TRAINING KIT

CONTACT INFORMATION:

For assistance ordering or accessing courses or more information about NCTI, please contact Customer Care:

Phone: 866.575.7206
Fax: 303.797.9394
Email: customercare@ncti.com
Office Hours: 7am-5pm (MST) Monday-Friday
# TABLE OF CONTENTS

## TECHNICAL
- Installer
- Techsellence
- Field Safety
- Customer Service for Technicians
- Applying Wi-Fi Technologies
- Broadband Digital Installer
- FTTx Basics
- Discovering DOCSIS 3.1 – Customer Premises
- Troubleshooting Advanced Services
- Computers and Broadband Modems
- IP Voice
- Installing SMB Telecom Service
- High Speed Data Installation
- Installer Technician
- Introduction to Telecom Operations
- Telephone Home Wiring
- Wall Drilling for Wiring
- Consumer Digital Electronics
- Service Technician
- Return Path Operations
- Digital Technician
- Fiber Installation and Activation
- System Technician
- Advanced DOCSIS 3.1 Operations
- Full Duplex DOCSIS 3.1
- Introduction to Multiplexing
- Introduction to Wide Area Networks
- Introduction to Protocols and Network Routing
- Fiber Testing and Maintenance
- Fiber Optics Workshop
- Fiber Optics 1-2-3
- Advanced Fiber Optic Training
- Certified Fiber to the Home Professional (CFHP)
- Certified Fiber to the Home Professional (CFHP) – Online
- FTTx for Installers and Technicians
- FTTx OSP Design
- Fiber Characterization: PMD, CD and ORL
- Emergency Restoration
- Advanced Technician
- Broadband HFC Network Testing and Measurements
- Understanding Voice and Data Networks
- Exploring Wireless Technologies
- Introduction to Networking: Home and Peer-to-Peer Networks
- Introduction to Networking: Local Area Networks
- Internetworking with TCP/IP
- Introduction to Networking: Wireless

## CUSTOMER MANAGEMENT AND SUPPORT
- Excellence in Customer Service
- Cable Network Overview
- Delivering Cable Services
- Basic Broadband Troubleshooting
- High-Speed Data Customer Service
- Advanced High-Speed Data Customer Service
- Operations Center Technical Support I
- Operations Center Technical Support II
- Operations Center Technical Support III
- Fundamental Selling Skills
- Competitive Services
- Delivering Video
- Delivering Voice
- Delivering Data
- Selling Communication Services
- Retaining Customers

## GENERAL EDUCATION
- Mentoring 101
- Leadership 101
- Working Across Generations and Maximizing Diversity
- Maximizing Diversity with Inclusion
- Effective Communication
- Healthy Conflict Management
- Building Synergistic Teams
- Managing and Promoting Change
- Organizational Development, Change and Innovation
- Effective Supervision
- Introduction to Business
- Introduction to Marketing
- Principles of Management
- Business Law and the Legal Environment
- Web Classroom Courses
  - Introduction to PC Applications
  - Stress Management
  - Technical Writing
  - Technical Mathematics
  - Cultural Diversity in Business
  - Business Writing
  - Time Management
  - Leadership
  - Intercultural Communications
  - Interpersonal Communication
  - Business Communication and Report Writing
  - Consumer Behavior
  - Negotiation and Conflict Resolution
  - Principles of Sales

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
NCTI’s PROFESSIONAL SERVICES

Our team offers specialized knowledge and expertise through Professional Services that will effectively bring best in class solutions to your organization’s projects with a proven return on investment. Our approach to relationships and service delivery helps clients across the globe leverage new opportunities, improve performance and enhance value.

The NCTI® Professional Services team has worked with industry leading companies throughout the United States, in various markets, thus bringing a unique talent to your project. Our Education Professionals, Instructional Designers and Technology Specialists are experienced at delivering solution-based products and services to meet your educational, certification and assessment needs.

OUR PROFESSIONAL SERVICES INCLUDE:

» Custom Curriculum Development
» Instructional Design Consulting
» Instructor-Led Training
» Product Education and Certification
» Assessment Programs
» Paper to e-learning Conversion
» Testing and Verification Services
» Career Path Progression
» Train the Trainer

THE NCTI PROFESSIONAL SERVICES APPROACH

NCTI applies a “three point” process to our services, creating custom workforce solutions for our clients. This process consists of knowledge management, technology expertise and project management. These components are critical to ensuring the solution we provide surpasses expectations while being delivered on-time and within budget.

We pride ourselves on our bright, motivated and committed team of experienced Instructional Design experts and our hands-on approach to solving complex training and education issues. Through our understanding of our customer’s commercial objectives, the technical issues during implementation of a project and our breadth of knowledge, our Professional Services team minimizes the effort required to implement a project and maximizes a customer’s return on investment in the product or solution.
NCTI’S COLLEGE CERTIFICATE AND DEGREE PROGRAM

Advance Your Career Through Professional Education

Earn college credit while learning job-specific skills through NCTI’s College Certificate and Degree Program, the only distance-learning, accredited higher education program designed specifically for the broadband and cable industry. The College Certificate and Degree Program allows individuals to apply virtually all NCTI courses to college-level certificates and two-year degrees.

BROADBAND TECHNOLOGY CERTIFICATE

Broadband cable industry professionals including line technicians, maintenance technicians, fiber optics technicians, headend technicians, persons in related positions and their managers should earn this certificate. Individuals doing so will be qualified in design, construction, installation, maintenance and service of broadband coaxial and fiber networks.

Courses
- CTC 107 Installer 3 credit hours
- CTC 109 Installer Technician 4 credit hours
- CTC 111 Service Technician 4 credit hours
- CTC 113 System Technician 4 credit hours
- CTC 127 Fiber Testing and Maintenance 2 credit hours
- CTC 128 Fiber Installation and Activation 2 credit hours
- CTC 129 Digital Technician 3 credit hours
- CTC 165 Advanced Technician 4 credit hours

TOTAL: 26 CREDIT HOURS

GET STARTED TODAY

1. Check with your supervisor on how NCTI works with your company. Many companies cover the expense of your tuition and offer incentives and raises for graduation from a course.
2. Obtain course descriptions and a NCTI enrollment application from your supervisor, your company’s NCTI training coordinator, or your human resources department.
3. You can also obtain course descriptions and a course application by clicking on the Products tab of our website, www.ncti.com, calling 866.575.7206 or emailing info@ncti.com.
4. Fill out the application completely, include your payment and mail to:
   NCTI, 300 East Mineral Avenue, Suite 5, Littleton, CO 80122
5. Your course will be shipped—if applicable—within 48 hours of receipt of payment.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
ASSOCIATE OF APPLIED SCIENCE IN BROADBAND TECHNOLOGY AND COMMUNICATION DEGREE FROM ACC

Through our partnership with Arapahoe Community College (ACC), regionally accredited by the North Central Association of Colleges and Schools, NCTI is pleased to provide students a straightforward path to advanced skills, opportunities for professional growth and a college degree.

The Associate of Applied Science degree allows students to complete a **NCTI Certificate of Broadband Technology**, combined with general education courses, major courses and restricted electives. The result is a versatile, professional degree that demonstrates both job-specific expertise and general business knowledge.

Be advised, while most courses are available anytime, others are only offered up to three times per year. Visit [www.ncti.com](http://www.ncti.com) for course availability and schedules.

**GENERAL EDUCATION REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 131</td>
<td>Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENG 121</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>MAT 108</td>
<td>Technical Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>or</td>
<td>Higher level college math course</td>
<td>3</td>
</tr>
<tr>
<td>COM 125</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>CIS 118</td>
<td>Introduction to PC Applications</td>
<td>3</td>
</tr>
<tr>
<td>BUS 115</td>
<td>Introduction to Business</td>
<td>3</td>
</tr>
<tr>
<td>MAN 116</td>
<td>Effective Supervision</td>
<td>3</td>
</tr>
</tbody>
</table>

**RESTRICTED ELECTIVES**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 220</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>MAR 111</td>
<td>Principles of Sales</td>
<td>3</td>
</tr>
<tr>
<td>BUS 216</td>
<td>Business Law and the Legal Environment</td>
<td>3</td>
</tr>
<tr>
<td>BUS 217</td>
<td>Business Communication and Report Writing</td>
<td>3</td>
</tr>
<tr>
<td>MAR 216</td>
<td>Introduction to Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MAN 226</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>CTC 117</td>
<td>Computers and Broadband Modems</td>
<td>3</td>
</tr>
<tr>
<td>CTC 118</td>
<td>Broaband Digital Installer</td>
<td>3</td>
</tr>
</tbody>
</table>

**CORE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR 160</td>
<td>Excellence in Customer Service</td>
<td>3</td>
</tr>
<tr>
<td>PSY 116</td>
<td>Stress Management</td>
<td>3</td>
</tr>
<tr>
<td>PSY 101</td>
<td>General Psychology I</td>
<td>3</td>
</tr>
<tr>
<td>BUS 241</td>
<td>Cultural Diversity in Business</td>
<td>3</td>
</tr>
<tr>
<td>MAN 117</td>
<td>Time Management</td>
<td>1</td>
</tr>
</tbody>
</table>

**PLAN OF STUDY (SPECIALIZATION)**

**BROADBAND TECHNOLOGY**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTC 107</td>
<td>Installer</td>
<td>3</td>
</tr>
<tr>
<td>CTC 109</td>
<td>Installer Technician</td>
<td>4</td>
</tr>
<tr>
<td>CTC 111</td>
<td>Service Technician</td>
<td>4</td>
</tr>
<tr>
<td>CTC 113</td>
<td>System Technician</td>
<td>4</td>
</tr>
<tr>
<td>CTC 127</td>
<td>Fiber Testing and Maintenance</td>
<td>2</td>
</tr>
<tr>
<td>CTC 128</td>
<td>Fiber Installation and Activation</td>
<td>2</td>
</tr>
<tr>
<td>CTC 129</td>
<td>Digital Technician</td>
<td>3</td>
</tr>
<tr>
<td>CTC 165</td>
<td>Advanced Technician</td>
<td>4</td>
</tr>
</tbody>
</table>

**Degree Total: 61 Credit Hours**

For more information, call 866.575.7206, email sales@ncti.com or visit [www.ncti.com](http://www.ncti.com)
Integrated Career Path for Broadband Field Operations

**NCTI COURSES**
- Installer
- Installer Technician
- IP Voice
- HSD Installation
- General Safety
- Teleshellence
- Telephone Home Wiring
- Installing SMB
- Broadband Digital Installer
- Customer Service for Technicians
- Consumer Digital Electronics
- Computers and Broadband Modems
- Troubleshooting Advanced Services
- Introduction to Networking: P-P

**IN HOUSE TRAINING**
- MSO Specific Training

**NCTI MASTER TECH CERTIFICATES**
- Master Technician: Customer Premises
- Installer Qualification (IQ) Certificate

**SCTE CERTIFICATES**
- BPI
- BPT
- BDS
- BPE

**ACADEMICS**
- Associate of Applied Science, Broadband Technology Communication
- Broadband Technology College Certificate
- Associate of Applied Science, Broadband Technology Communication Degree
- PROGRESSING TOWARD:
- Associate of Applied Science, Broadband Technology Communication Degree

**DISTRIBUTION TECH, RF COAX**
- Service Technician
- Return Path Operations
- System Technician
- Digital Technician

**TRANSPORTATION TECH, FIBER OPTICS**
- Fiber Installation and Activation
- Fiber Testing and Maintenance
- Internetworking TCP/IP
- Exploring Wireless Technologies
- Fiber Optics Workshop

**HEAD END & NETWORK OPERATIONS CENTER**
- Advanced Technician
- Understanding Voice and Data Networks
- Broadband HFC Test and Measurements
- Operations Center Technical Support I, II, & III
- Introduction to Networking
  - LAN
  - Wireless

**HEADEX TECH**
- Senior Master Technician
- BTECS
- DVEP
- IPEP

**NOC TECH**
- Senior Master Technician

Contact NCTI Customer Care at 866.575.7206 to map out your individual career path
NCTI’S MASTER TECHNICIAN PROGRAM

You Can Be One Of The Best

Created as a means to recognize the best of the best, the NCTI Master Technician Certification Program is an industry-recognized way of identifying a select group of technicians and engineers who have mastered the skills necessary to be regarded as the industry’s elite. To be qualified as a Master Technician, industry professionals must successfully complete a defined set of courses related to specific broadband operations. The following certificates can be earned:

MASTER INSTALLER (MI)

A certified MI provides a higher level of service by recognizing new technologies as well as best practices for all facets of a broadband cable installation. To qualify, an individual must complete the following courses:
» Installer
» TechSELLence
» High Speed Data Installation
» IP Voice
» Installing SMB Telecom Service
» Consumer Digital Electronics

MASTER TECHNICIAN (MT)

The certified MT has gained knowledge and expertise in broadband network and drop installation practices and procedures. To qualify, an individual must complete the following courses:
» Installer
» Installer Technician
» Service Technician
» System Technician
» Fiber Installation & Activation*
» Fiber Testing & Maintenance*
» Advanced Technician

MASTER TECHNICIAN, HFC NETWORKS (MTH)

A certified expert in HFC network maintenance practices and procedures is qualified to service and maintain two-way analog and digital services in the coaxial distribution system, fiber-optic system and headend. To qualify, an individual must complete the following courses:
» Service Technician
» Return Path Operations
» System Technician
» Fiber Installation & Activation*
» Fiber Testing & Maintenance*
» Digital Technician
» Advanced Technician

SENIOR MASTER TECHNICIAN (SMT)

The SMT is an unparalleled expert, possessing knowledge on all HFC network and drop installation practices and procedures, and the ability to maintain and troubleshoot the entire system from the customer’s premises through the headend. To qualify, an individual must complete the following programs/courses:
» Master Technician, Customer Premises (MTC) Program
» Master Technician, HFC Networks (MTH) Program
» Understanding Voice and Data Networks

* For students having completed Fiber Optics Technician, the course can be substituted for Fiber Installation & Activation AND Fiber Testing & Maintenance

Ready to achieve field success?
Learn with NCTI:
ncti.com | 866.575.7206
Master Technician Recertification Test

As the premier training and certification body in the cable and broadband industry for over 45 years, NCTI provides recertification for Master Technicians to ensure the continued aptitude of previously recognized technicians.

Our 75-question, 3-hour recertification assessments require a passing grade of 80% in order to earn recertification. Each assessment purchase grants the technician one exam attempt and a 60-day recertification resource-specific subscription to the NCTI Amp Library. This exam is not proctored and is open-book; usage of the Library is encouraged while taking this exam. Technicians who fail may purchase additional opportunities to pass. Questions are pulled from a pool of approximately 3,000 questions and will vary each time the assessment is taken.

NCTI currently offers recertification for the following:
» Master Technician
» Master Technician, HFC Networks
» Master Technician, Customer Premises
» Senior Master Technician

Recertification guidelines go into effect for each technician when he or she first certifies. Effective January 1, 2014, previously certified technicians have three years (36 months) to meet these new provisions.

Master Technician Equivalency Exams

The Master Technician collection of test-out assessments is ideal for organizations that have developed comprehensive in-house new hire and early-career training and for those seasoned technicians that have considerable knowledge and experience but have not pursued industry certification or advanced learning. In both instances, many installers and technicians are missing out on the opportunity to become a certified NCTI Master Technician. Master Technician certification offers the employee additional opportunities for growth and development which leads to increased employee retention and customer satisfaction. These assessments offer experienced technicians and installers the opportunity to progress toward becoming a Master Technician by testing out of courses and then pursuing course work that relates closer to their job responsibilities, skill sets and goals. Upon successful completion of these exams, NCTI will consider the student as having passed these required courses for Master Technician certification and the student will earn the applicable college credit. These assessments also offer MSOs an opportunity to integrate the NCTI Master Technician courses into their total training program. Students have 30 days from point of enrollment to complete the exams. Master Technician certification is the starting point for a College Certificate or Associates Degree and may also allow technicians to prepare for other industry certifications. Additionally, an MSO can use the Installer or higher level exam as a new hire placement assessment to evaluate a candidate’s level of technical knowledge.
NCTI Telecom Specialist

The NCTI Telecom Specialist Certification recognizes the distinct expertise of installation professionals who support legacy subscriber services.

An NCTI-certified Telecom Specialist is skilled in the installation and troubleshooting of modern and legacy subscriber services over a copper pair network and fiber optic networks such as Passive Optical Networks (PON) and Fiber to the Premises (FTTP). The services include Plain Old Telephone Service (POTS), Digital Subscriber Line (DSL), Voice over IP (VoIP).

To be qualified as an NCTI Telecom Specialist, industry professionals must successfully complete a defined set of courses related to this specific set of proficiencies.

Integrated Career Path for Telecom Specialist

NCTI TELECOM SPECIALIST COURSES
- Introduction to Telecom Operations
- Telephone Home Wiring
- Applying Wi-Fi Technologies
- Fiber Installation and Activation

IN HOUSE TRAINING
- Fiber Testing and Maintenance
- Introduction to Wide Area Networks
- Understanding Voice and Data Networks

TECHNICAL CERTIFICATES
- MSO Specific Training

TECHNICAL CERTIFICATES
- Telecom Specialist

PROGRESSING TOWARD
- Master Technician
- Master Technician, HFC Networks

ACADEMICS
- Broadband Technology College Certificate
- Associate of Applied Science, Broadband Technology Communication Degree

NCTI.com | 866.575.7206
Installer
Part of the Master Technician Certification Series

OVERVIEW
The Installer course is the foundation for NCTI’s Technical Career Path, as well as an essential preparation for the Broadband Digital Installer and Installer Technician courses. Beginning with a comprehensive overview of a broadband cable system, the course provides the student with a working knowledge of the system from the signal sources to the customer premises equipment, while teaching the student proper installation and troubleshooting techniques. This course discusses transmission mediums—Wi-Fi, Multimedia over Coax Alliance (MoCA) and quad play technologies, such as video, voice, data and home security services. The student is also provided with the processes and procedures surrounding digital signal tests and measurements. Specific references to more than 50 basic safety standards (OSHA and ANSI) as well as electrical codes (NEC and NESC) are made throughout the course.

Delivery Options:
All learning, lesson and final exams are delivered and taken online. Students will be able to print a resource guide.

Completion Time:
The estimated completion time for this course is 30 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry recognized NCTI certificate of graduation
» earn three hours of college credit
» can use this course to help prepare for SCTE’s Broadband Premises Installer certification
» receive credit towards NCTI Master Technician certification
» receive credit toward NCTI Master Installer certification

Ideal for:
» newly hired installers
» experienced technicians and installers interested in a refresher on current installation techniques

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. describe the operation of a broadband cable system
2. explain the safety regulations, customer service requirements, functions of drop components and connection/interface of customer premises equipment in a broadband drop system
3. identify customer concerns and solve customer problems
4. correctly use and maintain all required installation hand and power tools
5. describe required ladder inspections and practice safe ladder handling techniques
6. describe the required pole climbing safety inspections and safe pole climbing procedures
7. identify features and control components, perform measurements and maintain digital multi meters and signal level meters
8. identify F-connectors and explain how to install various indoor and environmentally sealed F-connectors

(Continued)
COURSE OBJECTIVES (Continued)

9. describe the use of passive optical networks (PON) architecture and equipment
10. explain the Radio frequency over glass (RFoG) standard
11. safely and correctly perform single resident aerial and underground installations from the tap to the customer premises equipment, following all pertinent safety regulations and recommended practices/procedures
12. interpret digital measurements to evaluate digital signal quality
13. examine the fundamentals of coaxial drop cable, fiber-optic drop cable, twisted-pair cable, Wi-Fi and MoCA technologies

COURSE OUTLINE

1. Broadband Technology Overview
   Explaining network architecture, analyzing frequency, channels and power, examining analog and digital signals and understanding bandwidth

2. Transmission Mediums
   Examining the fundamentals of coaxial drop cable, fiber optic drop cable and twisted-pair cable, describing Wi-Fi technology, Multimedia over Coax Alliance (MoCA) and the function of drop passives and actives

3. Quad-Play Technologies
   Understanding various digital television formats and displays available to customers, describing recording and playing devices, examining high-speed data, data delivery and hardware and discussing IP voice services and home security systems

4. Safe Installation Practices
   Examining personal protective equipment, ladder safety equipment, pole climbing safety equipment, evaluating the foreign voltage detector, understanding OSHA standards and discussing fiber-optic drop safety

5. Accessing Aerial Plant
   Understanding the aerial plant and discussing ladder safety, proper climbing techniques and how to use a bucket truck

6. Installation Tools
   Examining installation tools and test equipment

7. Exterior Coaxial Cable Craftsmanship
   Examining first steps to quality work, understanding how to install underground cable and aerial cable, identifying drop installation best practices and understanding how to mount splitters, attach the drop to the premises and bond the drop

8. Interior Coaxial Cable Craftsmanship
   Examining interior cable routing and how to fish walls, examining how to connectorize drop cable and discussing multiple dwelling unit installations

9. Troubleshooting the Drop
   Analyzing the troubleshooting process and examining ingress, egress and filters

10. FTTx Basics
    Describing overall fiber-optic network architectures and examining step-by-step how to connect a customer with a fiber-optic drop.

