

Fiber Optic Design Course Outline

Week 1. Theory and Principles of Fiber Optics

- The Origins of Fiber Optic Communications
- Basics of Fiber Optics
 - Principles of Operation
 - System Parameters
- Fiber Manufacture
- Understanding the “dB” of Fiber Optic Measurements
- Free Space Optics
- Fiber Optic Installation Safety
- Keeping up to Date
 - Resource Guide to Fiber Optics
 - Fiber Optic Economics
 - Fiber or Copper?
 - Fiber Applications
 - Fiber Performance

- Fiber End-Face Polish Techniques
- Connector Guidelines
- Storage loops
- Fiber Optic Restoration
 - Proactive Planning versus Reactive Restorations
 - Equipment Used in Restoration

Week 4. Optical Testing and Measurement

- Reasons for Testing
 - Acceptance Testing
- Types of Test Measurements
- Link Loss Calculation
- Power Budget and Rise time calculations
- Network Testing
- Network Utilities

Week 2. Network Design (Sources and Cable selection)

- Guidelines for Fiber Optic Design and Installation
- Light Sources
 - LED
- Vertical Surface Emitting Lasers
 - Lasers
 - Modulation
- Optical Fiber Cables
 - Multimode
- Restricted Mode Launch Bandwidth
- Laser Optimized Multimode
 - Single-mode
 - Optical Fiber Cable Construction
- Cable Parameters and Typical Values

Week 5. Fiber Related Standards and Codes

- The National Electrical Code®
- ANSI/TIA/EIA Building codes and Engineering updates
 - TIA/EIA-568-B
 - TIA/EIA-606-B
- Guidelines for Fiber Optic Design and Installation
 - Cable Guidelines
 - Connector Guidelines
- Cable Parameters and Typical Values
- Installation Specifications
- Specifying Fiber Optic Cable
- Environmental Specifications
- Cable Plant Documentation
- Documentation Software

Week 3. Fiber Termination Splicing and Hardware

- Fiber Optic Safety
- Fiber Optic Terminations: (Connectors, Splices and Joints)
- Fiber Optic Tools
- Termination Methods
- Fusion Splicing Methods
- Mechanical Splicing
- Striping, Cleaning, and Cleaving

Week 6. FDDI & Ethernet

- Introduction to How Ethernet Works
- Local Area vs. Wide Area
- General Model of Communications
- OSI Model
- Comparison of OSI Model and the TCP/IP Model
- Carrier Sense Multiple Access/Collision Detection
- Differential Mode Delay

10/Gigabit/1000Mbps/100Mbps/10Mbps
Limitations of Ethernet
Fiber Distributed Data Interface Functionality
FDDI Transmission Media
FDDI Specifications
FDDI Frame Format
FDDI Fault Tolerance

Week 7. Fiber Channels and ATM Networks

Fiber Channel Architectures
 Network Topologies
 Point to point
 Bus
 Ring
 Star
 Mesh
 Dual Ring
Applications
Standards
Asynchronous Transfer Mode
 ATM Model
 ATM Migration Path
 Optical Cabling for ATM

Week 8. Network Cabling and Data Center Design

Structured Cabling
Inter-building Cabling
Intra-building and Horizontal Cabling
Distributed and Centralized Cabling
System Redundancy
Anatomy of a Data Center
Areas and Types
Hardware Selection Factors
Main Cross Connect
Intermediate Cross Connect

Horizontal Cross Connect
Telecommunications Room Work Areas
Hardware connectors and Splicing
Cross Connect Design
Rack Layout
Fiber Management
Ladder Rack Systems
Raceway
Adequate Duct Space
Measuring for Conduit Pulls
Initial Planning Walkout
Planning the Installation
 The Process of Planning

Week9. Logical Network Topologies and Internetworking

Logical Network Topologies
Network Components
 Repeaters
 Bridges
 Routers
Optical Transport Networks
Design Considerations
Voice and Video Networks
Voice Signal Digitization
Multiplexing Techniques
Security Video
Conference Video Community
Antenna Television

Week 10. Designing a Full Service Network

Physical Plant Layout
Customer Requirements
Physical Topology
Fiber Counts Types
Estimating and Bidding Fiber
Optic Installation
Site Visit

Target Audience

This course is intended for contractors, installers, architects, engineers, project managers and all others who are involved with projects that include fiber optics.

Prerequisites

A basic understanding of telecommunications.

Course Length

30 Hours