single-mode fiber networks in order to increase efficiency and reliability, as well as reduce costs and downtime.

**Audience:** Installation contractors and end users involved in building and maintaining premises networks and data centers

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

### Course Outline

#### Classroom (1.5 Days)
- Introduction
- Applications
- Standards and Codes
- Fiber Optic Transmission Theory
- Multimode Optical Fibers
- Single-mode Optical Fibers
- Optical Cables
- Fiber Management Products
- Connectors
- Fiber Splicing
- Installation
- Test Equipment
- Testing
- System Design
- Safety

#### Hands-on (1.5 Days)
- **Cable Preparation**
  - Tight Buffered Cable Preparation
  - Loose Tube Cable Preparation
  - Fanout Kit Installation
  - Wire Mesh Pulling Grips
  - Pre-terminated Cable Protection
- **Connectorization**
  - Field-installable Connectors
  - Splice-on Field-installable Connectors
  - 900-micron Multimode Jumpers
  - Attenuation Measurement
- **Fusion Splicing**
  - Cleaning and Fiber Cleaving Processes
  - Attenuation Measurement
- **Testing**
  - Single-mode Insertion Loss Testing
  - Multimode Insertion Loss Testing
  - Single and Multifiber Connector Testing
  - Connector Inspection
  - OTDR Testing
  - Measure Optical Return Loss
  - Compute a Link Loss Budget

### Certification

**ETA® International Fiber Optics Technician—Inside Plant**

This certification is designed for those working with multimode and single-mode fiber in enterprise and data center applications. Valid for four years.

### Early Bird Pricing*

| Three-day course | $1500 |

*See page 17 for more information.

### 2020 Class Locations

<table>
<thead>
<tr>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Jose, CA</td>
<td>February 4-6</td>
</tr>
<tr>
<td>Las Vegas, NV</td>
<td>March 24-26</td>
</tr>
<tr>
<td>Sterling, VA</td>
<td>May 5-7</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>September 22-24</td>
</tr>
<tr>
<td>Geneva, IL</td>
<td>November 3-5</td>
</tr>
</tbody>
</table>

For training, tools, or equipment: 206.575.0404 • 800.451.7128
www.lightbrigade.com

Specifications and class dates are subject to change without notice.
Fiber Optics for Utilities

Certification

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

Early Bird Pricing*

- Level 1 Technician & e-manual..... $1500
- Level 2 Designer & e-manual........ $600
- Level 1 & Level 2 (Save $300)..... $1850
- Level 3 Advanced Designer
  *Custom course only; call for details*
  *Certification for any level*
  - UTC member rate................... $175
  - Non-member rate.................... $275

Printed manual available for purchase.

* See page 17 for more information.

2020 Class Locations

<table>
<thead>
<tr>
<th>City</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle, WA</td>
<td>February 4-7</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>April 14-17</td>
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<tr>
<td>Spartanburg, SC</td>
<td>June 16-19</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>July 14-17</td>
</tr>
<tr>
<td>Kansas City, MO</td>
<td>August 11-14</td>
</tr>
<tr>
<td>Charlotte, NC</td>
<td>October 20-23</td>
</tr>
</tbody>
</table>

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 utilities telecom industry

**Prerequisite:** Fiber Foundations 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 introductory courses like Fiber Optics 1-2-3, online training, or equivalent field experience

Level 3 Advanced 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

For training, tools, or equipment:
206.575.0404 • 800.451.7128
www.lightbrigade.com
Fiber Optics for Wireless

This four-day instructor-led introductory course provides the foundation needed to understand fiber optic applications and challenges in the FTTA/cell site space. This course examines how fiber works and the fundamentals of different fibers, cables, connectors, and other hardware used in fiber optic communication networks. All of this is with a focus on FTTA and small cell network applications. After learning the basics and the nuances of fiber within wireless networks, attendees will build skills and best practices in hands-on labs for fiber splicing, cable preparation, OTDRs, and optical loss testing.

Audience: Installers, design engineers, project managers, field engineers, or anyone who is managing or installing fiber for an FTTA/cell site
Prerequisite: Fiber Foundations recommended, but not required

Course Outline

Classroom (2 Days)
- Fiber Theory
- Fiber Types and Characteristics
- Cable Types and Characteristics
- Preterminated Cables
- Connectors
- Splicing
- Fiber and Cable Management
- Installation
- Standard Test Methods
- Restoration
- Safety
- System Design

Hands-on (2 Days)
- Cable Preparation
  - Loose Tube Cable Preparation
  - Hybrid Cable Preparation
  - Breakout and Distribution Cable Preparation
  - Patch Panel and Splice Closure Preparation
  - Mid-entry Practices
- Optical Loss Testing
  - Link Loss Measurement
  - Transmit and Receive Power
  - Visual Inspection / Cleaning
  - Variable and Fixed Attenuators
- OTDR Operation
  - Acceptance Testing
  - Reflection Testing
  - Span Testing and Splice Loss
  - Emergency Restoration
  - Troubleshooting
- Splicing
  - Fusion / Mechanical / Pigtail
  - Fiber Handling and Cleaving

Certification

ETA® International
Fiber to Any Antenna
FTAA certification is for those who install fiber optic cabling at wireless and cellular facilities. Valid for four years.