11. Customer Service Essentials
    Identifying internal vs. external customers, examining communication skills and examining personal standards, customer retention, effective customer interactions and stress management

12. Work Order: Video Services Installation
    Examining video services equipment and diagnostics, identifying how to connect video services, understanding television services and controls, discussing customer education and troubleshooting video problems

13. Work Order: High-Speed Data Services Installation
    Discussing site surveys, analyzing Ethernet, examining wiring/design topologies, modems, computer/HSD device setup and wiring errors and troubleshooting HSD

14. Work Order: Voice Services Installation
    Understanding voice services installation and telephone installation, describing tools, connectors and cordage in telephone wiring, examining alarm systems, identifying and testing common devices used on home telephone networks and troubleshooting IP voice installation

15. Work Order: Home Security Installation
    Understanding unique customer service situations, identifying how to install home security systems and examining how to finish the installation.
Techsellence

OVERVIEW
Techsellence is an online course designed to help you remain competitive by expanding sales opportunities while in the customer’s home. This course teaches field personnel to effectively evaluate each customer’s unique situation, use that information to introduce customers to enhanced services and products and ensure a positive customer experience. The student will learn to quickly grasp communication and observation strategies by reviewing various customer/field personnel interactions. With effective communication skills on the job, the student will proficiently drive overall customer satisfaction and increase sales.

Delivery Options:
□ All learning, lesson and final exams are delivered and taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is three months from the date of enrollment.

BENEFITS
Upon completion students will:
» increase product knowledge and enhance customer contact skills
» understand practical applications to test their knowledge and help improve their job performance
» identify clues within the customers’ premises that open new sales and communication opportunities
» understand the value of caring for customers’ needs and increase customer service ratings
» increase revenue potential for enhanced services
» receive an industry-recognized NCTI® certificate of graduation
» receive credit toward NCTI Master Installer certification

Ideal for:
Field personnel, including:
» technicians
» installers

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. evaluate each customer’s situation and use that information for mutual benefit
2. understand why communication skills are as important as technical skills
3. react appropriately to negative customer contact
4. expand their professionalism in the field and give customers one more reason to remain loyal
5. use teamwork and product knowledge to improve customer satisfaction
6. emphasize the importance of their role and highlight creative ways to increase customer satisfaction in light of increasing competition
7. identify how to make customers more aware of enhanced services

(Continued)
COURSE OUTLINE

1. Sales and Service Culture
   Discussing fundamentals of customer service and exploring customer situations

2. Why is Change Needed?
   Identifying purpose of customer service, discussing various communication techniques and exploring customer service benefits

3. How do I do it?
   Defining teamwork, identifying examples of teamwork, understanding product knowledge, identifying benefits of product knowledge, determining individual level of product knowledge, examining customer scenarios and identifying clues and identifying steps to assist customers

4. Working with the Customer
   Examining communication techniques regarding negative customer contact, identifying opportunities to upgrade and examining customer scenarios to identify communication techniques

5. Wrap-up
   Reviewing communication tools, re-examining steps to customer service and reviewing areas of product knowledge tied to sales opportunities

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Field Safety

OVERVIEW
The Field Safety course is an excellent resource for the technician who values safety and desires to understand the reasoning behind safe work practices. This course was specifically designed to give the technician necessary knowledge tools to perform with greater safety on the job. Personal protective Equipment (PPE), correct pole climbing techniques, proper ladder handling and methods for identifying foreign voltages are just a few topics covered in this course. The latest OSHA requirements are identified and covered in detail. Field Safety is meant to be both a standalone course; and a component of the Installer course series.

Delivery Options:
This course is delivered online. Lesson and final exams are taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry recognized NCTI certificate of graduation
» use what they’ve learned to help prepare for SCTE’s Broadband Premises Installer certification

COURSE OBJECTIVES
Upon completing this course, the student will be able to:
1. explain proper inspection and use of safety equipment
2. describe best practices for ladder safety
3. describe best practices for pole safety
4. use a foreign voltage detector when checking for stray voltage
5. identify when a hot chassis condition occurs and how to identify the source
6. analyze fiber-optic drop safety best practices
7. identify the equipment necessary to prepare a company vehicle
8. describe how to perform maintenance checks on a company vehicle
9. describe safety rules to be followed when driving a company vehicle
10. describe safe and effective practices prior to using a ladder or starting to climb a pole in order to access the aerial portion of the plant
11. describe safe and effective practices while on a ladder or climbing a pole to access the aerial components of the plant
12. describe safe and effective ladder and pole climbing practices when descending from the aerial portion of the plant
13. identify the proper use of a bucket truck when used to access the aerial elements of the plant

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy-to-read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OUTLINE

1. Safe Installation Practices
   Examining personal protective equipment; discussing vehicle maintenance and use, ladder safety equipment and pole climbing safety equipment; evaluating the foreign voltage detector; understanding OSHA standards and discussing fiber-optic drop safety

2. Accessing Aerial Plant
   Understanding the aerial portion of the plant and discussing ladder safety, proper climbing techniques and how to use a bucket truck
Customer Service for Technicians

OVERVIEW

Created specifically for the broadband industry, Customer Service for Technicians is a thorough guide for helping technicians deliver the highest levels of customer service. Designed to provide technicians with tools they can use immediately, the course covers the entire spectrum of customer service-related issues: developing customer service skills, proper communication techniques, customer account management, retention and loyalty, selling services, stress management, customer education and understanding advanced communication competition.

Delivery Options:
The course is delivered online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from the date of enrollment.

BENEFITS

Upon completion students will:

» learn how to immediately and positively affect customer satisfaction and loyalty rates
» save repeat truck roll expenses by educating customers on premises equipment functions
» reduce accounting expenses related to billing and customer database errors
» receive an industry-recognized NCTI® certificate of graduation
» use this course to help prepare for SCTE’s Broadband Premises Installer certification

Ideal for:
Technical personnel of any level, including:
» installers
» service technicians
» technical field personnel
» technical supervisors and management
» technical support staff

COURSE OBJECTIVES

Upon completing this course students will be able to:

1. describe techniques for overcoming communication obstacles and exhibiting professionalism when handling customers.
2. identify specific techniques for handling difficult customer service situations at the customer premises.
3. explain how to effectively demonstrate empathy when communicating with customers.
4. identify the obstacles associated with effective listening practices and explain how to overcome them.

(Continued)
COURSE OBJECTIVES (Continued)

5. explain how to structure open and closed questions to deal effectively with a customer.
6. describe alternative words, phrases and behaviors to use when dealing with an irate or disappointed customer.
7. describe what needs to be done so customers perceive value in purchasing telecommunication services.
8. demonstrate the steps involved in selling telecommunications services.
9. list successful techniques for releasing stress and coping with stress in a positive manner.
10. describe stress relievers that can help in managing difficult situations.
11. identify methods for matching educational resources with learning styles.
12. determine if the customer has successfully learned how to operate the digital video service.
13. recognize recording limitations due to copy protection.
14. determine the level of customer education that should be provided to the high-speed data customer.
15. identify additional important points of education for IP voice customers in single and multi-family dwellings.
16. list ways an installation technician can ensure customer satisfaction in a small business IP voice installation.
17. describe the competitive role of all high-speed data providers.

COURSE OUTLINE

1. Providing Customer Service
   Developing customer service skills, leading with customer service skills, maintaining accounts and up selling services, managing stress and educating the customer

2. Communicating Effectively
   Using successful communication techniques, developing good listening techniques, using a clear tone of voice and practicing a confident telephone technique

3. Retaining Customers
   Managing customer problems, responding to an irate customer and ensuring customer retention

4. Maintaining Customer Accounts
   Keeping customer accounts, processing customer accounts, processing customer payments and managing customer data

5. Selling Communications Services
   Preparing a sales presentation, examining key selling concepts and following the proper sales process

6. Managing Stress
   Reducing the effects of stress, coping with stress and preventing burnout

7. Educating the Digital Video Customer
   Preparing to educate the digital video customer, demonstrating digital video features and operating procedures, explaining key digital video concepts to the customer and handling difficult customer education situations

8. Educating the High-Speed Data and Voice Customer
   Educating the high-speed data service customer, educating the IP Voice customer and providing customer service at IP Voice installations for small business

9. Understanding Competitive Services
   Summarizing the competitive background, examining competing telecommunications services and bringing to light the value of cable

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Applying Wi-Fi Technologies
Part of the Telecom Specialist Certification Series

OVERVIEW
The NCTI® Applying Wi-Fi Technologies course teaches the broadband technician about the application of elements and principles that support installation and troubleshooting of Wi-Fi within the home, as well as in business environments. Wave propagation, channel assignment, interference, security and frequency bands, are just some of the fundamental topics technicians working in the Wi-Fi environment must understand. While Wi-Fi signals have become commonplace, there remains the need to understand the various ways devices receive and process Wi-Fi Data, troubleshoot interference and optimize Wi-Fi within the home or business. The Applying Wi-Fi Technologies course is appropriate for all Wi-Fi installation and troubleshooting technicians working in a Wi-Fi environment, offering fundamental as well as advanced topics.

Delivery Options:
The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated seat time for this course is 10 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Telecom Specialist certification

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. identify the types of radio waves and characteristics of frequency bands used in Wi-Fi
2. compare the features of the amendments to the IEEE standard 802.11
3. identify the components of a router used in the Wi-Fi network
4. analyze the characteristics of antennas used in Wi-Fi communications
5. explain the qualities of MIMO devices and how they are used to transmit and receive data
6. examine the types of security systems used to protect the Wi-Fi network
7. examine the router’s configuration pages to recognize the settings on a wireless router
8. analyze channel selection and interference to ensure connection to a network
9. recognize how signal strength is expressed in Wi-Fi and how it affects speed and reliability
10. examine the impact of interference and speed on the performance of a wireless network
11. describe Wi-Fi scanners and the information they display

RECOMMENDED PREREQUISITE
» Installer
» Computers and Broadband Modems

RELATED COURSES
Students completing this course should then enroll in:
» Installer Technician
» Troubleshooting Advanced Services

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials enhanced with online videos
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
12. describe how Wi-Fi spectrum analyzers are used to identify radio frequency activity in the 2.4 and 5 GHz bands
13. explain how site survey tools work
14. describe the factors used in the installation and placement of a gateway and/or router
15. describe the process for logging into a router and altering administrative settings
16. identify and configure Wi-Fi security
17. explain the difference between installing an additional access point and a wireless router
18. describe what considerations are used when deploying multiple access points
19. explain the methods used to improve signal strength
20. Describe the different Wi-Fi security features
21. Identify and explain SMB and enterprise hardware and software
22. Describe what steps are needed to improve poor signal strength
23. Identify the primary types of interference that affects Wi-Fi signal
24. Describe the types of non-Wi-Fi interference and troubleshooting solutions
25. Explain Wi-Fi devices speed processing capabilities

**COURSE OUTLINE**

1. **Wi-Fi Foundations**
   Explaining RF basics, reviewing 802.11 amendments, exploring wireless routers and gateways, reviewing antennas, exploring multiple input, multiple output (MIMO) and exploring Wi-Fi security

2. **Understanding Wi-Fi**
   Understanding a router’s settings, reviewing channels and interference, examining signal strength and discussing interference and speed

3. **Wi-Fi Tools**
   Explaining Wi-Fi scanners, reviewing spectrum analyzers and exploring site survey tools

4. **Installation of Residential Wi-Fi**
   Identifying gateway or router placement, setting up the wireless router, setting up Wi-Fi security and adding additional access points

5. **Installation of Commercial Wi-Fi**
   Working with multiple access points, considering signal strength in a commercial environment, introducing enterprise Wi-Fi security, identifying SMB and enterprise hardware and software

6. **Troubleshooting Wi-Fi**
   Troubleshooting Wi-Fi signal strength, examining Wi-Fi interference, examining non-Wi-Fi interference and examining client device capabilities
Broadband Digital Installer

Part of the Master Technician Certification Series

OVERVIEW

Broadband Digital Installer presents background information and installation practices pertaining to digital TV, Data over Cable Service Interface Specification (DOCSIS®) high-speed Internet, PacketCable™ telephone and home automation services for the connected home. Broadband professionals will be instructed on what is involved in certifying the reliability of the drop for digital TV, high-speed Internet and telephone service, as well as step-by-step installation procedures for each service. Because the DOCSIS and PacketCable technologies are unique to the broadband cable industry, the course provides extensive information about their origination and the advantages that each offers. The evolution of DOCSIS is detailed from its initial release through all versions including DOCSIS 3.1 and includes an explanation of what transpires in the background when a modem is being provisioned for service. Due to the rapid growth of and interest in home security and home automation within the broadband industry, this course covers the protocols that power the connected home as well as the connected home ecosystem.

Delivery Options:

The course is delivered online. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is 22 hours. The maximum allotted time is four months from the course enrollment date.

BENEFITS

Upon completion students will:

› receive an industry recognized NCTI certificate of graduation
› receive credit toward NCTI Master Technician Customer Premises certification
› earn three hours of college credit

Ideal for:

Broadband cable personnel who want to learn about installing digital TV, high-speed Internet access services, cable telephone service and home automation protocols, including:

› installers and technicians
› advanced services installers and technicians
› high-speed data installers and technicians
› telephone installers and technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. explain how the digital terminal adapter is used to deliver digital TV services
2. list the features of the different versions of DOCSIS through DOCSIS 3.1
3. describe the initialization and authorization process of a DOCSIS cable modem
4. describe how cable modem data is transported in the broadband cable network
5. describe the steps required to certify the reliability of a customer’s cable drop system for cable modem and telephone services
6. describe how packet switching compares to circuit switching technology
7. specify the techniques, precautions, standards, options, tools and materials used when installing unshielded twisted-pair cable

(Continued)
COURSE OBJECTIVES (Continued)

8. describe untwisted and twisted-pair cable, their color codes and their applications
9. describe the different categories and levels of twisted-pair cable
10. describe the different wiring configurations of twisted-pair cable at a jack and modular connector
11. compare the data rates of the different Wi-Fi® designations
12. describe how Multimedia over Coax Alliance (MoCA) is used in the home media network
13. describe home automation and its history
14. describe the differences between the ZigBee® and Z-Wave® communication process
15. identify and analyze different home automation platforms and their currently supported protocols
16. describe what must be considered during a cable telephone installation if the customer has a monitored alarm system

COURSE OUTLINE

1. Installing Digital Television Services
   Qualifying the signal for digital TV services; recognizing connection options, including direct, digital terminal adapter (DTA), digital set-top box (STB) and cable gateway and identifying consumer electronics in the home entertainment center
2. Introduction to DOCSIS
   Detailing the origins of DOCSIS modems, the DOCSIS architecture, the DOCSIS equipment certification process; comparing DOCSIS to the OSI reference model; describing the different versions of DOCSIS, shared networks, DOCSIS transmissions, asymmetric data throughput and long-loop automatic gain control
3. DOCSIS Modem Operations
   Obtaining DOCSIS single carrier RF operating parameters, obtaining DOCSIS 3.1 RF operating parameters, establishing an identity in the DOCSIS network and maintaining DOCSIS modem security
4. Installing a DOCSIS Modem
   Qualify the cable drop for cable modem service, locating and activating the cable modem and educating the customer
5. Introducing VoIP
   Exploring the world of VoIP, understanding cable telephony’s evolution from constant bit rate (CBR) to VoIP and understanding how the PacketCable VoIP service differs from other VoIP services
6. Installing VoIP
   Exploring VoIP pre-installation issues, installing the embedded multimedia terminal adaptor (EMTA) and connecting it into the customer’s telephone network
7. Introducing Twisted-Pair Inside Wiring
   Introducing the network interface device, untwisted and twisted-pair cables, twisted-pair cable hardware and routing topologies
8. Installing Twisted-Pair Inside Wiring
   Pre-qualifying existing telephone and broadband services, describing twisted-pair installation tools, routing and attaching unshielded twisted-pair cable, adding a modular telephone jack, installing modular telephone line cord plugs and data plugs on unshielded twisted-pair cable
9. Installing the Home Media Network
   Defining the media network and home automation protocols within the customer premises, introducing TV everywhere, discussing the Digital Living Network Alliance (DLNA), identifying the elements of the home media network, discussing Wi-Fi, HomePNA, HomePlug and MoCA technologies and defining the protocols that automate the Connected Home
10. Connected Home Transmission Technologies
    Describing home automation and its history; identifying home automation protocols as well as the fundamental background of each, describing the communication process between the app, hub and home automation devices within the premises and describing home automation network topologies
11. Install VoIP in Homes with Electronic Security Systems
    Understanding issues related to VoIP installations and electronic security system incompatibility, installing VoIP with a home security system and understanding VoIP problems with modem-type devices
FTTx Basics

OVERVIEW
The seemingly unquenchable demand for higher data speeds by consumers seems never ending. Fiber-to-the-“x” or fiber-to-the node, curb, business, home, premises, etc., is one way to quench this demand. Many broadband companies have dabbled with FTTx, in particular FTTH (fiber-to-the-home), and this trend is increasing in part due to competitive pressures. A company with technicians trained in FTTx is poised to take advantage of the growing demand for speed through fiber. The FTTx Basics course describes overall fiber-optic network architectures and provides in-depth step-by-step instructions for connecting a customer with a fiber-optic drop.

Delivery Options:
The course is delivered online and includes activities to promote learning. Lesson and final exams are taken online.

Completion Time:
Varies based on the student’s self-study pace; however, the maximum time allowed is four months from date of enrollment.

BENEFITS
Upon completion students will:
» understand the process for fusion splicing fiber-optic cable
» be able to effectively connect fiber-optic cable at the premises
» become knowledgeable of passive optical networks (PON) architecture and equipment
» understand the Radio frequency over glass (RFoG) standard
» be able to complete fiber-to-the-home installations
» receive an industry-recognized NCTI® certificate of graduation

Ideal for:
Technical personnel supporting Fiber-to-the-“x” services, including:
» installers
» installer technicians
» technical service representatives

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. describe the different “fiber-to-the-x” topologies used in broadband cable networks
2. describe a passive optical network
3. identify the different categories of fiber-optic cable that are used in a passive optical network
4. recognize the different topologies used in passive optical networks
5. explain how the radio frequency over glass (RFoG) standard operates with any passive optical network
6. identify the elements of a passive optical network
7. describe different applications for optical splitters
8. identify multiple fiber strands after a splitter on an OTDR trace
9. identify various connectors used with fiber-optic drops

(Continued)
COURSE OBJECTIVES (Continued)
10. sequence the steps to prepare drop fiber for splicing
11. describe pigtailed used for optical fiber terminations
12. describe the procedure for fusion splicing a drop fiber to a pigtal
13. identify the typical sources of failure in the outside plant
14. specify which fiber-optic test sets are used to troubleshoot common troubles
15. identify recommended fiber-optic restoration activities

COURSE OUTLINE

1. Operational Procedures
   Introducing FTTx network topologies, describing passive optical network topologies, examining the elements of a passive optical network (PON), installing at the optical network unit (ONU) and troubleshooting FTTx installations
Discovering DOCSIS 3.1 – Customer Premises

OVERVIEW
For many broadband cable operators DOCSIS has supplanted pay TV as their most popular and profitable service offering. To support the growth of this product all customer contact employees should have a thorough understanding of the DOCSIS product. The Discovering DOCSIS 3.1 – Customer Premises minicourse is targeted to field and customer care center employees that install, service and support DOCSIS products inside the customer premises. Comprised of three lessons, the course details the evolution of DOCSIS beginning with DOCSIS 1.0 and continuing through DOCSIS 3.1 and explains what goes on in the background when a modem is provisioned for service. Orthogonal frequency division multiplexing (OFDM), the transmission system used in DOCSIS 3.1, is introduced and explained, preparing the student for the next generation of DOCSIS. Lastly, the course instructs the student on preparing the DOCSIS modem for installation, activating the DOCSIS modem in the customer premises and then educating the customer.

