



This four-day course features 16 hours of classroom lecture and 16 hours of hands-on skills labs to provide an overview of fiber optic transmission theory, system design parameters, installation guidelines, fiber optic connector and splice termination options, test equipment, testing, documentation, and troubleshooting tailored for Pro A/V and broadcast applications. The course includes extensive hands-on exposure to fiber optic cable preparation, terminations, testing, and troubleshooting.

Prerequisites: None. Entry level.

Certifications and Credits: 32 InfoComm Recertification Units
Light Brigade Certification of Completion

Chapter 1 — Introduction

- Fiber in Pro A/V applications
- Basic fiber optic terminology
- Three critical considerations
- Optical fiber transmission system
- Standards committees
- Fiber optic standards groups
- Related standards
- Typical transmission rates
- Fiber optics history
- Fiber optic symbol master
- System topologies
- Advantages and disadvantages of fiber optics

Chapter 2 — Optical Theory

- Numerical aperture
- Refraction and optical reflection
- The electromagnetic spectrum
- Lightwave transmission
- Attenuation
- Causes for intrinsic and extrinsic losses
- Termination attenuation
- Multimode system
- Graded-index lightwave propagation
- Single-mode system
- Mode field diameter
- Dispersion

Chapter 3 — Optical Fibers

- Fiber characteristics
- Typical fiber specifications
- Multimode fiber types
- Multimode fiber bandwidth
- Overfilled launch condition
- Restricted mode launch
- Laser-optimized fibers
- Bend-insensitive multimode fiber
- Single-mode fiber types
- Single-mode dispersion
- Fiber optic color coding
- Application areas of optical fiber
- Fiber selection

Chapter 4 — Fiber Optic Cables

- Cable designs, materials, and structure
- Indoor optical cables
- Low smoke zero halogen cables
- Distribution cables
- Breakout cables
- Composite and hybrid cables
- Fiber optic cable cordage
- ST 311 HDTV camera cable
- Fiber optic broadcast camera cables
- Indoor/outdoor cables
- Loose tube outside plant cables
- Stranded cables
- Unitube cables
- Microduct cables
- Aerial fiber optic cables
- Loose tube cable preparation

Your Fiber Optic Training and Equipment Resource

Chapter 5 — Terminations

- Main connector components
- Fiber optic connector polishes
- Connector types
- Typical connector roles
- Subscriber connectors (SC)
- BFOC 2.5 (ST) connectors
- LC connectors
- Other SMF connectors
- HDTV connectors
- TFOCA connectors
- Multifiber connectors
- Termination techniques
- Multimode connector polishing procedure
- Standard fiber optic cleaning methods
- Broadcast connector cleaning methods
- Single-mode field connectorization issues
- The importance of yield
- Cable interconnection options
- Attenuators and terminators
- Good splice requirements
- Fiber optic cleaving
- Fusion splicing
- Mechanical splicing
- Pigtail splicing

Chapter 6 — Fiber and Cable Management

- Pro A/V and broadcast panels
- Fiber in the building
- Rack mounted panels
- Floor boxes
- Work area media/wall outlets
- Connector converters
- Fiber management
- Patch panels
- Fiber distribution units
- Optical entrance enclosures
- Fan out and breakout kits
- Fiber in the building installations
- OSP fiber and cable management
- Splice closures and slack buffer tubes
- Splice tray recommendations

Chapter 7 — Installation

- Cable handling
- Raceways for Pro A/V and studio applications
- Fiber raceway systems
- Cable trays and cable duct benefits
- Cable installation products
- Sequential markings
- The need for cable slack
- Standards, regulations, and codes

Chapter 8 — Test Equipment

- Optical power meters
- Optical loss test sets
- Visual tracers and inspection
- The OTDR
- Testing documentation
- Effective maintenance postures
- Test equipment selection

Chapter 9 — Optical Testing

- Fiber optic testing
- TIA-568 testing terminology
- Test methods
- Optical loss testing with a mandrel
- One-cord reference test method
- Two-cord reference test method
- Insertion loss method
- Testing dissimilar connectors
- Testing transmitter output power
- Testing receiver input power
- Testing through optical splitters
- Optical fiber transmission system
- OTDR signatures and deadzone
- Multimode index of refraction settings
- Single-mode index of refraction settings
- Documentation issues

Chapter 10 — Emergency Restoration

- Identify – locate – resolve
- Typical causes of failure
- Types of fiber optic damage
- Frequently encountered problems
- Equipment used in the restoration role
- Emergency restoration jump kit
- Fiber optic restoration
- Studio restorations

Chapter 11 — Passive Devices

- Fiber optic splitters
- Splitter specifications
- Tap splitters
- Multimode multiplexing
- Multiplexing light
- Demultiplexing light
- Fiber Bragg gratings
- Optical add/drop multiplexing and modules
- Dense wavelength division multiplexing
- Coarse wavelength division multiplexing
- Optical switches

Chapter 12 — Active Devices

- Fiber optic transmitters
- Fabry-Perot lasers
- Distributed feedback lasers
- Vertical cavity surface-emitting lasers
- Fiber optic receivers
- PIN and avalanche photodiodes
- SFF and SFP E/O transceiver modules
- Short-wavelength CWDM laser subsystems
- Electrical modulation techniques
- Optical bidirectional devices
- Optical triplexers
- Repeaters, regenerators, and amplifiers

Chapter 13 — System Design

- Design options for fiber optic networks
- Wavelength optimization
- Safety margin
- System budgets
- Multimode fiber size compatibility
- Multimode bandwidth
- Protecting your system
- Active optical cables

Chapter 14 — A/V System Applications

- Video transmission distance limitations
- Video topologies
- Optical distribution switching
- OEO and all-optical matrix switches
- Fiber protection switches
- Wavelength multiplexing
- Single-mode CWDM characteristics
- High-density video transport systems
- CWDM video and signal return transport
- Video repeaters
- Fiber and wavelength conversion
- Wavelength routing
- IP fiber rings for digital signage
- 4K (ultra HD) video transport
- Fiber optic products for A/V and broadcast

Chapter 15 — System Standards

- Wide area networks
- TCP/IP
- IEEE 802 standards
- Fiber optic modules
- Fibre Channel
- Video compression
- High definition television
- Hybrid fiber coax
- Closed circuit television
- FTTx active Ethernet and PONs

Chapter 16 — Safety

- Fiber optic safety concerns
- Working with lasers
- Visual safety using fiber optic sources
- Working with optical fibers
- Chemicals
- Material safety data sheets (MSDS)
- Installation practices

Chapter 17 — Miscellaneous

- National Electrical Code
 - Canadian Electrical Code
 - National Photonics Skills Standard
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Hands-on Skills Learning

Station 1 – Cable Preparation

- Tight buffered cable preparation
- Loose tube cable preparation
- Fan-out kit installation

Station 2 – Connectorization

- No-polish connectors
- Anaerobic connectors
- 900- μ m multimode jumpers

Station 3 – Connector Inspection and Cleaning

- Cleaning products and techniques
- Inspection equipment and processes
- Broadcast connectors
- Standard connectors

Station 4 – Splicing

- Fiber preparation and cleaving
- Fusion splices
- Mechanical splices

Station 5 – Field Testing

- Insertion loss measurement
- Network event loss
- Measuring cable length
- Isolating span problems
- Troubleshooting terminations
- Locating faults
- Tx and Rx power
- System bandwidth