Early Bird Pricing*
- Four-day course ......................... $1795
- Optional ETA FTAA exam .......... $155

* See page 17 for more information.

2020 Class Locations
- Las Vegas, NV
  - March 30-April 2
- Dallas, TX
  - June 16-19
- Seattle, WA
  - October 13-16

Specifications and class dates are subject to change without notice.
Industrial & Harsh Environments

Certification

ETA® International Fiber Optics Installer (FOI)
Valid for four years.

Early Bird Pricing*

Four-day course ....................... $1795
Optional ETA FOI exam ............... $155

* See page 17 for more information.

2020 Class Locations

Houston, TX December 1-4

Fiber Optics for Oil/Gas

This four-day instructor-led course teaches how to properly design, install, and maintain fiber optics systems in petrochemical environments. Attendees will use the latest fiber optic technology and equipment to splice, connectorize, test, and troubleshoot optical fiber networks in order to increase efficiency and reliability as well as reduce costs and downtime.

Audience: Those who design, install, test, or maintain fiber networks in petrochemical applications such as offshore drilling, pipelines, refineries, and processing plants

Prerequisite: Fiber Foundations recommended, but not required

Classroom (2 Days)

Optical Fibers and Connectors
Fiber Optic Splicing
Polyimide Coating Strippers
Fiber/Cable Management
Optical Cable Installation
Testing, Troubleshooting, and Restoration
Temperature/Stress Monitoring
Fiber Optic Sensing Applications

Hands-on (2 Days)

Fiber and Cable Preparation
Fiber Optic Splicing
Connectorization and Termination
Optical Loss Testing
OTDR Testing

Fiber Optics for Mining Applications

This three-day instructor-led course teaches how to properly design, install, and maintain fiber optics systems in harsh environment underground and surface mines. Attendees will use the latest fiber optic technology and equipment to splice, connectorize, test, and troubleshoot mining-based optical fiber networks in order to increase efficiency and reliability.

Audience: Anyone who designs, installs, tests, or maintains optical fiber networks in harsh or hazardous environments

Prerequisite: Fiber Foundations recommended, but not required

Certification

ETA® International Fiber Optics Installer (FOI)
Valid for four years.

2020 Class Locations

Call for details and pricing.
Benefits of On-site Training

• **Convenience**
  Schedule training exactly where and when you need it.

• **Cost Savings**
  Save travel time and expenses by bringing training to your facility.

• **Expertise**
  Learn on your own equipment or have us bring our extensive inventory of equipment and supplies. You decide!

• **Flexibility**
  Courses can be scheduled throughout the year and delivered at different company locations.

Customized Training

Don’t see exactly what you’re looking for?

Need training on something more unique or specific to your business?

Our subject matter experts can work with you to develop a course that meets your precise needs and then deliver it at your location. Whether you require small or large changes, we have the experts who can give your team the knowledge and skills needed to get the job done right.
Certifications & Discounts

Independent Certifications
Many of our courses are eligible for independent certification through third-party industry organizations and groups. These certifications show competency in hands-on skills and technical knowledge.

Third-party Credits
BICSI Continuing Education Credits (CECs) and NCTI Master Technician credits are available for many Light Brigade training courses.

Light Brigade Certificate of Completion
This certificate of completion is awarded to anyone who completes a Light Brigade instructor-led training course. Signed by the course instructor, this certificate specifies the content and total number of instructional hours for both classroom and hands-on skills training and each is uniquely traceable to the class attended.

Training Discounts
Light Brigade offers a variety of discounts and special pricing. Look for the green tag icon next to courses that are eligible for any of the discounts below:

- 10% discount for multiple attendees from the same organization.
- 10% discount for USTelecom members.
- 15% discount for UTC and FBA members.
- 25% discount for previous attendees of our three or four-day courses. Good for four years!

Note: Discounts cannot be combined. CONA and CFCE courses are only eligible for the 10% multiple attendee discount. Other discounts do not apply.