Delivery Options:
This course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 6 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» recognize how DOCSIS compares to the open systems interconnection (OSI) reference model
» make the distinction between the features in the different versions of DOCSIS
» learn how orthogonal frequency division multiplexing (OFDM) departs from legacy transmission systems
» learn why asymmetric data rates are common
» fully comprehend the initialization and authorization of a DOCSIS cable modem
» recognize how DOCSIS modems establish their identity in the network and obtain their operating parameters
» be able to install and activate a cable modem in the customer premises
» provide the customer the appropriate amount of product education
» receive an industry recognized NCTI certificate of graduation

Ideal for:
Broadband cable personnel who want to learn about DOCSIS enabled high-speed Internet access service, including:  
» installers and technicians  
» advanced services installers and technicians  
» high-speed data installers and technicians  
» customer care agents

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OBJECTIVES

Upon completing this course students will be able to:

1. describe the origins of the DOCSIS
2. identify the function of the major DOCSIS elements
3. explain the equipment certification process according to DOCSIS standards
4. explain how the DOCSIS network relates to the Internet protocol suite
5. list the features of the different versions of DOCSIS
6. describe the merits of DOCSIS 3.1
7. describe the initialization and authorization process of a DOCSIS cable modem
8. identify the client and the server in the DOCSIS architecture
9. describe how cable modem data is transported in the broadband cable network
10. instruct the customer how to most effectively use the newly installed high-speed broadband Internet access service
11. describe the steps required to certify the reliability of a customer’s cable drop system for cable modem and telephone services

COURSE OUTLINE

1. Introduction to DOCSIS
   Details the origins of DOCSIS modems, the DOCSIS architecture, the DOCSIS equipment certification process, compares DOCSIS to the OSI reference model, describes the different versions of DOCSIS, shared networks, DOCSIS transmissions, asymmetric data throughput and long-loop automatic gain control

2. DOCSIS Modem Operations
   Obtaining DOCSIS single carrier RF operating parameters, obtaining DOCSIS 3.1 RF operating parameters, establishing an identity in the DOCSIS network and maintaining DOCSIS modem security

3. Installing a DOCSIS Modem
   Qualification of the cable drop for cable modem service, locating and activating the cable modem and educating the customer
Advanced DOCSIS Operations

OVERVIEW
The NCTI Advanced DOCSIS Operations course is directed to an audience of engineers and headend technicians who have responsibility for configuring and maintaining DOCSIS operations throughout the broadband cable network. The course provides an overview of DOCSIS 3.1 and catalysts for its development before going into detail about orthogonal frequency division multiplexing (OFDM) and how it is applied and configured for DOCSIS 3.1. The course explains key operational DOCSIS parameters that must be configured for operations and then monitored after the product is launched to broadband cable customers. Legacy DOCSIS versions share many of the same configurations with DOCSIS 3.1, which is built on top of the legacy DOCSIS architecture. Thus, this course offers value to students working with DOCSIS versions prior to 3.1 as well. Technicians will even learn about some lesser known features of DOCSIS 3.1, how to enable them and their benefit to the operator and customers.

Delivery Options:

This is an e-learning course that is delivered completely online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 20 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Broadband cable personnel who want to learn about DOCSIS and are responsible for configuring and maintaining DOCSIS operations throughout the broadband cable network, including:
» headend and hub technicians
» area engineers
» HFC network engineers/technicians

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. identify and list the catalyst for DOCSIS 3.1
2. describe the DOCSIS architecture
3. describe how DOCSIS compares to the Open Systems Interconnection (OSI) reference model
4. describe how DOCSIS 3.1 shares the downstream frequency spectrum with previous DOCSIS versions
5. describe the DOCSIS 3.1 downstream radio frequency spectrum
6. describe how the RF downstream parameters of DOCSIS 3.1 compare to previous DOCSIS versions

(Continued)
COURSE OBJECTIVES (Continued)

7. describe the anatomy of the DOCSIS 3.1 downstream channel
8. describe which DOCSIS 3.1 downstream channel parameters need to be optimized for reliable operations
9. describe how DOCSIS 3.1 can adapt to varying network conditions
10. explain how DOCSIS 3.1 downstream and upstream profiles are crafted
11. describe how DOCSIS 3.1 modems acquire their respective profiles
12. describe the configuration settings that must be made in order to operate DOCSIS 3.1 while using legacy versions of DOCSIS modems
13. describe Time and Frequency Division Multiplexing and how they can be combined for efficient spectrum usage
14. explain the bonding of single carrier channels with orthogonal frequency division multiplexing (OFDM) channels
15. list the downstream and upstream Proactive Network Maintenance Metrics to enhance network reliability
16. explain how a fast Fourier transform is used and applied to OFDM
17. recognize the significance of some key cable modem termination system (CMTS) configurations
18. describe how DOCSIS service groups are built

COURSE OUTLINE

1. Deploying DOCSIS 3.1
   Identifying catalysts for DOCSIS 3.1, reviewing the DOCSIS 3.1 architecture and comparing DOCSIS to the OSI reference model

2. Configuring DOCSIS 3.1 Downstream Subcarriers
   Defining the DOCSIS 3.1 downstream RF framework, categorizing the DOCSIS 3.1 OFDM downstream subcarriers and optimizing the downstream channels

3. Creating Downstream Profiles
   Adapting to varying network conditions, crafting downstream profiles and obtaining downstream profiles

4. Configuring for Backward Compatibility
   Maximizing the spectrum of DOCSIS 3.1 and legacy devices and examining DOCSIS 3.1 migration strategies

5. Introducing Proactive Network Maintenance
   Instilling proactive network maintenance, examining how proactive network maintenance works and reviewing proactive network maintenance case studies

6. Building Service Groups
   Reviewing cable network architecture, describing how service groups are built and reviewing a more complex cable configuration example
Full Duplex DOCSIS 3.1

OVERVIEW

With distributed access architecture (DAA) development underway, CableLabs® engineers working on the 3.1 version of the Data Over Cable Service Interface Specification (DOCSIS®) saw an opportunity that leverages DAA to enhance upstream capacity. The resultant Full Duplex (FDX) DOCSIS 3.1 specification defines simultaneous upstream and downstream communications for symmetrical upstream and downstream data rate capacity. The NCTI Full Duplex DOCSIS 3.1 course teaches the broadband technician about interferences unique to FDX operation and how these interferences are addressed. The course also explains the difference between full duplex operation and frequency division duplexing, and how both are used for FDX DOCSIS 3.1 operations. Completing the NCTI FDX DOCSIS 3.1 course prepares the broadband technician for when FDX DOCSIS 3.1 operations are launched in their network.

Delivery Options:
- The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
- prepare for implementation of Full Duplex DOCSIS 3.1
- understand concepts of full duplex communications
- receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone whose system is considering or already implementing DOCSIS 3.1 full duplex operation

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. list reasons for Full Duplex DOCSIS 3.1 deployment
2. define what full duplex operation is
3. identify the frequency band allocated for Full Duplex DOCSIS 3.1 operations
4. describe what is required of a fiber node for full duplex operation
5. describe DOCSIS 3.1 FDX-Limited modems
6. describe how interference groups are used to limit interference between full duplex modems
7. describe the sounding process and hierarchy of resource block assignments, transmission groups to manage traffic in full duplex interference groups
8. describe echo cancellation at the node
9. describe how adjacent leakage interference and adjacent channel interference at the modem is suppressed with echo cancellation

(Continued)
COURSE OUTLINE

1. Implementing Full Duplex DOCSIS 3.1
   Weighing full duplex operations, identifying the full duplex frequency spectrum, recognizing full duplex downstream and upstream power levels

2. Enabling Full Duplex Operation
   Defining interference groups, discovering interference groups, suppressing echoes in the FDX fiber node and addressing interference in FDX modems
Troubleshooting Advanced Services
Part of the Master Technician Certification Series

OVERVIEW

The Troubleshooting Advanced Services course builds on the knowledge acquired in the Broadband Digital Installer course and complements it with a focus on troubleshooting. The three main service areas of a cable operator are covered in the course: digital video, data and voice. The course is geared toward troubleshooting at the customer premises and teaches real-world processes that the student can use in an actual work environment. Scenarios are presented for addressing specific issues of triple-play services at the premises, as well as the philosophy, mindset and attitude of a successful troubleshooter that can be applied to any circumstance.

Delivery Options:
The course is delivered online. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 18 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
» solve problems in customer homes related to digital video, high-speed data (HSD) services and IP Voice services more effectively and efficiently
» gain a thorough understanding of the use of test equipment, including digital signal analyzers, cable modem analyzers, telephone test sets and twisted-pair cable testers
» increase their technical knowledge base to maintain and troubleshoot the drop network and customer premises equipment
» receive an industry-recognized NCTI certificate of graduation
» use this course to help prepare for SCTE’s Broadband Premises Installer, Broadband Premises Technician and Broadband Telecom Center Specialist certifications
» receive credit towards NCTI Master Technician certification

Ideal for:
Personnel assigned to troubleshoot and repair products or services in the customer home, such as:
» installation repair technicians
» service technicians
» advanced installers
» high-speed data technicians

RECOMMENDED PREREQUISITES
» Installer Technician
» Broadband Digital Installer

RELATED COURSES
Students completing this course should then enroll in:
» Service Technician
» Fiber Installation and Activation
» Return Path Operations

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com

(Continued)
COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. explain the characteristics of a successful troubleshooter
2. troubleshoot the set-top box and its interfaces, especially the high-definition multimedia interface (HDMI)
3. troubleshoot customer audio issues, VOD, DVR and multiroom DVR service using Multimedia over Coax Alliance (MoCA) technology
4. explain perceptual quality metrics and their relationship to the digital video mean opinion score (MOS)
5. describe the adverse effects of the various parts of the network on digital video services
6. identify the appearance, cause and resolution of the various digital video artifacts likely to be seen by the customer
7. describe the use of digital signal analyzers and cable modem analyzers including modulation error ratio (MER), bit error rate (BER) and forward error correction (FEC) constellation patterns and adaptive equalization
8. detail the features of DOCSIS 3.1 and compare it to previous versions including channel bonding, IPv6 and IP multicast
9. troubleshoot specific HSD service problems in the customer premises
10. describe the construction and terminations of telephone wiring and twisted-pair cable
11. explain how no dial tone, continuous dial tone, noise on the line and ringer problems are the result of specific wiring issues in the customer premises
12. use a digital multimeter, a telephone test set, a tone generator/inductive amplifier probe, a twisted-pair cable tester, a modular cable tester and wiremap field test instrument to troubleshoot twisted-pair inside wiring
13. describe the function and interpret the front panel indicator lights of an embedded multimedia terminal adapter (EMTA)
14. troubleshoot EMTA initialization failures and isolate IP Voice service problems during and after installation and activation

COURSE OUTLINE

1. Troubleshooting Digital Video Service
   Dissecting digital video troubleshooting, troubleshooting the digital set-top box, examining potential HDMI problems, troubleshooting audio issues associated with digital video and attacking advanced digital video issues

2. Qualifying Digital Video
   Discerning digital video quality and isolating digital video points of failure

3. Troubleshooting the Digital Video Experience
   Observing digital video artifacts and troubleshooting digital video and audio

4. Using Digital Signal Analyzers
   Describing digital measurements, operating the digital signal analyzer and using cable modem analyzers

5. Troubleshooting High-Speed Data Service
   Delivering high-speed data service, detailing the features of DOCSIS 3.1 and resolving problems in the customer premises

6. Troubleshooting Telephone Wiring and Twisted-Pair Cable
   Identifying telephone wiring problems and describing twisted-pair wiring problems

7. Troubleshooting Twisted-Pair Inside Wiring
   Explaining twisted-pair cable malfunctions and troubleshooting twisted-pair wiring

8. Using Twisted-Pair Inside Wiring Test Equipment
   Using telephone test sets, using a tone generator and inductive amplifier probe, using a twisted-pair cable tester, using a modular cable tester and introducing the wiremap field test instrument

9. Troubleshooting IP Voice
   Understanding how to troubleshoot IP Voice service, examining the embedded multimedia terminal adapter and diagnosing IP Voice service problems

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Computers and Broadband Modems
Part of the Master Technician Certification Series

OVERVIEW
Computers and Broadband Modems introduces the fundamentals of personal computer (PC) hardware and software in connection with DOCSIS® cable modems. Students completing this course gain a thorough understanding of how the PC and modem interface with the broadband cable network. Topics of study include a detailed description of the major components in a PC and how they interact in the computer system; a review of Microsoft Windows, Apple and Linux operating systems with explanations of their respective features and vulnerabilities; an overview of mobile devices and their operating systems; wireless networks, Wi-Fi and Bluetooth; computer security and an introduction to DOCSIS cable modems and their installation.

Delivered online, the course includes videos and activities that are intended to help the student retain key points of information. The videos are hosted by Mike Meyers, author and holder of multiple IT industry certifications, whose colorful and humorous teaching makes the course both entertaining and effective. The Computers and Broadband Modems course is an excellent reference for the student learning about computer concepts and terminology. However, the cable modem lessons assume prior technical knowledge.

Delivery Options:
- The course is delivered online with in-course activities to promote learning. Lesson and final exams are also taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
- effectively troubleshoot basic personal computer problems
- recognize the capabilities and limitations of the different Windows, Apple and Linux operating systems
- thoroughly educate new high-speed data customers on their wired and wireless connected equipment’s operation
- understand the functions of the different computer modules and how they interact together
- educate high speed data customers on options to protect their equipment from malware and other security related concerns
- prepare students for customer questions that arise with respect to the different computer and mobile device operating systems.
- have a more complete understanding of DOCSIS modems
- understand how to complete advanced, high-speed data installations
- earn three hours of college credit
- receive an industry-recognized NCTI certificate of graduation
- receive credit toward NCTI Master Technician certification

(Continued)
Ideal for:
Technical personnel supporting Internet-based services, including:
  » installers
  » installer technicians
  » technical service representatives

COURSE OBJECTIVES
Upon completing this course, the student will be able to:
1. identify the main components of a computer system
2. describe how to maneuver in the different Windows operating systems to perform common tasks
3. explain the meaning of 32- and 64-bit processing
4. explain the labeling of the different types of random access memory (RAM)
5. describe the basic input/output services (BIOS) in a computer system
6. describe the computer motherboard and the different available form factors
7. list important considerations when choosing a computer power supply
8. describe a traditional hard drive and a solid state drive
9. identify different types of media for storing and playing back data
10. explain how to configure common input devices in a computer system
11. understand the terms resolution, refresh rate and color depth as they relate to a computer’s video configurations
12. describe the terms Transmission Control Protocol (TCP), User Datagram Protocol (UDP) and ports in reference to Internet applications
13. describe the waveform audio file format (WAV) and musical instrument digital interface (MIDI) file formats
14. identify different laptop types and features that make laptops versatile
15. describe mobile device operating systems
16. identify how to keep computer systems in an optimal operating condition
17. connect and troubleshoot Wi-Fi networks
18. describe the DOCSIS standard and how it originated
19. describe the initialization and authorization process of a DOCSIS cable modem

COURSE OUTLINE
1. Operational Procedures
   Discuss professionalism in appearance and communications, identify the biggest hazards to a computer and discuss safety for those working on a computer and for the computer while being worked on
2. The Visible PC
   Review how computers work, identify and explain the function of the main components inside a computer and describe the different computer interfaces to peripheral devices
3. Visible Windows
   Introduction to operating systems and touring operating systems
4. Microprocessors
   Understanding central processing units (CPU), investigating CPU speeds and cores, exploring CPU caches, understanding 32-bit and 64-bit processors, installing a CPU and cooling a CPU
5. Random Access Memory (RAM)
   Understanding RAM, looking at types of RAM, adding RAM to a system, troubleshooting RAM and understanding virtual memory
6. Basic Input/Output Services (BIOS)
   Defining the purpose of BIOS, describing the power-on self-test (POST) and troubleshooting BIOS
7. Motherboards
   Understanding form factor, ATX and ITX form factors, chipsets, the expansion bus, installing a motherboard and configuring for two CPUs
8. Power Supplies
   Electricity basics, describing the power supply and connections, choosing a power supply, power protection and troubleshooting the power supply
9. Hard Drive Technologies
   Introduction to hard drive technologies including solid state drives

(Continued)
10. Removable Media  
Remembering floppy discs and drives, investigating optical drives and flash media

11. Input Devices  
Supporting common ports and connecting input devices

12. Video  
Investigating video displays, connectors and video settings, working with projectors, setting up multiple monitors, installing graphics cards and troubleshooting video issues

13. The Internet  
Understanding Internet tier structures, connecting to the Internet, investigating Internet application protocols and analyzing Internet issues

14. Multimedia  
Recognizing sound file formats, working with volume and using tuners and video cards

15. Wireless Networking  
Introduction to wireless networking

16. Portable Computing  
Looking at laptop computers, managing and maintain portable computers and troubleshooting laptop computers

17. Mobile Devices  
Comparing smart phones and tablets, describe mobile operating systems, syncing mobile devices, connecting mobile devices to a network, connecting mobile devices to email and securing mobile devices

18. Securing Computers  
Exploring physical security, securing the environment against unauthorized use and against software threats, using firewalls, destroying data and complying with acceptable use policies

19. Introduction to DOCSIS  
An overview of the origins of DOCSIS modems, the DOCSIS architecture, the different versions of DOCSIS including DOCSIS 3.1 and the initialization and authorization of a DOCSIS modem

20. Installing a DOCSIS Modem  
Qualification of the cable drop for cable modem service, suggestions to reduce upstream noise, locating and activating the cable modem and educating the customer

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
IP Voice

OVERVIEW

The IP Voice course is comprised of four sections covering the delivery of telephone service using Voice over Internet (VoIP) technology through broadband cable’s managed network. The IP Voice course uses full-motion video and animation to closely mirror a hands-on learning environment. The video provides detailed and realistic demonstrations of the critical skills needed by an installer to successfully deliver voice service. Learners ride along with an installer as he takes them step-by-step through all the aspects of IP Voice service, including: preparation, installation in single- and multi-dwelling units, homes with security systems, troubleshooting and safety. This well-rounded approach to understanding IP Voice services ensures learners comprehend both the how and why of the job they are performing.

Delivery Options:
- All learning, lessons and final exams are delivered and taken online.

Completion Time:
The estimated completion time for this course is 8 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion, students:
- use this course to help prepare for SCTE’s Broadband Premises Installer certification
- receive an industry recognized NCTI certificate of graduation
- receive credit toward NCTI Master Installer certification

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. define and describe IP Voice service
2. describe and identify the tools and equipment used to deliver IP Voice service
3. identify types of wiring commonly used in IP Voice installations
4. describe the two basic types of house wiring schemes
5. describe what must be addressed before or during the installation of IP Voice
6. describe the process for installing and activating the embedded multimedia terminal adapter (EMTA) and connecting it into the existing premises wiring
7. explain how to install IP Voice in a customer premises with a monitored alarm system
8. explain basic rules of how to troubleshoot various IP Voice service problems

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OUTLINE

1. Introduction to IP Voice
   Introducing IP Voice as the cable industries’ Voice over Internet Protocol (VoIP) solution that is comparable to that of the legacy telephone providers, explaining the conversion of analog voice to data packets and the packet’s delivery over the cable operator’s private IP network, explaining the benefits and features of using the PacketCable™ architecture, introducing the embedded multimedia terminal adapter (EMTA), discussing EMTA function and operating requirements, listing, describing, providing and demonstrating the basic hand tools, test equipment, wiring and hardware used during an IP Voice installation and describing the different types, categories and components of twisted-pair cable and wiring polarity.

2. Preparing to Install IP Voice
   Describing what to check on the work order, listing what should be in the truck before leaving the office each day, defining customer service and interactions between the installer and the customer from the initial meeting to the closing of the work order, describing how e911 emergency services work with IP Voice and explaining it to the customer.

3. Installing IP Voice
   Explaining how to safely follow step-by-step installation procedures at the tap, ground block and in the customer premises, recognizing causes of problems in the coaxial cable drop system, describing how to prevent problems, measuring and recording signal levels, replacing F-connectors, installing drop tags and the EMTA into the existing premises wiring and toning, testing the wiring to identify its routing, learning how and when to use straight through and crossover jumpers and verifying that the service is installed and working properly.

4. Special Situations
   Explaining how IP Voice and the EMTA is to be connected into monitored security alarm systems, learning about potential alarm system problems and how to avoid them, describing the EMTA installation in an MDU along with installation restrictions and possible solutions, troubleshooting an IP Voice service with no dial tone, noise on the line and continuous dial tone, describing some of the test equipment used to troubleshoot wiring problems and common wiring errors and learning about different devices to test and troubleshoot IP Voice problems.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Installing SMB Telecom Service

OVERVIEW

This course is intended for experienced installers and technicians and will provide them with an opportunity to further their career in this exciting field. With the advent of IP Telephony, cable companies are now offering competitive voice and data service to the Small and Medium Business (SMB) sector. This opens up a huge market of new customers, however, there’s a catch. There is not only stiff competition to provide business-class service, but the business customer’s expectations are different and more demanding than those of the residential customer. Besides having a solid network, a commercial grade installation is the most critical component for success. Installers have to offer the best customer experience as well as quality installations that exceed the customers' expectations. Installing SMB Telecom Service can ensure your installers have the skills necessary to meet the needs of the demanding business customer.

The Installing SMB Telecom Service course provides a cost-effective interactive training program and features rich video content with actual installers performing real installations and interacting with real customers. Installers and technicians have the opportunity to learn from their peers in a language they understand. The course provides training in IP Voice technology and installation processes as well as critical information about how to work in a business environment as opposed to residential. Students will be provided with a job aid/reference guide that will serve as a handy tool for on-the-job reference while in the field.

Delivery Options:
- All learning, lesson and final exams are delivered and taken online. Students will be able to print a job aid/reference guide.

Completion Time:
Varies based on the student’s self study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion, students will:
- be able to install SMB telecom service
- value the impact phone service has within a business environment
- understand important differences between traditional and digital voice services
- understand how to work with businesses in a professional manner
- understand VoIP hosted service technology
- receive an industry recognized NCTI® certificate of graduation
- receive credit toward NCTI Master Installer certification

Ideal for:
Field personnel, including:
- technicians
- installers
- contract installers
- management
- support groups (day of install)
- sales engineers

RECOMMENDED PREREQUISITES
- Installer
- IP Voice

THIS COURSE IS PART OF THE INSTALLER QUALIFICATION (IQ) SERIES.

