Fiber Optics Workshop
Course Description

**PREREQUISITE:** Graduates of Jones/NCTI’s [Fiber Installation and Activation](#) and [Fiber Testing and Maintenance](#) courses are eligible for this class.

**COURSE DESCRIPTION:**
This two-day class contains 16 hours of hands-on labs to provide practical understanding and skills required to properly design, install, and maintain fiber optic networks. Applicable for 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 cost and downtime.

**COURSE OUTLINE:**
Students will break into groups led by one instructor per group – this low ratio ensures each student receives the one-on-one training necessary to fully understand and learn how to perform fiber-optic installation, testing and troubleshooting in the field. Students spend approximately 3-4 hours at workstations, rotating through until all tasks are completed.

**WORKSTATION #1 - CABLE & SPLICE CLOSURE PREPARATION**
Learn how to safely and properly prepare fiber-optic cable for acceptance testing, splicing, termination and mid-entries on communication systems. An outline of hands-on training covered at this workstation includes:

- Prepare distribution, breakout and loose-tube cables
- Learn how to perform a fanout on outdoor cable structures
- Learn why fiber and cable lengths do not match with an OTDR and learn how to compensate for these effects
- Learn how to properly document an acceptance test on reels of cable
- Learn how to prepare a fiber optic closure
- Learn how to ground a cable splice into a closure
- Learn how to dress a mid-entry into a closure
- Learn how to transfer fibers from storage trays to splice trays
- Learn how to organize and dress splice trays
- Learn how to “block” loose-tube cable gels
- Learn how to organize jumpers and pigtailed in the panel/closure
- Learn about labeling issues in panels and closures
- Learn about possible points of failure and their prevention
WORKSTATION #2 - FUSION & MECHANICAL SPICING

This workstation includes background material on optical fibers, cables, cleaving tools, techniques and disciplines associated with optical splicing. The focus of the module is the fusion and mechanical splicing of optical fibers in temporary, permanent and emergency restoration applications.

A fiber network depends on splice quality and workmanship. This workstation provides both the skill and knowledge components to perform correct splicing operations for various applications. Students will learn how to:

- Correctly strip 250 and 900 micron optical fibers using two separate techniques
- Correctly cleave optical fibers using cleaving tools (three types)
- Properly place splice protectors over fusion splices (two types)
- Correctly fusion splice fibers
- Adjust the fusion splice to compensate for environmental issues
- Pigtail splice from 250 to 900 micron fibers
- Identify the different OTDR signatures for fusion and mechanical splices
- Document splice losses
- Perform mechanical splices for quick restoration
- Troubleshoot procedures for splicing

WORKSTATION #3 - OTDR THEORY & OPERATION

This workstation instructs and educates students on OTDR operation and its use in fiber-optic communication systems.

The module content includes background material on theory, operation, and applications of the OTDR. The theory will explain OTDR operation, terminology, and functions. Applications will include optical cable acceptance testing, monitoring splices, and installed optical cables, and how the OTDR is used during maintenance and restoration of optical cables. These topics are applied to the hands-on portion of the module during the OTDR operation training.

The OTDR is an important tool for fiber-optic testing and troubleshooting. Students will learn to:

- Operate an OTDR
- Setup and calibrate an OTDR
- Perform the OTDR basic functions:
  - acceptance testing (reel)
  - splice & span loss testing
  - use of the OTDR for outage restoration
  - reading various OTDR signatures for troubleshooting
- Documentation
WORKSTATION #4 - CONNECTORIZATION

This workstation instructs and educates students on proper connectorization of optical fibers for communication systems. Background material is provided on optical fibers, cables, connector styles, bonding techniques, cleaving tools, and related test and inspection equipment.

The focus of the workstation is to enhance the abilities of the technician to connectorize distribution, breakout, and loose-tube cables in addition to standard cordage. The workstation will focus on techniques that improve optical performance while increasing yield.

Students learn how to terminate optical fibers using several bonding methods, such as epoxy oven cure and quick cure using anaerobic adhesive. Students will:

- Terminate ST and SC connectors
- Visually inspect fiber endfaces and learn the quality control criteria
- Test built assemblies for optical loss
- Troubleshoot terminations for loss and failures – discerning which connector end has failed

WORKSTATION #5 - OPTICAL LOSS TESTING

This workstation instructs and educates students on optical loss testing for fiber-optic communication systems. Background material is included on light sources, power meters, and optical loss test sets used in testing fiber-optic transmission equipment and end-to-end cable spans.

Work and skill sheets assist the operator in documenting fiber equipment and spans. This information is critical for demonstrating and instructing students in the applications and operations of optical loss test equipment.

OLT -- Optical Loss Testing is required for testing fiber-optic systems to establish loss over the span.

The following is covered:

- Measuring your equipment’s transmit power
- Measuring your equipment’s receive power
- How to perform end-to-end and link loss measurements
- Documentation
- Troubleshooting using:
  - Test sets
  - Visual fault finders
  - Identifier