Early Bird Pricing
Receive $150 off list price by registering more than 14 days prior to the start of class. Classes booked 14 days or less will be charged full list price. Book early and save!
Combine Early Bird Pricing with one of our many discounts for additional savings!
Online Training

**Fiber Foundations**

Perfect for those new to fiber, this interactive online course is the ideal first step into fiber optics for anyone new to the industry. The overview of basic theory, terminology, and key products is designed to provide a baseline on which to build more in-depth training. Whether a new employee at an organization that manufactures fiber related products, or a technician moving over from the copper world, this short e-course will introduce technical terminology with accurate, easy-to-understand language.

**Course Pricing**

<table>
<thead>
<tr>
<th>Online course</th>
<th>$95</th>
</tr>
</thead>
</table>

1 BICSI CEC

**Single-mode Technology: Theory and Fibers**

This interactive online course covers topics that go beyond the fundamentals. Communications today depend on single-mode fiber, from backbone infrastructure of voice, data and video wireline networks to most wireless networks. This e-course offers a deeper understanding of optical theory as it applies to single-mode fibers and systems, making it critical to anyone working in the fiber optic industry.

**Course Pricing**

<table>
<thead>
<tr>
<th>Online course</th>
<th>$99</th>
</tr>
</thead>
</table>
More Than Just Lasers
A Guide to Practical Fiber Optic Safety

When strong health and safety practices become part of the operational fabric of your organization, everyone wins. Help create a positive safety culture by ensuring your employees are trained to follow safety procedures and can identify safety concerns unique to fiber optics.

Fiber optic professionals can be exposed to a wide variety of hazards — from the glass fibers themselves to chemicals used in cleaners and adhesives, to the sharp tools used to prepare cables for termination. They often encounter heavy equipment and power tools and may be in proximity to high voltage and traffic hazards during cable placement and system restoration.

This course examines these concerns and provides recommendations for safe practices when working with optical fibers and cables. It’s a solid foundation for ensuring your workforce remains healthy and productive and a great addition to your current safety program. Creating a safety-first culture helps to ensure your workforce is not part of painful statistics involving injuries and costly litigation.

Certified Fiber to the Home Professional Online Training Program
Learn more on page 9.

Staff Development Videos
These staff development training videos were designed for anyone looking for a flexible and convenient way to learn about fiber optic technology and various products. Each video covers a specific topic using an assortment of video clips, animations, and graphics to provide key technical concepts and hardware information. Order and watch online – or buy in DVD format to watch without the need for a high-speed Internet connection.

The videos may be purchased individually or as a set. Detailed descriptions and previews can be found at www.lightbrigade.com.

Course Pricing
Online course ...................................... $175
What Our Customers Are Saying

“I have now attended three classes taught by Light Brigade instructors, and have enjoyed all of them. I have come out with more knowledge than going in. I look forward to more classes in the future.”

Michael Bass, Opelika Power Services
Attended Advanced OSP Technician in Huntsville, AL

“A very knowledgeable experienced instructor. His expertise in the field is very much respected. He taught in a very understandable way that will allow subject retention. I will be able to apply principles and practices taught.”

Rod Brown, City of Lodi Electric Utility
Attended Fiber Optics 1-2-3 in Portland, OR

“Course paid for itself by noon the first day.”

Eric Barker, Simplot
Attended Advanced OSP Technician in Denver, CO

“This will reduce our repair times.”

Jack Bowles, Bend Broadband TDS
Attended OTDR & Testing Deep Dive in Bend, OR

“The course was very helpful to me because my company is just getting into FTTH. The course instructor was extremely knowledgeable and a great guy!”

Will Moore, Hart Telephone Company
Attended Fiber Optics 1-2-3 in Spartanburg, SC

“By far, the most knowledgeable instructor I’ve ever had in the 17 years I’ve been in the industry. I don’t think there is a question he could not answer.”

Brandon Martinez, Webpass
Attended Fiber Optics 1-2-3 in Alameda, CA

“I liked that no one manufacturer was pushed on us and that they had a good variety of equipment. By far the best instructor I have had.”

Jason Pehr, ESPN
Attended Fiber Optics 1-2-3 in Miami, FL

 “[Instructor]’s knowledge was outstanding. His ability to come up with answers to questions thrown at him was top notch.”

RJ David, University of Oregon
Attended Advanced OSP Technician in Seattle, WA
Top reasons to buy from Light Brigade

1. **Expertise**
We know fiber optics inside and out. It’s all we do!

2. **Tools & Accessories**
Comprehensive tool kits designed for field use.

3. **Partnerships**
We work with the leading suppliers in the industry.

Need Products? Call Us!

Specifications and class dates are subject to change without notice.