RELATED COURSES
Students completing this course should also enroll in:
- Installer Technician
- Telephone Home Wiring
- Introduction to Networking: Home and Peer-to-Peer Networks
- HSD Installations

TRAINING FEATURES
- Knowledge-based, broadband and job-specific content
- Video-rich and interactive course materials
- Career path advisement
- Online lesson feedback and progress monitoring at www.ncti.com
- Online testing
- Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
COURSE OBJECTIVES

Upon completing this course the student will be able to:

1. discuss the benefits of cable network VoIP to a business owner
2. describe the purpose of PacketCable specifications
3. explain standard procedures to follow during the business installation process
4. define cable types and uses in building installation
5. describe types of wiring topologies for businesses
6. identify the functions of the embedded multimedia terminal adaptor (EMTA) equipment used in a small business installation
7. describe possible scenarios encountered when installing complex wiring in buildings
8. discuss how to set up a new EMTA and MAC address
9. identify parts and functions of the 66 block used in business installations
10. discuss how to prevent disruption to service for the business customer
11. describe the specifications required to ensure customer’s needs are supported before installation
12. describe courteous and efficient customer care skills before, during, and after a business installation
13. explain the systematic process to follow with a customer during a site survey
14. describe the manner in which the completed work is confirmed with and communicated to the customer
15. discuss installation requirements when no coaxial cable exists
16. describe functions of the NID and safety precautions when connecting and reconnecting the device
17. describe the functions of the tools used to install cable for the business customer
18. determine correct approach to installation at the tap and ground block at a business
19. describe the process for installation at the ground block for small to medium businesses
20. analyze prevention strategies when installing a phone system with an existing alarm system
21. identify proper wiring of the telephone jack with an alarm system
22. apply the six-step troubleshooting model to resolve customer problems

COURSE OUTLINE

1. Defining Business Telephony
2. Commercial Buildings and Building Wiring
3. Distribution Blocks and Station Jacks
4. Tools and Safety
5. Customer Telephone Equipment
6. Customer Care
7. Business Telephony Installation
8. Security Alarms
9. Troubleshooting and Conclusion

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
High-Speed Data Installation

OVERVIEW
The High-Speed Data Installation course introduces the fundamentals of high-speed data Internet access service by presenting the typical features and functions of cable modems. The student will gain a thorough understanding of how the PC and modem interface with the broadband network. Topics of study include DOCSIS in the network, cable modem provisioning, the role of the cable modem termination system (CMTS) and more. The student will also learn how to effectively educate customers on high-speed service.

Delivery Options:
- All learning, lesson and final exams are delivered and taken online.

Completion Time:
The estimated completion time for this course is 8 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion, students:
- use this course to help prepare for SCTE’s Broadband Premises Installer certification
- receive an industry recognized NCTI certificate of graduation
- receive credit toward NCTI Master Installer certification

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. define and describe high-speed data service
2. define and describe cable modem system components
3. identify and choose the correct tools and equipment used in high-speed data service installations
4. interact professionally with the customer
5. perform an interior and exterior site survey before installing high-speed data service
6. locate and mitigate ingress and egress
7. choose the correct tools and equipment for the installation of high-speed data service
8. set up a customer high-speed data and e-mail account
9. activate an EMTA for high-speed data service
10. describe the classifications, properties, wiring schemes and components of twisted-pair cable
11. attach a modular RJ-45 plug to a twisted-pair cable
12. rewire an RJ-45 wall jack
13. troubleshoot twisted-pair high-speed data installations
14. connect multiple devices to a single cable modem Internet connection
15. recognize basic modem emulator functions
16. interpret information obtained by a modem emulator
17. use a modem emulator to conduct a return test
18. list devices that can conduct a return test

(Continued)
COURSE OUTLINE

1. Introduction to High-Speed Data
   Introducing the high-speed data product and its value to the cable operator; describing promotions and premium services, defining the competition; and inspect and operate a company vehicle in a professional manner.

2. Upgrading to High-Speed Data Service
   Review good customer practices and skills, qualifying the signal at the wall outlet for high-speed data service, inspecting a drop to ensure compliance with company and industry standards, identifying equipment needed to install high-speed data service, attaching the cable modem to customer premises equipment, describing twisted-pair Ethernet cables, activating the cable modem for high-speed data service, verifying high-speed data service and providing high-speed data service customer education.

3. Activating an EMTA for High-Speed Data Service
   Gathering the equipment for twisted-pair service, describing an EMTA, identifying the MAC address for EMTA registration, describing twisted-pair cable test equipment, identifying a twisted-pair line, distinguishing between a straight-through and crossover twisted-pair cable, identifying twisted pair cable plugs and jacks, identifying twisted-pair handling practices, identifying twisted-pair wiring errors, connecting customer premises equipment to the EMTA and connecting the EMTA to the computer.

4. Troubleshooting High-Speed Data Service
   Probing the customer to learn more about the problem, using a cable modem emulator to troubleshoot, identifying and resolving high-speed data problems, recognizing proper application of house amplifiers and connecting a wireless router to a cable modem.

COURSE OBJECTIVES (Continued)

19. apply the divide and conquer troubleshooting method
20. describe house amplifiers and their properties
21. connect a wireless router
22. describe packet loss
Installer Technician
Part of the Master Technician Certification Series

OVERVIEW

The NCTI Installer Technician course focuses on maintaining reliability in the installed drop system. The electronic theory provides the foundation for understanding decibels, signal leakage detection and troubleshooting techniques. A basic mathematics review helps the student with equations and formulas relating to basic electronic theory and signal level. Also covered are topics on how to detect and troubleshoot signal leakage in the VHF and UHF frequency bands including LTE frequencies. The course concludes with the basic characteristics and functions of line extender amplifiers and a discussion of government regulations and ways to comply with industry rules.

Delivery Options:
The course is delivered online. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is six months from enrollment.

BENEFITS

Upon completion students will:
» correctly troubleshoot and maintain the installed drop system
» utilize mathematical equations and formulas related to installed cable systems
» identify, locate and repair common problems from premises to the tap
» use this course to help prepare for SCTE’s Broadband Premises Installer and Broadband Distribution Specialist certifications
» earn four hours of college credit
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Master Technician certification

Ideal for:
Technical personnel, including:
» installers
» maintenance technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. understand and apply basic DC electronic theory, perform Ohm’s law calculations and discuss relevant broadband cable applications
2. perform basic cable math calculations
3. explain dB and dBmV fundamentals and broadband cable applications and perform gain and loss calculations
4. recognize the impact of signal leakage and use a signal leakage detector to identify and troubleshoot signal leakage from the tap into the customer premises
5. identify, locate and repair common problems from the customer premises

(Continued)
COURSE OBJECTIVES (Continued)

6. understand the theory of operation of line extender amplifiers and explain the functions of amplifier passives and actives
7. identify the role of national and international organizations in establishing and implementing telecommunications standards

COURSE OUTLINE

1. Exploring Electrons and Electricity
   Establishing electron characteristics, identifying element categories, understanding electron current flow, electric current, electrical force and using units of electrical measurement

2. Understanding Magnetism and Electromagnetism
   Looking at the history and theory of magnetism and electromagnetism and exploring magnetic and electromagnetic applications

3. Using Positive and Negative Numbers, Decimals and Fractions
   Reviewing positive and negative numbers and understanding common and decimal fractions

4. Examining Equations and Powers of Numbers
   Examining equations and powers of numbers

5. Understanding Electrical Circuits
   Understanding circuit essentials, differentiating current flow conditions, defining current types and understanding circuit graphics

6. Understanding Resistance
   Understanding, changing and controlling resistance

7. Using Ohm’s Law for Power and Energy
   Describing basic electrical characteristics, working with Ohm’s law, solving power equations and solving an energy equation

8. DC Series Circuits
   Circuit requirements, characteristics and calculations

9. Understanding Decibels
   Reviewing the history of decibels, making comparisons between two values, explaining the concept of bels and decibels and understanding power and voltage ratios

10. Using dB and dBmV
    Working with dBmV and performing signal level calculations

11. Detecting Signal Leakage
    Reviewing signal leakage basics, selecting and operating signal leakage detection equipment and eliminating signal leakage

12. Thinking Skills for Troubleshooting
    Preparing your mental processes for troubleshooting and discussing how to think when troubleshooting a problem

13. Communication Skills for Troubleshooting
    Identifying soft communication skills, understanding the importance of spoken and unspoken communications and learning how to listen

14. Troubleshooting Coaxial Cables and Connectors
    Describing the drop and inside wire elements, understanding coaxial cable test equipment and explaining how to install connectors

15. Troubleshooting Fiber-Optic Cables and Connectors
    Discussing characteristics of fiber-optic cable and examining how to troubleshoot problems and repair fiber-optic cable and components

16. Troubleshooting Drop Splitters, DCs and Drop Amps
    Examining splitter and directional coupler problems and discussing basic troubleshooting techniques for drop amplifiers

17. Troubleshooting Ingress and Egress
    Understanding ingress and egress, examining ways to isolate and diagnose the cause of ingress and examining UHF signal leakage and ingress

18. Troubleshooting Inside Wiring, Powering Elements and Bonding
    Identifying insider wiring plugs and jacks, understanding how to troubleshoot inside wiring, power cables and connectors

19. Line Extender Amplifier Operation
    Examining amplifier housing, line extender AC/DC powering systems, RF passives and controls and amplifier modules and discussing the classification of line extender specifications

20. Understanding Broadband Cable Regulatory Issues
    Identifying government regulation, examining how technical performance is regulated and understanding how to comply with industry rules

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Introduction to Telecom Operations
Part of the Telecom Specialist Certification Series

OVERVIEW
The Introduction to Telecom Operations course is designed for the telecom technician. Copper pair networks can provide modern services over an infrastructure that is over a century old, while still providing plain old telephone service (POTS). The course explains basic safety practices according to OSHA, and basic electronics such as voltage, power, current and resistance. These electronic principles are foundational to the understanding of how a copper network works. In addition to POTS, the course teaches installation and troubleshooting of digital subscriber line (DSL), voice over IP (VoIP) and passive optical network (PON) fiber to the premises (FTTP).

Delivery Options:
This course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 16 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Telecom Specialist certification

Ideal for:
Anyone wanting to be a valued company asset by knowing how to service all installation and repair technician aspects of a telecom network.

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. examine the proper use of personal protective equipment (PPE) and how to inspect them
2. describe the features of the foreign voltage detector and how to use it to detect electrical hazards
3. describe the characteristics of the various types of ladders and pole climbing equipment and how to safely use them
4. outline company vehicle use and distracted driving guidelines
5. describe the features of a bucket truck and safety practices when working in and around manholes
6. convert volts, amperes, ohms and watts into values using scientific notation and metric prefixes
7. explain how to use Ohm’s law to perform calculations
8. identify equations used to perform various power calculations
9. examine the types and behaviors of copper cable designs and how installation affects the design
10. compare DSL components and how they have improved over time

(Continued)
11. analyze DSL network design and components and how they operate together to deliver Internet traffic to the subscriber
12. examine the features of a passive optical network and how it improves the speed of the network service to the customer
13. identify best practices for installing small diameter conductors and how terminals are used at the central office
14. explain the characteristics of the main distribution frame and how to place jumpers in the MDF
15. describe the purpose and characteristics of the cross-connect box, how to make terminations and how to install jumpers
16. describe the types and characteristics of serving terminals and best practices for accessing them at the customer’s drop
17. examine the function, features and layout of the network interface device and how to properly install it to the customer premises
18. identify the different types of inside wiring and how to correctly install wiring and jacks
19. identify the different types of DSL modems and how to place, install and configure the modems to match customer circuit settings
20. explain the features of POTS and best practices for installing a telephone that is working properly
21. examine the technology for VoIP used for transporting telephone conversations
22. explain troubleshooting processes for Internet, POTS and VoIP services
23. explain how to test and troubleshoot AC and DC voltage, resistance, capacitance, longitudinal balance, load coil and bridged tap
24. describe how to perform DSL synchronization, wideband spectral analysis and wideband impulse noise testing and determine pass/fail results
25. describe how to trouble isolate and resolve in-home or central office issues
26. describe how to isolate and resolve trouble to LAN or WAN
27. describe how to isolate and resolve trouble to digital subscriber line access multiplexer or modems

COURSE OUTLINE

1. Operational Safety
   Examining personal protective equipment, evaluating the foreign voltage detector, evaluating ladder safety, evaluating pole climbing safety equipment, using a bucket truck, manhole safety and analyzing company vehicle use

2. Using Ohm’s Law for Power and Energy
   Describing basic electrical characteristics, working with ohm’s law and solving power equations

3. Copper Cable and Network Design
   Copper cable design and copper cable network design

4. Digital Subscriber Line and Passive Optical Networks
   Telecom operations, DSL network design and components and passive optical network topologies

5. Service Installation: Central Office to Cross-Connect Box
   Installing and connecting wires, main distribution frame and jumper installation and cross-connect box and jumper installation

6. Service Installation: Serving Terminals to Network Interface Device
   Serving terminals, installing drops and network interface device installation

7. In-Home Installation
   Inside twisted copper and jack installation, DSL modem installation, plain old telephone service installation, voice over Internet protocol, installation tools and service test and quality check

8. Basic Maintenance and Repair
   Narrowband/physical equipment test and results analysis, broadband/DSL test equipment and results analysis, inside or outside trouble isolation and resolution, LAN or WAN trouble isolation and resolution and DSLAM and DSL modem trouble isolation and resolution

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
OVERVIEW
Telephone Home Wiring teaches technicians how to correctly install and troubleshoot the hardware associated with an in-home telephone system. This hardware includes various twisted-pair transport media, interface devices and termination points. The technician will learn how to avoid problems associated with telephone service installations in homes with electronic security systems. The technician is introduced to inside wiring topologies, cable and connector configurations, Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA) standards and twisted-pair test equipment. Additionally, extensive troubleshooting of twisted-pair wiring is presented to ensure the technician is able to solve telephony related issues within the premises.

Delivery Options:
Learning takes place online with the aid of a textbook. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 10 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» be better prepared to troubleshoot twisted-pair wiring issues in the home
» reduce repeat service calls and improve customer satisfaction
» use this course to help prepare for SCTE’s Broadband Premises Installer certification
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Telecom Specialist certification

Ideal for:
Personnel, who need to learn about installing telephone home wiring, including:
» installers and technicians
» advanced services installers and technicians
» high-speed Internet installers and technicians
» telephone installers and technicians

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. describe untwisted-pair and twisted-pair telephone wire, their applications and their color code
2. explain the purpose and applications of the American National Standards Institute (ANSI)/TIA/EIA-570B Residential Telecommunications Infrastructure Standard
3. install modular plugs/jacks on inside wiring data cables using ANSI/TIA/EIA-T568-A and T568-B wiring configurations
4. identify the characteristics of shorts and crosses, and open circuits within a twisted-pair inside wiring system
5. describe three types of twisted-pair inside wiring errors

RECOMMENDED PREREQUISITES
» IP Voice

RELATED COURSES
Students completing this course should then enroll in:
» Installer Technician
» Broadband Digital Installer
» Computers and Broadband Modems
» Understanding Voice and Data Networks

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
COURSE OBJECTIVES (Continued)

6. describe wiring topologies commonly used for twisted-pair inside wiring
7. use a tone generator and an inductive amplifier probe to perform a telephone line test/polarity test and identify twisted-pair conductors
8. use a twisted-pair cable tester to test circuit faults on twisted-pair cable utilizing one of three different wiring configurations and interpret test results
9. explain the potential problems associated with installing telephony in homes with electronic security systems

COURSE OUTLINE

1. Introducing Twisted-Pair Inside Wiring
   Introducing the network interface device, untwisted and twisted-pair cables, twisted-pair cable hardware and routing topologies

2. Installing Twisted-Pair Inside Wiring
   Pre-qualifying existing telephone and broadband services, describing twisted-pair installation tools, routing and attaching unshielded twisted pair (UTP), adding a modular telephone jack and installing modular telephone line cord plugs and data plugs on UTP cable

3. Troubleshooting Twisted-Pair Inside Wiring
   Identifying problems and symptoms, describing twisted-pair wiring problem causes and troubleshooting

4. Using Twisted-Pair Inside Wiring Test Equipment
   Explaining how to use telephone test sets, a tone generator and inductive amplifier probe, a twisted-pair cable tester, a modular cable tester and introducing the wiremap test instrument

5. Installing VoIP in Homes with Electronic Security Systems
   Describing issues related to VoIP installations and electronic security system incompatibility, explaining installing VoIP with a home security system and describing VoIP problems with modem-type devices

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Wall Drilling for Wiring

OVERVIEW
Wall Drilling for Wiring is a fundamental course that covers routing cables through basements, crawl spaces, attics, and walls, as well as showcasing techniques for using drills and drilling through different types of exterior and interior walls.

Delivery Options:
- The course is delivered online. Final exam is taken online.

Completion Time:
The estimated completion time for this course is 90 minutes. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
- receive an industry-recognized NCTI certificate of graduation

Ideal for:
- any technical personal with the responsibility of bringing wires or cables into a structure

COURSE OBJECTIVES
Upon completing this course students will be able to:
1. safely and accurately drill through walls.
2. drill through walls without damaging property

COURSE OUTLINE
1. Describe Home Construction Architecture Issues
2. Considering Various Entry Points
3. Drilling Through Walls
4. Recognizing Wall Materials and How to Drill Through the Different Types
5. Wall Entry and Running Wires Through Flooring and Carpet
6. Checking for Obstacles
7. Drilling Angles
8. Routing Wire

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
Consumer Digital Electronics
Part of the Master Technician and Master Installer Certification Series

OVERVIEW

The Consumer Digital Electronics course teaches students the what, how, when, where and why of customer premises equipment. The student will learn how to properly lay out a home theater system and correctly adjust video settings on a digital display. An explanation of audio technology, the technology’s implementation and interface into the home theater system is provided. The student will learn how to troubleshoot a digital set-top box and which digital video interface to use between customer premises equipment for best picture resolution. The student will also be introduced to the different parental control options for TV programs and video games that may cause the customer to request a technician’s assistance. By taking Consumer Digital Electronics the student will have a better understanding of the different components in the home theater system and how they interface and operate together.

Delivery Options:
- The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 16 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
- effectively answer customer questions regarding consumer electronics in the home
- understand how to connect and operate consumer electronics in the home
- reduce repeat service calls and improve customer satisfaction
- have a better understanding of the different audio technologies used in home theater systems
- recognize the different equipment options associated with installing digital television service
- use this course to help prepare for SCTE’s Broadband Premises Installer certification
- receive an industry-recognized NCTI certificate of graduation
- receive credit toward NCTI’s Master Installer certification
- receive credit toward NCTI’s Master Technician, Customer Premises certification
- receive credit toward NCTI’s Master Dispatcher certification

Ideal for:
- new hires
- residential installers
- customer service representatives

COURSE OBJECTIVES

Upon completing this course the student will be able to:
1. identify the key milestones in developing television standards and the major organizations that have defined standards
2. identify the characteristics of standard-, enhanced- and high-definition television and next-generation technologies
COURSE OBJECTIVES (Continued)

3. identify the features of digital television technologies and equipment
4. identify the characteristics of past and present video technologies
5. identify the characteristics of projection systems
6. examine the features and characteristics of DVD media
7. examine the features and characteristics of digital storage devices
8. describe the features and characteristics of audio components used in customer’s homes
9. explain the technology behind speaker construction
10. explain the difference between analog and digital sound and how the fidelity of the audio signal can be maintained through the analog-to-digital conversion
11. identify the key components and adjustable features of an audio/video receiver
12. describe the proper set-up for home theater components that best fit the needs of the customer
13. examine digital music services and close captioning services
14. identify features, care and maintenance of the digital set-top box
15. discuss best practices for performing set-top box diagnostics
16. explain the digital terminal adapter and Internet protocol TV and how they are used
17. analyze the process and best practices for connecting customer equipment to other video and audio equipment
18. describe the best audio connection options to connect the customers equipment and customize it to their needs
19. examine best practices for installing the customer’s television and related components
20. identify the menu features on the TV and how to use the features to assist the customer
21. identify configuration practices for parental control, and the functions of the electronic program guide
22. describe how to operate and troubleshoot remote controls

COURSE OUTLINE

1. Video Standards, Definitions and Services
   Encompassing television technology, defining television, regulating and describing digital television services

2. Video Display Technologies
   Describing tube-type displays, understanding flat panel displays, identifying projection displays and analyzing projectors and screens

3. Video Recording and Playback Devices
   Examining recording media, explaining digital disc media, exploring hard drive video storage, understanding video game consoles and introducing other digital storage

4. Audio Technologies
   Examining analog and digital audio technologies for home theater systems, understanding sound reproduction systems, analog-to-digital conversion of audio signals and management of loudness in television audio

5. Audio Systems and Services
   Exploring audio receiver components, audio/video receiver features, laying out a home theater system and discussing analog and digital music services

6. Digital Set-Top Boxes
   Examining set-top box and digital terminal adapter physical features, functional features, using set-top box diagnostics and defining IPTV

7. Connecting Consumer Electronics
   Recognizing the different consumer electronics interfaces, making video connections, audio connections and connecting consumer electronics equipment

8. Operating Consumer Electronics
   Identifying video device source selections, understanding menu features, exploring video viewing options and analyzing remote controls

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Service Technician
Part of the Master Technician Certification Series

OVERVIEW
The NCTI Service Technician course provides broadband technicians with invaluable information on the broadband cable distribution network, including lessons on amplifiers and passive devices, hardline coaxial cable/connectorization, the fundamentals of cable network powering, basic test equipment operation and signal leakage measurements. This course also teaches all the necessary electronic theory and application techniques needed to conduct technical duties at this level. Fiber-optic cable theory, optical networks and fiber-to-the-home topologies are also covered.

Delivery Options:
The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 40 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» earn four hours of college credit
» use this course to help prepare for SCTE’s Broadband Distribution Specialist certification
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Master Technician certification

Ideal for:
Broadband technicians and other technical personnel involved in maintaining the distribution system, including:
» service technicians
» line technicians
» plant maintenance technicians
» installer technicians

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. understand and apply electronic theory, perform electronic calculations and determine electronic broadband cable network applications
2. explain the theory of operation of passive devices in the distribution network and calculate the input signal level, signal loss and output signal level of passive devices from a design map
3. explain physical characteristics of hardline coaxial cable, calculate the attenuation of the cable for various lengths and temperatures and connectorize the cable
4. splice active and passive devices and activate the broadband cable network
5. explain the theory of operation of standby and non-standby power supplies, perform preventive maintenance and calculate AC input voltages to amplifiers from a design map
6. explain the theory of operation and operate digital signal analyzers and time domain reflectometers

(Continued)
7. explain the theory of operation and perform setup procedures to rough-balance distribution amplifiers used in HFC distribution networks
8. explain the theory of operation and perform setup procedures to rough-balance line extender amplifiers
9. explain the optical active and passive components of fiber-optic networks and the applications of various fiber-optic topologies

COURSE OUTLINE

1. Distribution System Overview
   Applying basic electronics to distribution systems, comparing system architectures, examining distribution system transmission equipment, measuring system vital signs and faults and troubleshooting and preventing signal outages and impairments

2. Alternating Current
   Understanding AC power and waveforms

3. Understanding AC Waveform Fundamentals
   Examining AC waveform characteristics and values

4. Resistive AC Circuits
   Understanding basic relationships, eddy currents, skin effect and solving sample problems

5. Inductance and Transformers
   Introducing induction, inductance, inductors and transformers

6. Capacitance
   Explaining capacitance and capacitors

7. Examining Hardline Coaxial Cable
   Learning mechanical and electrical properties of hardline cable

8. Connectorizing Hardline Coaxial Cable
   Selecting proper connectors and adapters, preparing to connectorize coaxial cables, installing connectors and weatherproofing

9. Reactances
   Explaining inductive reactance, capacitive reactance and inductive/capacitive reactances

10. Working with Hardline RF Splitters
    Identifying splitter types and components, examining splitter electrical characteristics, understanding the theory of splitter operation and considering applications

11. RF Directional Couplers and Power Inserters
    Describing directional couplers and power inserters

12. Working with RF Taps
    Identifying types of taps and mechanical components, examining tap electrical characteristics, understanding the theory of tap operation and considering design criteria

13. Line Extender Setup and Operations
    Recognizing the role of the line extender, performing preliminary checks on a line extender, setting up the forward section of a line extender and setting up the return section of a line extender

14. Distribution Amplifier Operation
    Understanding types and applications of distribution amplifiers, examining the distribution amplifier housing, explaining AC and DC powering of distribution amplifiers, working with RF passives and controls in distribution amplifiers, understanding the distribution amplifier module, classifying distribution amplifier specifications, setting up and troubleshooting distribution amplifiers

15. Powering Cable Networks
    Examining ferroresonant power supplies, AC power insertion methods and performing powering calculations

16. Semiconductor Materials and P-N Junctions
    Examining semiconductor material, examining N-type and P-type semiconductors: extrinsic semiconductors

17. Diodes and Diode Circuits
    Examining rectifier circuits and exploring optical diodes

18. Using Digital Signal Analyzers
    Describing digital measurements, operating the digital signal analyzer and using cable modem analyzers

19. TDR Fundamentals and Operation
    Describing types of TDRs, understanding TDR theory of operation and applications, considering TDR preliminaries, noting TDR measurement precautions, learning measurement procedures and pinpointing fault site

20. Controlling Signal Leakage
    Examining signal leakage, describing measurement equipment and preventing and repairing signal leakage

21. Understanding Fiber Optics and HFC Networks
    Introducing fiber optics, constructing fiber networks, the evolving HFC network and optimizing the HFC network

22. Developing Prevention Programs
    Ensuring safety awareness, monitoring leakage, stressing preventive maintenance and reducing outages and theft

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Return Path Operations

Part of the Master Technician Certification Series

OVERVIEW

This course introduces the basic concepts of return path functions, and outlines procedures for testing, repairing and maintaining a viable return path for the support of revenue sources and services such as video-on-demand (VOD), high-speed data (HSD) and telephony. The student will learn what can jeopardize the return path performance including ingress, laser operations, noise, system alignment and installation of equipment at the customer premises. The course also describes how the operation of the return path has transformed to becoming integral to the successful and reliable operation of cable modems, VOD, telephony and many other services via the broadband HFC network.

Delivery Options:

The course is delivered online with learning activities throughout each lesson. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:

Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:

» gain the knowledge to troubleshoot the return path
» maximize revenue by maintaining optimal performance levels of premises equipment
» improve customer satisfaction levels with new and legacy premises equipment
» help speed the roll out of new services that utilize the return path
» receive credit towards NCTI® Master Technician certification
» receive an industry recognized NCTI certificate of graduation
» use this course to help prepare for SCTE’s Broadband Distribution Specialist (BDS) and Broadband Transportation Specialist (BTS) certifications

Ideal for:

Personnel who install services, perform demand or preventive maintenance on the coaxial plant or work on the fiber-optic portion of modern HFC networks. This includes:

» service technicians
» system technicians
» high-speed data technicians
» installers
» network technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. describe the return path signal flow and major transmission elements
2. explain the concept of long-loop automatic gain control and how it is used to establish RF levels from cable modems, embedded multimedia terminal adapters (EMTA), and set-top boxes (STB)

(Continued)
COURSE OBJECTIVES (Continued)

3. explain the concept of funneling on the return path
4. discuss procedures for improving overall return path performance, including use of high-pass filters and step attenuators
5. explain how test equipment for return path alignment measures return path signal levels
6. discuss the differences, advantages and disadvantages of single carrier, multicarrier and return sweep testing
7. define and discuss upstream transmit level and path attenuation
8. explain how to measure the amplitude of transient signals and noise measurements on the return path
9. describe why optimization of the optical portion of the return path is critical to reliable operations of the services that use the return path
10. identify methods for multiplexing multiple return paths into a single fiber, including frequency stacking, wavelength division multiplexing, dense wavelength division multiplexing and digital return

COURSE OUTLINE

1. Return Path Operations Overview
   Understanding return path signal flow in the hybrid fiber/coaxial (HFC) network, examining technical challenges and maintaining the return path

2. Introducing Return Path Fundamentals
   Learning return path frequency spectrums, explaining how the reverse path works, calculating return path loss in the drop system, assessing the quality of the drop’s return path examining house amplifiers and installing mitigation filters at the customer premises

3. Troubleshooting the Return Path
   Describing return path test equipment, troubleshooting the return path in the drop system and using the spectrum analyzer to troubleshoot the return path in the HFC network.

4. Maintaining Return Path Signals
   Describing return path amplifier levels, setting return amplifier levels and balancing the return path

5. Examining Signals in the Return Path
   Modulating return path signals, examining spectrum sharing technologies, analyzing return path carriers and DOCSIS 3.0 in the return path

6. Examining the Optical Return Path
   Examining optical return technologies, optimizing optical return path performance and introducing optical return path multiplexing

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Digital Technician
Part of the Master Technician Certification Series

OVERVIEW
Digital technology is all around us, from the clocks on our coffee makers to our mobile phones and computers. Broadband cable technicians are trained to install and service digital customer premises equipment (CPE) such as set-top boxes (STB) and cable modems that connect to digital televisions and computer devices. The NCTI Digital Technician course elevates the broadband cable technician’s knowledge of digital technology beyond CPE. To put the significance of digital communications into context, the course begins with a review of several applications of digital technology in communications. Binary and hexadecimal numbering systems including Boolean algebra, which are digital fundamentals, are explained as well as how analog signals are converted to digital signals. Techniques to identify, omit and recover redundant data in a digital signal are described before presenting details of various digital modulation schemes and methods for overcoming bandwidth limitations. The compression and transport standards from the Moving Picture Experts Group (MPEG) are reviewed, followed by explanations of the Internet protocol (IP) and IPTV. After completing the Digital Technician course, technicians can apply what they have learned to troubleshoot and resolve problems as well as prepare for career advancement.

Delivery Options:
All learning, lesson and final exams are delivered and taken online.

Completion Time:
The estimated completion time for this course is 18 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» earn three hours of college credit
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Master Technician certification

Ideal for:
» service technicians
» system technicians
» headend technicians
» managers and supervisors looking to keep skills current
» network operations

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. explain both the present and future of digital technology
2. recognize how digital technology is applied in applications pertaining to state-of-the-art techniques in broadband cable network operations and inside the customer premises
3. identify services that are enabled by digital communications
4. describe the fundamentals of digital communications

(Continued)
5. describe how digital information is modulated onto a carrier for transport and distribution over a network
6. describe how measurements of digital modulation channel power differ from analog amplitude measurements, why it is of concern and how these power measurements are executed
7. interpret measured digital modulation channel parameters to determine if and what corrective action needs to be taken
8. describe how digital modulation technology is used to maximize the use of RF spectrum and channel bandwidth
9. identify the Moving Pictures Expert Group (MPEG) and the role it has in the development of digital television
10. describe the Internet protocol suite and how it works
11. explain how digital TV has enabled the delivery of TV content to devices other than stationary television sets

COURSE OUTLINE

1. **Applying Digital Communications Technology**
   Identifying interactive network models, examining telephone services and discussing trends in television

2. **Fundamentals of Digital Communications**
   Reviewing digital communications, examining character codes and data compression and presenting logic gates

3. **Digital Modulation**
   Diagnosing the continuous wave carrier, delving into pulse code modulation, describing digital modulation schemes, highlighting digital vestigial sideband modulation and modulating OFDM subcarriers

4. **Digital Channel Amplitude Measurements**
   Defining digital modulation measurement values, adjusting amplitude levels for channel bandwidth, loading the downstream frequency spectrum and assessing return channel levels

5. **Quantifying Digital Channel Quality**
   Defining digital measurements, considering digital modulation test instruments and interpreting digital modulation measurements

6. **Network Capacity Management**
   Improving spectrum efficiency, compressing TV signals and controlling source content

7. **MPEG Standards and Data Streams**
   Identifying the Moving Pictures Expert Group, describing the MPEG-2 Systems Layer and assessing digital TV quality

8. **The Internet Protocol Suite**
   Moving data over the Internet, discussing the Transport Layer of the Internet protocol suite and integrating television into the Internet protocol suite

9. **Concepts of IPTV**
   Disrupting legacy television service delivery, distributing IPTV content and addressing Internet protocol TV distribution challenges

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Fiber Installation and Activation

Part of the Master Technician Certification Series

OVERVIEW

The NCTI Fiber Installation and Activation course provides indispensable and up-to-date information on the deployment of fiber-optic cable in broadband networks. The course outlines the basics of optical transmission, modulation and transport through optical fiber along with the reception and conversion of the optical signal back to electrical signals. The characteristics of different types of optical fiber and cable construction are introduced and described with explanations for their application. Fiber-optic network architecture, topology, design and construction practices are also covered. Fiber Installation and Activation instructs how to install and activate fiber-optic networks and also prepares the student to splice optical fibers using mechanical and fusion methods. Passive optical network (PON) access technologies utilizing fiber-to-the-premises (FTTP) topologies, which include GPON, EPON, RFOG and next generation access (NGA) architectures, are described and compared. The course assumes previous knowledge and experience in RF Broadband Technology.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is 32 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» earn two hours of college credit
» receive credit toward NCTI® Master Technician certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:

Technical personnel, including:

» fiber-optics technicians
» service technicians
» network technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. identify the optical spectrum and wavelengths of light waves used for fiber-optic communications
2. describe the optical sources and receivers used for fiber-optic communications
3. describe safety materials and procedures for handling and splicing optical fibers
4. recognize common standards used in fiber-optic transport networks
5. describe the different optical fiber types and factors that determine how well light waves are transported through optical fiber
6. identify different types of fiber-optic cable and their applications

(Continued)
COURSE OBJECTIVES (Continued)

7. describe optical connectors, patch panels and ancillary optical devices such as optical splitters, pigtails and attenuators
8. explain the procedures to prepare a splice closure and a fiber-optic splice tray
9. describe how to splice fiber-optic cable
10. discuss considerations and specifications for proper installation of fiber-optic cable
11. describe the different types of optical modulation and optical detection technologies
12. discuss the differences in coarse wavelength division multiplexing, wide wavelength division multiplexing and dense wavelength division multiplexing technologies
13. describe the synchronous optic network (SONET)
14. identify the different optical network architectures and topologies, including fiber-to-the-premises (FTTP)
15. list the steps in the setup of an optical transmitter and receiver
16. define and give examples of an optical power budget
17. discuss the application and operation of centralized and distributed node powering
18. recognize the different passive optical network (PON) access architectures

COURSE OUTLINE

1. Discovering Fiber-Optic Technology
   Exploring fiber-optic fundamentals, understanding light sources and examining optical detectors
2. Introducing Fiber-Optic Networks
   Exploring the basic HFC architecture, examining scalable optical nodes, identifying applications and services, citing transmission standards and handling fiber-optic cable safely
3. Investigating Properties of Fiber-Optic Cable
   Identifying optical fiber types, evaluating fiber performance and examining optical fiber dimension tolerances
4. Investigating Fiber-Optic Components and Terminations
   Examining fiber-optic cable, optical connectors, cable management panels, optical splitters and ancillary devices
5. Preparing Optical Fibers for Splicing
   Preparing to join optical splitters and working with splice closures
6. Splicing and Terminating Fiber-Optic Cable
   Examining various splicing techniques and installing facility terminations
7. Introducing Fiber-Optic Cable Construction Techniques
   Discussing the importance of safety and examining fiber-optic cable installation in outside plant
8. Installing Fiber-Optic Cable in Outside Plant
   Installing aerial fiber-optic cable and installing fiber-optic cable in conduit
9. Understanding Optical Transmission Systems
   Examining optical modulation techniques, discussing optical detection and demodulation, examining the synchronous optical network (SONET) and examining wavelength division multiplexing
10. Fiber-Optic Network Architectures and Topologies
    Examining fiber-optic network architecture, introducing FTTx network topologies and describing passive optical network topologies
11. Transmitting and Receiving Optical Signals
    Studying optical transmitters, understanding optical receivers and recognizing optical transport elements
12. Understanding Fiber-Optic Network Design
    Establishing network design guidelines, analyzing the network design route and discussing network documentation
13. Fiber-Optic Node Powering
    Powering optical networks, examining outside plant power distribution and node equipment
14. Passive Optical Networks
    Presenting passive optical networks (PON), examining PON architectures in broadband cable networks and introducing next-generation access (NGA) architectures

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
System Technician

Part of the Master Technician Certification Series

OVERVIEW

One of the courses included in NCTI’s Master Technician certifications, the NCTI System Technician course provides foundational information that can accelerate a technician’s career path advancement. Foundational lessons include principles of amplitude, frequency and phase modulation, which remain integral in modern digital modulation schemes, basic circuits that are found in equipment being serviced in today’s broadband cable networks, power supply and amplifier circuit information as applied in RF amplifier operations and the alignment of distribution amplifiers and line extenders. The course clearly presents the FCC Technical Standards testing requirements and procedures and the NCTA Recommended Practices for system measurements, system sweeping and testing, signal leakage analysis and spectrum analyzer basics and measurements. The course also describes techniques for underground construction. The value of this foundational information becomes apparent when the technician successfully troubleshoots and resolves escalated problems.

Delivery Options:

This course is delivered online. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is 42 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students:

» receive an industry-recognized NCTI certificate of graduation
» earn four hours of college credit
» can use this course to prepare for SCTE’s Broadband Distribution Specialist and Broadband Transportation Specialist certifications
» receive credit toward NCTI Master Technician certification

Ideal for:

Broadband cable service technicians seeking advancement through their company’s career path.

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. list the dimensional elements of a carrier wave and how they can be modified with information during the modulation process
2. identify the functional blocks of a receiver and explain their operation
3. identify basic transport components in broadband cable networks and the symbols used to identify equipment in broadband cable network maps
4. explain how AC voltage is converted to DC and how the voltage is regulated
5. describe the operation and applications for bipolar junction and field effect transistors in basic circuit configurations
6. describe operational amplifiers and some of the more common circuit applications where they are used
7. describe the most common amplifiers that are used in broadband cable applications

(Continued)
8. describe the different modules that comprise an amplifier station
9. explain the operation of several types of oscillators, including crystal oscillators and multivibrators
10. describe distribution amplifiers, their application and alignment
11. explain how DOCSIS modems can enable proactive network maintenance for more reliable network operations
12. describe how common distortion and noise measurements in broadband cable networks are taken manually using a spectrum analyzer and using the automated functions of a spectrum analyzer
13. describe how signal leakage data is gathered, organized and reported to the Federal Communications Commission (FCC).
14. explain how to sweep the coaxial cable portion of a hybrid fiber/coaxial (HFC) cable network
15. describe how underground broadband cable networks are built using trenching and directional boring methods

COURSE OBJECTIVES (Continued)

8. describe the different modules that comprise an amplifier station
9. explain the operation of several types of oscillators, including crystal oscillators and multivibrators
10. describe distribution amplifiers, their application and alignment
11. explain how DOCSIS modems can enable proactive network maintenance for more reliable network operations
12. describe how common distortion and noise measurements in broadband cable networks are taken manually using a spectrum analyzer and using the automated functions of a spectrum analyzer
13. describe how signal leakage data is gathered, organized and reported to the Federal Communications Commission (FCC).
14. explain how to sweep the coaxial cable portion of a hybrid fiber/coaxial (HFC) cable network
15. describe how underground broadband cable networks are built using trenching and directional boring methods

COURSE OUTLINE

1. Discussing Modulation
   Examining the unmodulated carrier, discussing amplitude modulation, diagnosing frequency modulation, identifying digital modulation variations

2. Exploring Communications Circuit Blocks
   Identifying the functional blocks of a receiver, delving into tuned circuits, employing intermediate frequencies and recognizing amplifier properties

3. Trunk System Overview
   Understanding system design symbols and architectures, constructing and powering the cable plant, examining transmission components and verifying plant reliability

4. Explaining Power Supplies
   Identifying rectifier circuits, examining voltage regulator circuits and studying non-linear power supplies

5. Discussing Discrete Amplifier Components
   Exploring bipolar junction transistors and discovering field effect transistors

6. Detailing Operational Amplifier Circuits
   Diagnosing operational amplifier structure, examining the most basic operational amplifier circuit and discussing representative operational amplifier circuits

7. Diagnosing Discrete Amplifier Circuits
   Defining key amplifier properties, analyzing the class A amplifier and utilizing push-pull amplifiers

8. RF Amplifier Operations, I
   Examining the trunk/bridger amplifier housing, describing the trunk amplifier module and describing the bridger amplifier module

9. RF Amplifier Operations, II
   Control modules, return/reverse amplifier module, status monitoring module operation and DC power supply module/amplifier power distribution

10. Delving into Oscillators
    Identifying relevant oscillator applications, explaining how oscillator circuits work, diagnosing crystal oscillators and presenting the multivibrator family

11. Distribution Amplifiers
    Introducing the distribution amplifier, examining the distribution amplifier and aligning the distribution amplifier

12. Leveraging DOCSIS Modems for Proactive Network Maintenance
    Presenting DOCSIS proactive network maintenance, executing proactive network maintenance and addressing linear distortion

    FCC requirements/NCTA recommended practices and testing for channel distortions using manual procedures

    Introducing the spectrum analyzer, operating the spectrum analyzer and using the spectrum analyzer in the broadband cable system

15. Analyzing Signal Leakage
    System leakage analysis and annual FCC reporting requirements

16. Cable System Sweeping
    Describing sweep, sweeping the forward path, sweeping the return path and troubleshooting sweep response problems

17. Constructing Underground Plant, I
    Using chain trenchers, digging trenches, burying coaxial cable and backfilling the trench

18. Constructing Underground Plant, II
    Understanding plowing, introducing dry boring machines and explaining fluid-assisted boring

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Introduction to Multiplexing

OVERVIEW
Multiplexing signals together onto a common medium for transport is a practice that is an often-overlooked stage of signal processing. The NCTI® Introduction to Multiplexing course defines time division multiplexing (TDM) and frequency division multiplexing (FDM), the two most common multiplexing schemes that have long been used to transport television and telephone signals through their respective transport mediums. An overview of orthogonal frequency division multiplexing (OFDM) is provided as it has now become commonplace in many applications. Optical multiplexing, which falls under the banner of wave division multiplexing (WDM), requires review of fiber-optic technologies before various levels of WDM can be defined. Detailed explanations are provided of how TDM is used in assorted telecommunications protocols that were first used by the telephone industry before being implemented in many broadband cable networks. This course is beneficial for the technician who works in the hybrid fiber coax (HFC) network or headend.

Delivery Options:
☐ The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 2 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. identify the characteristics of the most common multiplexing techniques
2. compare the types of wavelength division multiplexing and how they work
3. describe how time division multiplexing is adapted for different applications

COURSE OUTLINE
1. Distinguishing Multiplexing Schemes
   Discussing optical fiber basics, describing frequency division multiplexing and assessing orthogonal frequency division multiplexing
2. Multiplexing Optical Wavelengths
   Introduction to understanding wave propagation, defining the electromagnetic spectrum and wavelength, assessing optical fiber modes, defining wavelength division multiplexing, applying wide wavelength division multiplexing, examining coarse wavelength division multiplexing and discussing dense wavelength division multiplexing
3. Detailing Time Division Multiplexing
   Interleaving data, defining time division multiplexing frames, optimizing TDM efficiency, identifying synchronous TDM applications and recognizing asynchronous TDM applications

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
Introduction to Wide Area Networks

Part of the Telecom Specialist Certification Series

OVERVIEW

Wide area networks (WAN) comprise the data networks covering individual cities, to the entire globe. The data on these networks, naturally, includes video and voice. For technicians to perform well in this world, they need to be familiar with the various WAN technologies. As an introduction into WAN, this course teaches satellite network basics, as well as how the various WAN technologies work together to transport data; such as synchronous optical networks (SONET), Ethernet and multiprotocol label switching (MPLS). Virtual private networks (VPN) functionality and security is also explored.

Delivery Options:

The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is four hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Telecom Specialist certification

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. identify the advantages and disadvantages of the different WAN technologies
2. differentiate between the types of packet switched technologies
3. discuss synchronous optical network (SONET) and how it is used as a transport protocol
4. describe the characteristics of Ethernet protocol
5. explain how multiprotocol label switching (MPLS) relates to time-division multiplexing (TDM), asynchronous transfer mode (ATM) and Ethernet
6. describe how virtual private networks (VPN) function and how the various VPN security methods work

COURSE OUTLINE

1. Wide Area Networks Technologies
   Exploring wide area networks, reviewing communication satellite networks, examining synchronous optical networks (SONET) and examining ethernet

2. Multiprotocol Label Switching
   Exploring multiprotocol label switching (MPLS) and examining virtual private networks (VPN)

RELATED COURSES

Students completing this course should then enroll in:

» Introduction to Protocols and Network Routing
» Introduction to Networking: Home & Peer-to-Peer Networks

TRAINING FEATURES

» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy-to-read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Introduction to Protocols and Network Routing

OVERVIEW
Networking is an integral part of the broadband industry and any industry that provides communication technology services. The key to being a contributor to your industry and company is to learn as much as you can about IP networks. Although this is not an overnight process, this course teaches the introductory fundamentals of IP networking. Learning about networking starts with the OSI (Open Systems Interconnection) reference model. From there, you will learn the structure of IP addresses and packets in IPv4 and IPv6. Fully qualified domain names (FQDN) are explored along with subnet masking and multicasting. Finally, transport layer protocols such as TCP (transmission control protocol) and UDP (user datagram protocol) are explained.

Delivery Options:
The course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is four hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. describe the OSI reference model, IP structure and how they relate to network routing.
2. examine the attributes of a DNS and how it is used to share information around the world
3. describe the characteristics of subnet masking classless routing protocols used to forward subnet masks along with their updates through the network
4. examine the components of IP Multicasting and how it enables data communications.
5. discuss the features of gateway protocols and how they instruct and distribute communications
6. examine the Transport Layer protocol messages in the OSI reference model

COURSE OUTLINE
1. Network Routing Principles
   Examining Internet protocol addresses, examining domain name system (DNS) and examining subnet masking
2. Network Protocols
   Examining Internet protocol multicasting, exploring gateway protocols and explaining transport layer protocols

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Fiber Testing and Maintenance

Part of the Master Technician Certification Series and Telecom Specialist Certification Series

OVERVIEW

The NCTI Fiber Testing and Maintenance course provides the fiber-optic cable technician with information regarding post activation fiber-optic theory and application. The course concentrates on the test equipment and procedures necessary to perform testing and maintenance for new fiber-optic cable links, troubleshooting service outages and restoring fiber-optic links to their original performance specifications. The course also describes the process of fiber-optic cable restoration planning and implementation of preventive maintenance regimens in an HFC network.

Delivery Options:

The course is delivered online and comes enhanced with 30 instructional videos developed in partnership with Light Brigade®. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:

Varies based on the student’s self-study pace, however, the maximum time allowed is six months from enrollment.

BENEFITS

Upon completion students will:

» understand the importance of recording and maintaining fiber-optic cable link performance documentation
» have the knowledge to operate and use fiber-optic cable test equipment
» be able to correctly set up and use the OTDR for initial testing, turn-up and restoration purposes
» have the ability to read and understand fiber-optic cable event signatures
» be familiar with basic restoration procedures
» earn two hours of college credit
» use this course to help prepare for SCTE’s Broadband Transportation Specialist certification
» receive credit toward NCTI Master Technician certification
» receive credit toward NCTI Telecom Specialist certification
» earn an industry-recognized NCTI certificate of graduation

Ideal for:

Technical personnel involved in maintaining the fiber-optic portion of HFC networks, including:

» fiber-optic cable technicians
» service technicians
» network technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. know what to look for when making visual inspections of the outside fiber-optic cable plant
2. explain what damage can be done to the fiber-optic cable during the installation process that does not immediately appear
3. explain how to check post-installation damage to ensure that all damaged and stressed fiber-optic cable is identified and replaced
4. perform tests using the optical power meter for measuring optical transmit and receive power
5. explain the function of a light source and why maintaining optical stability is important
6. explain how a laser light source is used to identify an optical fiber
7. identify the components of an OTDR waveform display
8. identify the advantages of optical fiber break locators
9. distinguish between long and short pulse widths
10. realize the importance of entering the correct index of refraction into an OTDR
11. connect an optical fiber to an OTDR using compatible and incompatible connectors and polishes
12. understand the difference between a reflectance measurement and an optical return loss (ORL) measurement
13. accurately measure optical splice and connector loss
14. perform a step by step acceptance test of a fiber-optic cable reel
15. identify multiple optical fiber strands after a splitter on an OTDR trace
16. recognize the difference between a real event and a ghost event on an OTDR trace
17. describe how to measure transmitter optical power and receiver optical power levels using an optical power meter
18. understand the relationship between the DC voltage test point and optical power
19. identify procedures for set up of the return path from the node to the headend
20. explain how to use network documentation
21. explain the purpose of the fiber-optic test sets used to troubleshoot a system problem
22. list the test parameters that must be entered into the OTDR prior to making any test
23. explain what causes reflective and non-reflective events
24. identify the typical sources of failure in the equipment room and in the outside plant
25. describe how service may be restored in a temporary and a permanent restoration
26. describe the differences between aerial and underground restorations
27. describe safety practices specific to the restoration environment
28. explain how dense wavelength division multiplexing (DWDM) and coarse wavelength division multiplexing (CWDM) can change preventive maintenance requirements
29. identify applications of various types of optical spectrum analyzers

COURSE OUTLINE

1. Maintaining Optical Networks
   Knowing the fiber-optic cable network, preparing for what can go wrong in the fiber-optic cable network, understanding the fiber-optic cable troubleshooting process and documenting fiber-optic cable additions, moves and changes

2. Introducing Optical Test Equipment
   Examining optical power meters, laser light sources, optical fiber identifiers, optical talk sets and optical loss test sets

3. Presenting Optical Time Domain Reflectometer (OTDR) Basics
   Introducing OTDRs, describing OTDR types and examining OTDR features

4. Preparing for OTDR Measurements
   Performing preliminary OTDR procedures, programming the OTDR and understanding OTDR tests

5. Performing OTDR Measurements
   Recognizing OTDR signatures, conducting OTDR tests and making span measurements with an OTDR

6. Conducting Acceptance Testing of a Broadband Optical Link
   Testing optical power and reflectivity, testing optical transmitters and receivers and using optical fiber documentation

7. Troubleshooting the Fiber Outage
   Understanding key elements of effective fiber-optic troubleshooting and outlining the fiber-optic troubleshooting process

8. Planning Fiber-Optic Restorations
   Explaining a fiber restoration plan, understanding causes of optical failures and planning efficiently and effectively for fiber restorations

9. Restoring Service in Optical Networks
   Assembling necessary resources for fiber restorations, outlining fiber restoration safety concerns, adjusting to the fiber restoration scenario and preparing for the next fiber restoration

10. Preventing Optical Failures
    Inspecting the fiber-optic cable plant visually, using status monitoring tools, testing optical transport and identifying RF effects on optical performance

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Fiber Optics Workshop

OVERVIEW
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 communication 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.

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.

CERTIFICATIONS AND CREDITS
» Electronics Technicians Association (ETA) Fiber Optic Installer (FOI) [$150]
» 28 BICSI ITS Continuing Education Credits
» 4 SCTE Recertification Units
» Light Brigade Certificate of Completion

SKILLS LAB OUTLINE
WORKSTATION #1 – CABLE & SPLICING CLOSURE PREPARATION
Learn how to safely and properly prepare fiber-optic cable for acceptance testing, splicing, termination and mid-entries on communications 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 pigtails in the panel/closure
» learn about labeling issues in panels and closures
» learn about possible points of failure and their prevention

RECOMMENDED PREREQUISITE
» Graduates of NCTI's Fiber Installation and Activation and Fiber Testing and Maintenance courses are eligible for this class.

TRAINING FEATURES
» Professional instructors and technicians with real world practical experience
» Small classes ensure valuable instructor/student interaction
» State-of-the-art equipment
» Timely and relevant course materials
» Long-term technical assistance available

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
WORKSTATION #2 – FUSION & MECHANICAL SPLICING

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 how 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.

(Continued)
WORKSTATION #4 – CONNECTORIZATION (Continued)

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

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
OVERVIEW

This four-day class has been developed with 16 hours of classroom lecture and 16 hours of hands-on skills labs to provide practical understanding and skills required to properly design, install and maintain fiber optic networks in Telco, Broadband and Premises (LAN) applications. This course is also available in a two-day version with 16 hours of classroom lecture.

Students will use the latest fiber optic technology and equipment to learn how to connectorize, splice, test and troubleshoot optical fiber networks in order to increase efficiency, reliability and on-the-job safety as well as reduce cost and downtime.

The course is intended for those who design, install, test and maintain fiber optic communication systems for voice, video and data applications.

CERTIFICATIONS AND CREDITS

» Electronics Technicians Association (ETA) Fiber Optic Installer (FOI) [$150]
» 28 BICSI ITS Continuing Education Credits
» 4 SCTE Recertification Units
» Light Brigade Certificate of Completion

CLASSROOM COURSE OUTLINE

1. Introduction to Fiber Optics
   Standards and terminology
2. Fiber Theory and Optical Fibers
   Single-mode, multimode and new generation
3. Fiber Optic Cables
   Indoor/outdoor and special types
4. Connectors
   Single-mode, multimode, SFF styles, attenuators and terminators, reflection and polishes, connector cleaning and inspection
5. Fiber Optic Splicing
   Fusion splicing, mechanical splicing and cleaving tools
6. Cable Management
   Panels, closures, pedestals and FTTx products
7. Installation
   Outside plant, underground, aerial and premises / LAN
8. Test Equipment and Testing
   Optical loss test sets, optical time-domain reflectometers (OTDRs), visual inspection equipment, dispersion testers
9. Optical Testing
   Premises, outside plant and systems
10. Restoration/Maintenance
    Outside plant, premises and emergency restoration
11. Safety
12. System Design
    Sources / detectors, repeaters / amplifiers, passive devices, WDM, DWDM, CWDM, loss budgets and integration
13. Systems Overview
    Ethernet, HDTV, SONET and FTTx/PON

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
SKILLS LAB OUTLINE

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 pigtails 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 SPLICING

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
» pigtai 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.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
WORKSTATION #3 – OTDR THEORY & OPERATION (Continued)

Students will learn how 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

Produced in Conjunction with

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Certified Fiber to the Home Professional – CLASSROOM

OVERVIEW
This course features 16 hours of classroom lecture with an experienced FTTH instructor. Students will gain a broad base of knowledge and familiarity with FTTH architecture, network design, deployment technology and operational skills. The course is intended for network designers, network planners, supervisors and project managers that will be involved in deploying and maintaining FTTH and FTTB networks.

CERTIFICATIONS
» FTTH Council’s Certified Fiber to the Home Professional (CFHP) Certification
» Light Brigade Certification of Completion

CLASSROOM COURSE OUTLINE

1. Applications
Planning and design of the FTTH network, fiber optic transmission, today’s applications, fiber to the home, fiber to the business/building, drivers behind FTTx, the evolution from POTS to fiber, FTTx origins and evolution, TPON (telephony PON), fiber to the curb, cable television and radio frequency over glass

2. Bandwidth Issues
The demand for bandwidth, technology in transition, analog to digital video, SDTV and HDTV, multimedia convergence for the IP network, over the top video, next generation 3D HDTV, IP video delivery, telecommuting, interactive technologies, high bandwidth users, cloud computing, storage and cell towers

3. Economics
Defining CAPEX and OPEX, FTTH and FTTB CAPEX items, analog impacts, who’s implementing FTTH?, triple play network characteristics, cost comparisons, migration path considerations, FTTH and FTTB OPEX items, power, network management systems, mean time between failure, maintenance issues, operations software, interface software, quality of service, OPEX and CAPEX costs

4. Theory and Fibers

5. FTTH Standards

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
6. **Network Topologies**
   - The physical topologies, point to point topologies, star topology, PON star configurations, reach extender, route redundancy, ring, mesh and bus topology

7. **Network Components**
   - Active devices, typical transmitter types, optical return loss and the ODN, erbium-doped fiber amplifiers, photodetectors, OLTS and ONTs, fiber optic passive devices, WDMs and PON systems, coarse, wide and dense WDM, PON configurations for WDM, filters and gratings, diplexers, triplexers and quadplexers, splitters, planar lightwave circuits, optical bands and windows and wavelength allocations

8. **Cables**
   - FTTx distribution and drop cables, outside plant cables, high fiber count cables, aerial fiber optic cables, FTTx drop cables, indoor/outdoor cables, FTTH/MDU premises installations, distribution cables, plenum, riser and LSZH cables, fiber optic cable cordage, fiber and buffer color codes, cable handling and FTTx installation disciplines

9. **Cable Management**
   - Fiber optic interconnect hardware, outside plant cable management, patch panels, splice panels, optical entrance enclosures, distribution panels, fiber distribution hubs, pedestals, vaults and handholes, splice closures, multiport service terminals, fiber transition terminals, FTTH panels, cabinets for active Ethernet, cable storage methods, hardened connector slack storage, panel and closure issues

10. **Cable and Fiber Termination**
    - Managing termination costs, splicing for the FTTx system, traditional splice scenarios, drop cable splicing, extrinsic splice and connection attenuation, fusion and mechanical splicing, ribbon splicing technology, pigtail splicing, splice protection, main connector components, fiber optic connector polishes, common FTTx connectors, hardened connectors, small form factor LC connectors, multifiber connectors, field terminable FTTH connectors, fiber optic cleaning methods, attenuators and terminators

11. **Splitter Placement**
    - FTTH planning, take rate, growth strategies for PON, migration strategy, splitter flexibility, FTTH design engineering, fiber management, rural applications, slack storage, MDUs and MTUs, outdoor splitter and hub location, centralized and distributed splitter in FTTH

12. **Network Design**
    - Designing FTTx systems, selecting transmission protocol, proper aerial route planning and engineering, active Ethernet P2P networks, growth strategies, migration, FTTH PON design engineering, FTTH outside plant design, splitter location, FTTH home run management, FTTH centralized splitter management, FTTH distributed topology, sales and construction planning, project chronology, writing OSP specifications, fiber management specifications, fiber cable management, cable mid-entry planning and specifying termination options

13. **Fiber to the Building**
    - High-rise MDU/MTU, medium-rise MDU/MTU, low-rise MDU/MTU, horizontal MDU/MTU, FTTH systems and design goals, FTTH MDU existing infrastructure, telecommunications rooms and closets, telecommunications enclosure, backbone hierarchical star topology, FTTH MDU installation and termination, cable structure and fiber counts, end user locations, solutions to get cabling to each user, optical network terminals and access points, aesthetics and termination techniques

14. **Loss Budgets**
    - Impacts on signal quality, loss budgets for FTTP networks, fiber, splitter and WDM specifications, active components, active Ethernet, PON classes, class B+ and C+ specifications, differential optical path loss, PON loss budgets, B-PON specifications, EPON specifications, G-PON specifications, XG-PON specifications, 10GE-PON specifications, RFoG loss budgets, tapered loss budgets and reach extension

15. **Test Disciplines**
    - FTTH testing and troubleshooting, network test and equipment, testing active Ethernet, testing PON systems, testing FTTH/PON, optical loss test sets, PON power meters, optical loss testing, optical power measurements, OTDR testing, splitter signatures, reflection testing, visual inspection, documentation, visual laser testing requirements, troubleshooting with a visual fault locator, troubleshooting PON and AE systems, system test points, system related problems and service activation testing

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Certified Fiber to the Home Professional – ONLINE COURSE

OVERVIEW

This course is focused to network designers, network planners, supervisors and project managers that will be 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.

This online training program is comprised of modules that allow the student to grasp key concepts at their own pace and gauge their mastery through knowledge questions, culminating in a 75-question practice exam. It is ideal for remote and international students, providing valuable training without the expense or inconvenience of travel.

The comprehensive online training course covers the same material as our Certified Fiber to the Home Professional (CFHP) instructor-led classroom training, including the following topics:

- 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

Completion Time:

After registering online, you will be given a log in and password unique to you. You will have 90 days to complete the course — but it can be completed in a single weekend if you choose. Take each module at your own pace, review completed modules and retake practice exams at your convenience.

CERTIFICATIONS

- Upon completion of this program, the student will have the necessary knowledge to successfully complete the CFHP certification exam available on the Fiber to the Home Council’s website. ($150)
- Light Brigade Certification of Completion

COURSE OUTLINE

1. Applications
   Planning and design of the FTTH network, fiber optic transmission, today’s applications, fiber to the home, fiber to the business/building, drivers behind FTTx, the evolution from POTS to fiber, FTTx origins and evolution, TPON (telephony PON), fiber to the curb, cable television and radio frequency over glass

2. Bandwidth Issues
   The demand for bandwidth, technology in transition, analog to digital video, SDTV and HDTV, multimedia convergence for the IP network, over the top video, next generation 3D HDTV, IP video delivery, telecommuting, interactive technologies, high bandwidth users, cloud computing, storage and cell towers

(Continued)
3. **Economics**
Defining CAPEX and OPEX, FTTH and FTTB CAPEX items, design impacts, who's implementing FTTH?, triple play network characteristics, cost comparisons, migration path considerations, FTTH and FTTB OPEX items, power, network management systems, mean time between failure, maintenance issues, operations software, interface software, quality of service, OPEX and CAPEX costs

4. **Theory and Fibers**

5. **FTTH Standards**

6. **Network Topologies**
The physical topologies, point to point topologies, star topology, PON star configurations, reach extender, route redundancy, ring, mesh and bus topology

7. **Network Components**
Active devices, typical transmitter types, optical return loss and the ODN, erbium-doped fiber amplifiers, photodetectors, OLTs and ONTs, fiber optic passive devices, WDMs and PON systems, coarse, wide and dense WDM, PON configurations for WDM, filters and gratings, diplexers, triplexers and quadruplexers, splitters, planar lightwave circuits, optical bands and windows and wavelength allocations

8. **Cables**
FTTx distribution and drop cables, outside plant cables, high fiber count cables, aerial fiber optic cables, FTTx drop cables, indoor/outdoor cables, FTTB/MDU premises installations, distribution cables, plenum, riser and LSZH cables, fiber optic cable cordage, fiber and buffer color codes, cable handling and FTTx installation disciplines

9. **Cable Management**
Fiber optic interconnect hardware, outside plant cable management, patch panels, splice panels, optical entrance enclosures, distribution panels, fiber distribution hubs, pedestals, vaults and handholes, splice closures, multiport service terminals, fiber transition terminals, FTTB panels, cabinets for active Ethernet, cable storage methods, hardened connector slack storage, panel and closure issues

10. **Cable and Fiber Termination**
Managing termination costs, splicing for the FTTx system, traditional splice scenarios, drop cable splicing, extrinsic splice and connection attenuation, fusion and mechanical splicing, ribbon splicing technology, pigtail splicing, splice protection, main connector components, fiber optic connector polishes, common FTTx connectors, hardened connectors, small form factor LC connectors, multifiber connectors, field terminable FTTH connectors, fiber optic cleaning methods, attenuators and terminators

11. **Splitter Placement**
FTTH planning, take rate, growth strategies for PON, migration strategy, splitter flexibility, FTTH design engineering, fiber management, rural applications, slack storage, MDUs and MTUs, outdoor splitter and hub location, centralized and distributed splitter in FTTB

12. **Network Design**
Designing FTTx systems, selecting transmission protocol, proper aerial route planning and engineering, active Ethernet P2P networks, growth strategies, migration, FTTH PON design engineering, FTTH outside plant design, splitter location, FTTH home run management, FTTH centralized splitter management, FTTH distributed topology, sales and construction planning, project chronology, writing OSP specifications, fiber management specifications, fiber cable management, cable mid-entry planning and specifying termination options

(Continued)
13. Fiber to the Building
High-rise MDU/MTU, medium-rise MDU/MTU, low-rise MDU/MTU, horizontal MDU/MTU, FTTH systems and design goals, FTTH MDU existing infrastructure, telecommunications rooms and closets, telecommunications enclosure, backbone hierarchical star topology, FTTH MDU installation and termination, cable structure and fiber counts, end user locations, solutions to get cabling to each user, optical network terminals and access points, aesthetics and termination techniques

14. Loss Budgets
Impacts on signal quality, loss budgets for FTTP networks, fiber, splitter and WDM specifications, active components, active Ethernet, PON classes, class B+ and C+ specifications, differential optical path loss, PON loss budgets, B-PON specifications, EPON specifications, G-PON specifications, XG-PON specifications, 10GEPON specifications, RFoG loss budgets, tapered loss budgets and reach extension

15. Test Disciplines
FTTH testing and troubleshooting, network test and equipment, testing active Ethernet, testing PON systems, testing FTTH/PON, optical loss test sets, PON power meters, optical loss testing, optical power measurements, OTDR testing, splitter signatures, reflection testing, visual inspection, documentation, visual laser testing requirements, troubleshooting with a visual fault locator, troubleshooting PON and AE systems, system test points, system related problems and service activation testing

16. Network Trends
Describe the difference between XG-PON and NG-PON networks, briefly explain the impact of 5G, describe the basic principles behind optical transmission keys, explain rogue ONT behavior and identify steps involved when migrating to NG-PON
13. Fiber to the Building
High-rise MDU/MTU, medium-rise MDU/MTU, low-rise MDU/MTU, horizontal MDU/MTU, FTTB systems and design goals, FTTB MDU existing infrastructure, telecommunications rooms and closets, telecommunications enclosure, backbone hierarchical star topology, FTTB MDU installation and termination, cable structure and fiber counts, end user locations, solutions to get cabling to each user, optical network terminals and access points, aesthetics and termination techniques

14. Loss Budgets
Impacts on signal quality, loss budgets for FTTP networks, fiber, splitter and WDM specifications, active components, active Ethernet, PON classes, class B+ and C+ specifications, differential optical path loss, PON loss budgets, B-PON specifications, EPON specifications, G-PON specifications, XG-PON specifications, 10GE-PON specifications, RFoG loss budgets, tapered loss budgets and reach extension

15. Test Disciplines
FTTH testing and troubleshooting, network test and equipment, testing active Ethernet, testing PON systems, testing FTTH/PON, optical loss test sets, PON power meters, optical loss testing, optical power measurements, OTDR testing, splitter signatures, reflection testing, visual inspection, documentation, visual laser testing requirements, troubleshooting with a visual fault locator, troubleshooting PON and AE systems, system test points, system related problems and service activation testing
FTTx for Installers and Technicians

OVERVIEW
This four-day class has been developed with 16 hours of classroom lecture and 16 hours of hands-on skills labs to provide practical understanding and skills required to install, test and troubleshoot PON and active Ethernet FTTx systems according to ITU, IEEE and SCTE standards. Students will perform bidirectional testing, WDM testing and splitter testing with the latest FTTx test equipment such as PON power meters and optical time-domain reflectometers.

CERTIFICATIONS AND CREDITS
» Electronics Technicians Association (ETA) Fiber Optic Technician-Outside Plant (FOT-OSP) Certification [$150]
» 18 BICSI ITS Continuing Education Credits
» 3 SCTE Recertification Units
» Light Brigade Certification of Completion

CLASSROOM COURSE OUTLINE
1. Introduction to Fiber Optics
   Basic fiber optic terminology, FTTx optical fiber transmission systems, typical transmission rates, fiber optic symbols, why use fiber optics, fiber optic standards and brief history of fiber optics

2. FTTx PON Methodology
   Basic FTTx terminology, passive optical networks (PON), fiber to the home, fiber to the business/building, POLAN, fiber to the curb, IP video delivery, active Ethernet, TDM and TDMA, broadband PON (B-PON), asynchronous transfer mode (ATM), Ethernet PON, gigabit PON (G-PON), 10G-PON, 10 gigabit EPON, RF video overlay, radio frequency over glass (RFoG) and WDM-PON

3. Topologies
   Network topologies, physical topologies, point-to-point topology, star topology, reach extender, route redundancy, ring topology, mesh topology and bus topology

4. Optical Distribution Network (ODN) and OSP
   ODN capabilities, outside plant cable management, drop terminator and cable and fiber management

5. Fiber Theory
   The three big issues, attenuation, fresnel reflection, refraction, numerical aperture, intrinsic and extrinsic losses, the electromagnetic spectrum, lightwave transmission, single-mode step-index fibers, mode field diameter and dispersion (pulse spreading)

6. Fiber
   Optical cable for FTTx, FTTx distribution and drop cables, outside plant cables, high fiber count cables, aerial fiber optic cables, indoor/outdoor cables, plenum and riser cables, low smoke zero halogen, distribution cables, fiber optic cable cordage and fiber and buffer color codes

7. Cable
   Outside plant, underground, aerial and premises / LAN

8. Connectors
   Extrinsic splice and connection attenuation, fiber optic connector polishes, common FTTx connectors, small form factor LC connectors, multifiber connectors, field terminable FTTH connectors, hardened connectors, connector inspection and cleaning, terminators and attenuators and single-mode field connectorization issues

(Continued)
9. **Splicing**  
Traditional splice scenarios, drop cable splicing, good splice requirements, fiber cleaving, fusion, ribbon and pigtail splicing, protecting the splice and mechanical splices

10. **Fiber and Cable Management**  
Panels, closures and cabinets, fiber optic interconnect hardware, splice tray recommendations, FTTx OSP cable management products, cabinets for active Ethernet, network access points, slack storage, vaults and handholes, indoor slack storage methods, underground cable storage, aerial cable storage products and hardened connector slack storage

11. **Passive Devices**  
Fiber transition to the network, planar lightwave circuits, fused biconical taper splitters, splitter challenges and scenarios, tap splitters, WDMs and PON systems, optical bands and windows, wavelength allocations, multiplexing and demultiplexing, filters and gratings, types of WDMs, PON configurations for WDM, RF video overlay, diplexers, triplexers and quadplexers and coarse, dense and wide WDM

12. **Active Devices**  
Fiber optic transmitters, distributed feedback lasers, Fabry-Perot lasers, fiber optic receivers, photo diodes, Erbium-doped fiber amplifiers, reflection issues, optical return loss and the ODN

13. **Optical Line Terminals (OLTs) and Optical Network Terminals (ONTs)**  
OLTs, ONT, NT and ONU, UPS and battery backup systems

14. **Loss Budgets**  
Designing FTTx systems, writing OSP specifications, loss budgets for FTTx networks, safety margins, “Not to exceed” charts for single-mode, active Ethernet specifications, PON loss budgets, G-PON specifications, G-PON power levels, Ethernet specifications, RFOG and tapered loss budgets

15. **Installation**  
FTTx cable installation, cable handling, standards and regulations, underground installation techniques, direct buried, conduit and duct installation, cable pulling methods, tension monitoring, high air speed blown, air blown fiber, aerial installation techniques, mid-span (express) entries, cable installation products, FTTB installation techniques, MDUs and MTUs, FTTB design goals, telecommunications rooms, get cabling to each user, termination techniques, aesthetics, ONTs and access points and installation inspection reports

16. **Testing**  
Testing active Ethernet, testing PON systems, initial installation testing, testing equipment for different scenarios, “Not to exceed” values, OTDR testing, dynamic range, deadzone, OTDR signatures, key points to understanding IOR, post-installation testing with the OTDR, testing drop cables, reflection testing, measuring reflectance with a deadzone box, optical loss testing, insertion loss method, visual laser testing requirements and visual inspection

17. **Maintenance**  
Identify – locate – resolve, typical causes of failure, system related problems, eye diagrams, types of fiber optic damage, typical cable system faults, equipment used in the restoration role, emergency restoration kit requirements, aerial restoration, outside plant restorations, the need for slack cable, effective maintenance postures and post-restoration recommendations

18. **Safety**  
Fiber optic safety concerns, visual safety using fiber optic sources, wavelength of the eye, laser classifications, working with lasers and optical fibers, personal protective equipment, chemicals, material safety data sheets (MSDS), work area safety and installation practices

**SKILLS LAB OUTLINE**

**WORKSTATION #1 – CABLE MANAGEMENT**

- cable preparation
- mid-entry practices
- closure preparation
- panel dressing
- splitter installation
- splice tray fiber routing

(Continued)
WORKSTATION #2 – SPLICING
» strip and cleave processes
» inline and pigtail splicing
» FTTx splicing
» fixed V-groove splicers
» core alignment splicers

WORKSTATION #3 – OTDR TESTING
» OTDR use in FTTx installations
» FTTx OTDR signatures
» measuring reflectance
» testing splitters

WORKSTATION #4 – OPTICAL LOSS TESTING
» FTTx test equipment
» testing OLT/ONT power levels
» test points in FTTx installations
» upstream/downstream testing
» troubleshooting
» FTTx documentation
FTTx OSP Design

OVERVIEW
This three-day class has been developed with 16 hours of classroom lecture and 8 hours of hands on design exercises to teach attendees to apply critical issues such as customer take rate and density to outside plant design. This course covers FTTH network field configurations, design benchmarks and installation parameters for active Ethernet and PON systems. Attendees will create their own FTTx network designs in classroom break-out sessions, applying the learned objectives to distributed split, centralized split, home run and point-to-point systems.

CERTIFICATION
» Light Brigade Certification of Completion

CLASSROOM COURSE OUTLINE
1. Introduction to FTTx
   General engineering guidelines, FTTx basics, fiber optic transmission, basic fiber optic terminology, the three big issues, attenuation, lightwave transmission, FTTH formats, POLAN and PON generations

2. Optical Fiber

3. Optical Cables
   Optical cable for FTTx, FTTx distribution and drop cables, high fiber count cables, aerial fiber optic cables, distribution cables, cable structure and fiber counts, fiber and buffer color codes, cable handling, outside plant cable management, fiber distribution hubs, pedestals, splice closures and multiport service terminals

4. Connectors and Splitters
   Common FTTx connectors, small form factor LC connectors, multifiber and hardened connectors, fiber optic connector polishes, termination options, splitter flexibility and management

5. AE versus PON
   FTTH design options, AE versus PON cost comparisons and the fundamental fiber plan

6. Fundamental Fiber Planning
   Engineer or designer, fundamental planning design steps, cost considerations, fiber and cable management, the ideal network location, central office location strategy, ideal hub/node placement, density and central office location, PON system design, configuring fiber routes, ideal feeder route configuration and cost variance from the ideal

7. Futureproofing
   Fiber cable sizing, what speed do we need to the home, full spectrum zero water peak fiber and general engineering guidelines

8. PON Design Options
   Basic PON design options, distributed split designs, determining the best solution, OLT and splitter relationship, pseudo cabinet concept, OLT costs, fiber cable tapering, FTTx design efficiency and operational issues

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
9. Fiber to the Building
MDUs and MTUs, get cabling to each user, fiber in the building design goals, high-rise and medium-rise buildings, MDU existing infrastructure, telecommunications room, outside-in MDU cabling system, outside-in multifiber bundle system, outdoor/indoor MDU cabling system, MDU buildings OSP design options, low rise and campus MDUs, typical cabinet design strategy, typical distributed split design strategy, distributed split design conclusions, FTTB premises, ONT options, end user locations, optical network terminals and access points and aesthetics

10. Single-family Residential Areas
PON areas, subdivision design strategies, typical drop layout and fiber drop design

11. Connectorization Options
Connectorized versus fusion splicing, connectorized drops, common reasons for using connectors, conventional design options, plug and play design options, field terminated FTTH connectors, mechanical connectors, capital expenditures (CAPEX), administration, network performance, organizational considerations, developing a cost model and take rates

12. Rural Areas
Network design for rural areas, ideal hub/node placement, rural applications, rural area network design, splitter placement and distribution and splitter field arrangement

13. WDM-PON
The impact of WDM-PON, WDM-PON design basics, spectrum WDM-PON, WDM-PON options, three options for splitter placement, home run design conversion, centralized design conversion, distributed split design conversion and PON to WDM-PON conversion

14. Design Steps
PON loss budgets, calculating network loss, “not to exceed” loss budgets, general design steps, home run design steps, cabinet design steps, cost analysis, design steps for splitter placement, central office versus cabinet, cabinet design steps and distributed split designs

15. Specifications
Product specification, partial fiber specification and typical optical cable specification sheet

16. Miscellaneous
ITU-T G.671, splitter specifications, WDM specifications, telcordia generic requirements, physical layer standards, outside plant standards, North American codes, proper aerial route planning and engineering, typical pole clearances and fiber quality

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Fiber Characterization: PMD, CD and ORL

OVERVIEW
This three-day class has been developed with 16 hours of classroom lecture and 8 hours of hands-on skills labs to provide practical understanding of the principles behind building and maintaining high-speed optical networks. Key critical parameters such as polarization mode dispersion (PMD), chromatic dispersion (CD) and optical return loss (ORL) need to be calculated in order to evaluate system capabilities and network upgrades to higher bit rate systems.

CERTIFICATIONS AND CREDITS
» E5 SCTE Recertification Units (RUs)
» Light Brigade Certification of Completion

CLASSROOM COURSE OUTLINE
1. Introduction
The three big issues, optical units, standards committees, high-speed transmission, SONET optical carrier rates, time domain multiplexing systems, wavelength dimension in WDM systems, optical fiber transmission system, four tiers of fiber industry providers, optical network enabling technologies, optical network evolution and evolving to the all-optical network

2. Optical Fiber

3. Connectors
What to look for in a connector, typical connector roles, single-mode connector polishes, visual inspection equipment, visual safety using fiber optic sources, IEC 61300-3-35, fiber optic cleaning method, optical return loss and the ODN, reflection testing and terminators

4. Components Overview
Light sources – lasers, laser spectral width, fabry-perot lasers, distributed feedback lasers, direct and indirect modulation, pulse chirping, signal information in a light beam, reflection causes and issues, optical isolators, tunable lasers, laser safety, photodiodes, detector types, materials used in detectors, attenuators, bit error rate, system related problems and eye diagrams

5. Regeneration
Repeaters, regenerators and amplifiers, factors for regenerator usage, basic components for optical transmission, DWDM system spans, optical amplification and roles of optical repeaters

(Continued)
6. Optical Multiplexing
Wavelength division multiplexing, fiber optic transponders, fiber optic passive devices, multiplexing basics, coarse wavelength division multiplexing, dense wavelength division multiplexing, optical demultiplexing, fiber Bragg gratings, optical circulators and system loss budgets

7. Dispersion
Dispersion power penalties, dispersion formulas, pulse spreading, modulation, pulse compression and broadening, pulse appearances, calculating dispersion penalty and dispersion in submarine systems

8. Chromatic Dispersion
Components of chromatic dispersion, chromatic dispersion compensation, dispersion-compensating fiber, dispersion compensating modules, chromatic dispersion measurement, spectral group delay in the time domain and interferometry method

9. Polarization
Polarization mode dispersion, birefringence in fiber, optical cable installation, linear polarization states, controlling polarization, polarization-dependent loss, simple PMD calculations, polarization mode dispersion testing, PMD measurement methods, complete PMD fiber characterization and PMD first order limits

10. Test Equipment
Optical loss test sets, optical talk sets, optical time-domain reflectometers, optical reflection, extrinsic loss and fiber tolerances, pulsewidth, OTDR signatures, fiber tolerance issues, resolving fiber versus cable length, reflection testing, measuring reflectance with a deadzone box, reflectometers, optical spectrum analyzers, multiwavelength meters, testing WDM networks, optical dispersion testing, chromatic dispersion, polarization mode dispersion and testing 100G systems

11. The Future
New and future bandwidth demands, TCP/IP, 40/100G transmission, advanced technologies and trends
Emergency Restoration

OVERVIEW

The words “emergency restoration” strike fear into any network or outside plant manager. 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 trained to deal with the emergency in a timely, cost-efficient, manner.

This three-day course features classroom lecture with heavy emphasis on fault location, troubleshooting and test equipment, followed by hands-on tasks that simulate actual field restorations for both retrievable and non-retrievable slack scenarios. It is intended for those who perform or specify fiber optic maintenance and restoration programs.

CLASSROOM COURSE

1. Fiber and Fiber Theory
2. Optical Cable
3. Connectors
4. Fiber and Cable Management
5. Splicing
6. Test Equipment
7. Optical Testing
8. Documentation
9. Restoration Planning
10. Retrievable and Nonretrievable Slack
11. The Restoration
12. Safety

SKILLS LAB

1. Safety Meeting
2. Restoration Simulation
   • Build an Emergency Restoration Kit
   • Build a Simulated Fiber Optic System
   • Test the Span with an OTDR
   • Perform a Loss Budget
   • Perform Optical Loss Testing
   • Install and Emulate a Live System
   • Measure Tx Output Power
   • Measure Rx Input Power
   • Define the Simulated Outage
   • Measure Optical Distance
   • Field Repair Simulation
   • Retest and Document the System

RECOMMENDED PREREQUISITE

» The course requires basic knowledge of fiber optic theory and terminology, as well as field experience, equivalent formal training such as the Fiber Optics 1-2-3 course, Fiber Optics Workshop or viewing the Light Brigade Staff Development DVD set.

TRAINING FEATURES

» Professional instructors and technicians with real world practical experience
» Small classes ensure valuable instructor/student interaction
» State-of-the art equipment
» Timely and relevant course materials
» Long-term technical assistance available

Produced in Conjunction with Light Brigade

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Advanced Technician

Part of the Master Technician Certification Series

OVERVIEW

The NCTI Advanced Technician course teaches the broadband technician about the application of elements and principals that support operation of most broadband cable headends. Transmission lines, radio wave propagation, antennas, microwave systems and satellite communications are fundamental topics that technicians working in the headend must understand. While digital TV signals have become commonplace, there remains the need to understand analog TV signal processing, analog video analysis and FCC proof-of-performance execution. Digital TV related elements and topics are covered in lessons on digital satellite receivers, digital modulators, digital processors and equipment connection protocols. The Advanced Technician course prepares the technician that has previously worked only in the field for the transition to working inside today’s sophisticated broadband cable headend.

Delivery Options:

The course is delivered online. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is 34 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

- use this course to prepare for SCTE’s Broadband Transportation Specialist (BTS) and Broadband Telecom Center Specialist (BTCS) certifications
- earn four hours of college credit
- receive credit toward NCTI® Master Technician certification
- receive an industry-recognized NCTI certificate of graduation

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. describe how headend system components work together to process analog and digital television services
2. apply governmental regulations and industry recommended practices to headend operation and maintenance
3. define what transmission lines are and the categories of transmission lines
4. describe how radio waves propagate over-the-air and through the atmosphere
5. describe antenna principles and how they apply to different antenna types
6. describe several applications of microwave communications and identify common microwave components
7. describe the basic operation of satellite communications systems
8. explain and apply headend theory of operation and how to connect analog and digital signal processing equipment
9. explain and apply proper headend combining and distribution techniques to downstream and upstream signals
10. describe various types of telecommunications transmission systems and their associated applications

(Continued)
COURSE OBJECTIVES (Continued)

11. explain the NTSC analog video format
12. explain and apply FCC Technical Standards measurement requirements and NCTA Recommended Practices
13. configure a satellite receiver to receive programming
14. explain and apply the different interconnection protocols used in the headend

COURSE OUTLINE

1. Examining Transmission Lines
   Defining transmission lines, reviewing characteristic impedance and adjusting transmission line characteristics

2. Understanding Radio Wave Propagation
   Introduction to understanding wave propagation, discussing components of the electromagnetic wave and explaining radio wave propagation through the atmosphere

3. Examining Antenna Principles
   Defining basic antenna concepts, detailing how antennas transfer energy and optimizing antenna performance

4. Investigating Antenna Types
   Categorizing antenna types, enhancing antenna performance, identifying wide-bandwidth antennas and evaluating mobile antennas

5. Examining Microwave Applications
   Reviewing microwave fundamentals, transporting microwave signals through waveguide and applying microwave communications in broadband cable networks

6. Examining Microwave Components
   Routing microwave signals, assessing microwave diodes and creating and processing microwave signals

7. Delving into Satellite Communications
   Discussing basic concepts of satellite communications, recognizing applications for satellite communications, explaining the technologies of satellite communications and dissecting ground-based satellite antenna operation

8. Analyzing Analog TV Signals
   Introducing composite color video signal characteristics, examining synchronizing pulses, examining signal separation and exploring television test signals

9. Equipment Connection Protocols
   Examining digital interconnection protocols, creating flexibility in the headed and explaining digital program insertion

10. Understanding Signal Processors
    Examining the carrier frequency conversion process, examining the analog television channel processor and explaining the processing digitally modulated carriers

11. Modulating and Demodulating Analog TV Signals
    Examining modulation and demodulation, describing analog television modulation, examining the modulator and examining the demodulator

12. Digital Integrated Receiver/Decoders
    Detailing satellite signal reception, examining the receiver in the integrated receiver/decoder, examining the decoder in the integrated receiver/decoder and configuring the integrated receiver/decoder

13. Transcoding Digital Broadcast Channels
    Examining digital broadcast television, distributing digital broadcast television services on the broadband cable system and discussing ancillary data

14. Digital Modulators
    Examining digital modulators, examining conditional access and examining applications of digital modulators

15. Combining Broadband Signals
    Describing passive signal combining devices, describing downstream combining and describing upstream signal distribution in the headend

16. Analog Video Measurements and Testing
    Characterizing the baseband video signal, examining video test equipment and test signals, executing baseband video measurements and recognizing alternative baseband video test equipment

17. Planning and Executing FCC Proof-of-Performance Tests
    Recognizing the FCC proof-of-performance testing requirements, applying the FCC proof-of-performance testing requirements to a broadband cable network, examining test descriptions and procedures, including the set-top box in the proof-of-performance test results and compiling the FCC proof-of-performance test results

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Broadband HFC Network Testing and Measurements

OVERVIEW

This course provides the advanced student with a comprehensive understanding of system testing theory and application. The student is exposed to the proper use, theory of operation, applications and measurement procedures for test equipment used in the network from the customer premises to the headend.

Delivery Options:

The course is delivered online. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 36 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» receive an industry-recognized NCTI certificate of graduation

Ideal for:

Personnel who install and perform demand and preventive maintenance on coaxial plant or work on the fiber-optic portion of the modern HFC network, including:

» service technicians
» network technicians
» fiber-optic technicians
» headend technicians

COURSE OBJECTIVES

Upon completing this course students will be able to:

1. perform broadband cable AC/DC voltage and resistance measurements using a digital multimeter (DMM)
2. use a signal level meter (SLM) to troubleshoot a drop installation
3. measure video and audio carrier levels and hum modulation per FCC Technical Standards and National Cable & Telecommunications Association (NCTA) Recommended Practices
4. describe system vulnerability and effect on cellular services
5. use a time domain reflectometer (TDR) to locate coaxial cable impedance mismatches and to confirm and identify unauthorized drop cable connections
6. comply with FCC Technical Standards and NCTA Recommended Practices for audio carrier center frequency separation and video carrier level measurements
7. video measurement sets and measure chrominance to luminance gain and phase, differential gain and differential phase distortions
8. measure visual signal-to-coherent beats, test terminal isolation, and measure hum in compliance with FCC Technical Standards and NCTA Recommended Practices
9. set proper sweep and telemetry injection levels and verify the importance of two telemetry paths
10. connect and use a spectrum analyzer to perform tests on the RF spectrum, including noise and distortions
11. interpret digital measurements with a digital signal analyzer to evaluate digital signal quality
12. perform tests using an optical power meter for measuring transmit and receive power
13. use an optical time domain reflectometer (OTDR) to confirm the performance of an optical link
14. set up the forward RF output level at an optical node

RELATEd COURSES

Students completing this course should then enroll in:

» Understanding Voice and Data Networks
» Exploring Wireless Technologies
» Introduction to Networking: Home and Peer-to-Peer Networks
» Internetworking with TCP/IP

TRAINING FEATURES

» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OUTLINE

1. Operating Digital Multimeters
   Defining Types of DMMs, Controls, Components and Specifications, measuring Voltage, Resistance and Current and Caring for and Maintaining DMMs

2. Measuring Signal Levels
   Understanding broadband signals, identifying SLM features and components, maintaining SLMs and performing measurements

3. Using Digital Signal Analyzers
   Describing Digital Measurements, operating the digital signal analyzer and using Cable Modem System Analyzers

4. Detecting Signal Leakage
   Signal leakage and examining signal leakage measuring equipment

5. Controlling Signal Leakage
   Identifying specific signal leakage measurement considerations, eliminating signal leakage and preventing signal leakage

6. Analyzing Signal Leakage
   System leakage analysis and annual FCC reporting requirements

7. TDR Fundamentals and Operation
   Describing types of TDRs, understanding TDR theory of operation, describing TDR applications, considering TDR preliminaries, noting TDR measurement precautions, learning measurement procedures and pinpointing fault site

8. Analog Video Measurements and Testing
   Characterizing the baseband video signal, examining video test equipment and test signals, executing baseband video measurements and recognizing alternative baseband video test equipment

9. Cable System Sweeping
   Describing sweep and understanding sweep specifications, setting up and sweeping the forward and return paths and troubleshooting sweep response problems

10. Maintaining Return Path Signals
    Describing return path amplitude levels, setting return amplifier levels and balancing the return path

11. Examining Signals in the Return Path
    Modulating return path signals, examining spectrum sharing technologies and analyzing return path carriers

12. Automated Spectrum Analyzer Basics
    Introducing and reviewing features of the spectrum analyzer, operating the spectrum analyzer, using the spectrum analyzer in the broadband cable system and using the digital signal analyzer feature

13. Planning and Executing FCC Proof-of-Performance Tests
    Recognizing the FCC proof-of-performance testing requirement, applying the FCC proof-of-performance testing requirements to a cable system, including the set-top-box in the proof-of-performance test results and compiling the FCC proof-of-performance test results

    FCC requirements, NCTA Recommended Practices and testing for channel distortions using manual procedures

15. Introducing Optical Test Equipment
    Examining Optical Power Meters, examining Light Sources, examining Optical Fiber Identifiers, examining Optical Fiber Talk Sets and examining Optical Loss Test Sets

16. Presenting OTDR Basics
    Overview, types, features and specifications

17. Performing OTDR Measurements
    Performing Preliminary Procedures, recognizing OTDR Signatures, programming the OTDR, understanding OTDR Tests, conducting OTDR Tests and making Span Measurements

18. Conducting Acceptance Testing of a Broadband Optical Link
    Testing optical power and reflectivity, performing optical transmitter and receiver tests, examining scalable optical nodes and using documentation
Understanding Voice and Data Networks

Part of the Master Technician Certification Series and Telecom Specialist Certification Series

OVERVIEW

Understanding Voice and Data Networks presents the fundamental knowledge and concepts that are needed to expand a broadband career. Upon completion of the course, the student will understand the operation of data networks, telephone systems and Voice over Internet Protocol (VoIP) technologies.

Delivery Options:
Learning takes place online with the aid of a textbook. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 30 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
» use this course to help prepare for SCTE’s Broadband Telecom Center Specialist certification
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Senior Master Technician certification
» receive credit toward NCTI Telecom Specialist certification

Ideal for:
» network technicians
» headend technicians
» system technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. Explain how signals are transmitted over wires and fiber-optic cables
2. Explain how an Ethernet Local Area Network (LAN) works
3. Describe how data travels across the Internet
4. Describe the progress of a typical telephone call
5. Identify the common types of networking devices and explain the purpose and operation of each one
6. Describe how a voice telephone call differs from packet data transmission
7. Explain what converged networking is and identify the key technologies that make it possible
8. Describe the most common tools and techniques used to analyze and troubleshoot converged networks

(Continued)
COURSE OUTLINE

1. Physical Communication Infrastructure
   Communication and signals, internal computer components, software, network topologies, copper cable, fiber optic cable, cable and equipment installation and cables and connectors

2. A Layered System of Data Protocols
   Protocols and the open systems interconnection (OSI) model, the physical layer, the data link layer, the network layer, the transport layer, the session layer, the presentation layer and the application layer

3. Data Networking Protocols
   Local area network (LAN) data link protocols, Ethernet, point-to-point wide area network (WAN) services and switched WAN services

4. Data Networking Components
   Repeaters and hubs, bridges, switches, routers and virtual local area networks (VLAN’s) and network servers

5. TCP/IP Protocols and Services
   The transmission control protocol/Internet protocol (TCP/IP) protocol suite, Internet protocol (IP), address resolution: address resolution protocol (ARP) and reverse address resolution protocol (RARP), user datagram protocol (UDP) and transmission control protocol (TCP), Internet addressing, subnetting fundamentals, IP routing, IP address management: bootstrap protocol (BOOTP), dynamic host configuration protocol (DHCP), and network address translation (NAT), and IP name resolution: HOSTS, domain name system (DNS) and Windows Internet naming service (WINS)

6. The Public Telephone Network
   Local exchange components, central office switching, trunks, lines and loops, analog voice impairments, small office telephone equipment, private branch exchange (PBX), voice mail systems, signaling basics, signaling system seven (SS7) and integrated services digital network (ISDN)

7. Network Convergence
   Packet telephony, general quality of service (QoS) concepts, overview of telecommunication standards, admission control and traffic shaping, traffic prioritization, H.323 standard for packet multimedia, H.323 call processing, session initiation protocol (SIP) and approaches to IP network QoS

8. Troubleshooting Converged Networks
   Common network testing tools, a step-by-step method, troubleshooting a wiring problem, converged network failure points and a converged network troubleshooting example

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Exploring Wireless Technologies

OVERVIEW
This course provides a comprehensive introduction to the underlying theory, design techniques and core principles of wireless system operation.

NCTI recommends that the student taking this course should have an understanding of electricity and electronics or have completed the Installer, Installer Technician and Service Technician courses of the NCTI technical career path. The student also should be familiar with computer networks, or have completed the NCTI course, Introduction to Networking: Local Area Networks.

Delivery Options:
The course is delivered online. A textbook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 24 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Personnel who need to learn about new wireless technologies; wireless cable extensions, the wireless quad play or wireless networking, including:
» broadband technicians
» advanced services installers
» technical management

COURSE OBJECTIVES
Upon completing this course the student will be able to:
1. explain the role modulation plays in sending and receiving a message
2. describe the method of generating an AM signal
3. identify and explain the stages of a typical receiver and their functions
4. describe an automatic gain control circuit
5. determine the required bandwidth for an FM signal
6. find the radio wave horizon distance when given antenna height
7. understand the cause for fading and multipath reception
8. describe the concept of reciprocity in antenna theory
9. describe antenna radiation patterns
10. identify a dipole antenna and its transmission line interface
11. explain how antennas achieve gain and directionality
12. describe the effects of weather on microwave signals
13. name the modes of wireless access
14. list and discuss the characteristics and application of wireless local area networks (LAN) technologies

(Continued)
COURSE OUTLINE

1. Communications Systems
   Reviewing the history of communications, exploring the meaning of communication, examining noise as a limiting factor, exploring bandwidth and channel allocations and examining communications systems considerations

2. Communications Circuits
   Examining filters, tuned circuits and resonance, exploring oscillators and examining amplifiers

3. Amplitude Modulation
   Examining the AM signal, AM transmitters and receivers, exploring single-sideband transmission and examining single-sideband receivers

4. Frequency Modulation
   Examining frequency modulation, FM signal generation, exploring phase modulation, examining FM receivers and understanding phase-locked loops

5. Transmission Lines and Techniques
   Examining types of transmission lines, understanding characteristic impedance, exploring resonance and examining transmission line losses

6. Radio Wave Propagation
   Examining radio wave characteristics, propagation characteristics, exploring atmospheric conditions and communications and extending the communications range

7. Examining Antenna Principles
   Examining antenna fundamentals, special characteristics of antennas and improving receive antenna signal-to-noise ratio

8. Investigating Antenna Types
   Examining types of transmitting antennas, exploring antenna arrays, exploring other types of antennas and examining receiving antennas

9. Examining Microwave Applications
   Introducing microwave fundamentals and exploring microwave transport systems

10. Examining Microwave Components
    Exploring passive microwave components, examining microwave oscillator and amplifier components

11. Satellite Communications
    Introducing basic concepts, examining satellite technologies and capacity and investigating system properties

12. Wireless Communications
    Exploring the cellular mobile telephone system, comparing analog and digital access and identifying wireless applications and products
Introduction to Networking: Home and Peer-to-Peer Networks

Part of the Master Dispatcher Certification Series

OVERVIEW

Introduction to Networking: Home and Peer-to-Peer Networks is designed for students who have a basic understanding of personal computers and their applications. By teaching the fundamentals of data networking and communications, the course explains how to build and operate a small computer network, typically found in a customer’s home. In addition, the course identifies and describes the hardware, software, protocols and signals that are essential to understanding how data networks operate. The students are introduced to the Open Systems Interconnect (OSI) protocol and how the signals travel across the different layers of the protocol, carrying data from one device to another. Local Area Networks (LAN) and Wide Area Networks (WAN) are introduced along with Metro Ethernet, WiMAX and Cellular technologies. Networking terminology and acronyms are defined and explained throughout the course, which illustrates how the same key principles and components form the foundation of all networks, from the smallest peer-to-peer network to the Internet.

Delivery Options:

The course is delivered online. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is 16 hours. The maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:

- receive credit toward NCTI Master Dispatcher certification
- receive an industry-recognized NCTI certificate of graduation

Ideal for:

Technical personnel supporting Internet-based services, including:

- broadband technicians
- network technicians
- headend technicians
- system technicians
- level two call center technical support
- NOC technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. identify the different types of networking hardware and software
2. describe the various physical and logical topologies used and discuss networking hardware and software implementation
3. discuss industry networking standards and enforcement

(Continued)
COURSE OBJECTIVES (Continued)

4. explain how network signals are transmitted over wired and wireless networks
5. describe what protocols are and why they are necessary
6. describe the different types of addresses that computers use to send and receive information
7. explain the OSI Model and describe how information flows between two communicating computers
8. describe the technologies used in local area networks (LANs) and wide area networks (WANs)
9. identify Metro Ethernet, WiMAX and Cellular technology
10. identify the common types of networking devices and explain the purpose of each
11. explain how the Internet works in simple terms
12. understand how to build and operate a small peer-to-peer network
13. describe remote connectivity
14. identify common problems that can stop communications in a network

COURSE OUTLINE

1. Computers and Software in Networks
   Describe devices on networks and internal computer components: central processing units (CPU), input/output (I/O) hardware, memory and network interface cards (NIC), along with software and popular operating systems

2. Carrier Signals, Cable Types and Network Topologies
   Review communication and signals, network topologies and overview of a structured wiring system

3. Computer Protocols and Services
   Learn about protocols, layers of protocols and services and communicating across a network

4. The OSI Model
   Introduction to the Open System Interconnect (OSI) model, the physical layer, the data link layer, the network layer, the transport layer, the session layer, the presentation layer and the application layer

5. Local Area Networks (LAN)
   LAN data link protocols, Ethernet, token ring and FDDI, wireless LANs, LAN software architectures and information flow between client and server

6. Network Components
   Repeaters and hubs, bridges, switches, routers and gateways

7. Wide Area Networks (WAN)
   Point-to-point WAN services and switched WAN services

8. Integrating the Course Elements
   Building a small, peer-to-peer network and expanding the small network
Introduction to Networking: Local Area Networks

OVERVIEW

Introduction to Networking: Local Area Networks explains the concepts, technologies and components used to build and maintain local area networks (LANs). Students completing this course will have a solid understanding of the fundamentals needed to build and maintain LANs. As a result, students are well prepared to support and operate LANs in customer premises and businesses.

Students will learn about Ethernet LAN protocols and concepts over different media including: coaxial cable, twisted-pair cable, fiber-optic cable and wireless. This course also introduces the network operating systems most widely used in local area networks: Windows, Linux and Mac OS. Additionally, the course covers the principles of network design and the roles of hubs, switches and routers to optimize network traffic. Lessons also include information on the elements of wireless LAN technologies, Ethernet Data Link protocols, 10 Gigabit Ethernet, Virtual LANs (VLANs) and Layer 3 switching.

Delivery Options:
Learning is a combination of online and textbook activities.

Completion Time:
Varies based on the student’s self-study pace; however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:
- understand the different types of Ethernet networks
- describe the tools necessary to analyze and troubleshoot computer networks
- identify and explain the purpose of the common types of networking devices
- have a basic understanding of how the Internet works
- describe Internet protocols and their roles in establishing local area networks

Ideal for:
Technical personnel supporting Internet-based services, including:
- broadband technicians
- network technicians
- headend technicians
- NOC technicians
- system technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. explain the characteristics of the three types of physical media used in LANs (copper, fiber and wireless)
2. describe the operation of Ethernet local area networks
3. identify the different types of Ethernet protocol standards and explain...
COURSE OBJECTIVES (Continued)

their relationship to each other
4. explain the basic approaches of traffic isolation and broadcast containment in Ethernet LANs, including Quality of Service (QoS)
5. identify the LAN architecture that best meets a user’s requirements
6. identify the primary advantages of the client/server networking model
7. describe the key features and characteristics of Windows, Linux, and Mac OS

COURSE OUTLINE

1. Review of LAN Fundamentals
   Network classifications and topologies, programs, the open systems interconnection (OSI) model and processes, protocols and layers

2. Connecting Computers
   Network interface cards (NIC), review of cable properties, wireless local area networks (WLAN), media selection and installation and unshielded twisted-pair (UTP) patch cables and connectors

3. Ethernet LANs
   Review of Ethernet, Ethernet frame format, fast Ethernet, gigabit Ethernet, 10 gigabit Ethernet, switched Ethernet configurations, virtual local area networks (VLAN) and Layer 3 switches

4. LAN Networking Software
   Review of client/server and network operating system (NOS) fundamentals, remote procedure calls (RPC), file servers, print servers, web servers, other common servers and backup and disaster prevention

5. Network OS Software – The Windows Family
   The Windows OS Architecture

6. Linux
   Linux Architecture and Linux features

7. Mac OS Platform
   Mac OS Platform overview and description of features

8. Analysis of LANs
   Overview of the network development process, working with binary and hexadecimal numbers and LAN analysis and testing tools
Internetworking with TCP/IP

OVERVIEW
In order to enable a greater number and variety of services, broadband cable operators are utilizing Internet protocol (IP) technologies throughout their networks. Technicians called upon to support these technologies are required to understand how IP and related protocols work together to enable video, data and voice services in IP-based networks.

The Internetworking with TCP/IP course is the technicians guide to understanding the processes, protocols, and architectures associated with TCP/IP, the engine that runs the Internet. Geared toward anyone whose network accesses the Internet, the course introduces networking protocols, including transmission control protocol (TCP), hypertext transfer protocol (HTTP), file transfer protocol (FTP), network management protocols, email protocols and many others. The course also describes IP address classes and subnets, and how subnets are used to efficiently use IP addresses. Advanced routing protocols and the software packages that implement them are also described. After completing this course, the technician will understand how the different TCP/IP protocols are used to provide voice, video and data-related services in the broadband cable network and customer premises.

Delivery Options:
- Learning is delivered online. An ebook is also provided. Lesson and final exam are taken online

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
- understand how to test and troubleshoot IP-based communications systems
- effectively design and implement systems to support email, file transfers, network management, web access and other TCP/IP services
- successfully support voice, video and data services in IP networks
- receive an industry-recognized NCTI® certificate of graduation
- use this course to help prepare for SCTE’s Broadband Telecom Center Specialist Certification

Ideal for:
Technical personnel supporting Internet-based services, including:
- broadband technicians
- network technicians
- headend technicians
- system technicians

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. recognize TCP/IP layers, components and functions and map them to the open systems interconnection (OSI) model
2. describe and implement TCP/IP application services that support email, network management, web access and file transport across routed IP networks
3. explain TCP/IP protocols used to transport data over intranets, extranets and the Internet
4. identify and use Internet navigation and search tools such as web browsers and HTTP as well as file transfer services such as FTP and trivial file transfer protocol (TFTP)
5. design and implement subnetworks
6. choose a routing protocol based on network size and service requirements, including quality of service/type of service (QoS/ToS) routing, variable-length subnet mask (VLSM) and link redundancy
7. describe TCP/IP support services, including Domain Name System (DNS) and dynamic host configuration protocol (DHCP)
8. use TCP/IP utilities to troubleshoot and isolate Internetwork communication failures
9. explain how TCP/IP supports converged voice and data networks

COURSE OUTLINE
1. TCP/IP Structure Addressing
   Open systems interconnection (OSI) model review, Internet protocol suite, Internet addressing and Internetworking devices
2. Overview of TCP/IP Applications
   Summary of transmission control protocol/Internet protocol (TCP/IP) applications, web browsers and servers, file transfer protocol (FTP), email, network management and other applications
3. TCP/IP Addressing and Subnets
   Number conversion and subnetting fundamentals along with address classes and classless interdomain routing
4. TCP/IP Protocols
   IP, address resolution, address resolution protocol (ARP), user datagram protocol (UDP), transmission control protocol (TCP) and connection establishment and moving information across the network
5. TCP/IP Services
   Domain Name System (DNS), Internet control message protocol (ICMP), Internet group management protocol (IGMP), dynamic host configuration protocol (DHCP), BOOTP, network address translation (NAT) and Internet protocol version 6 (IPv6)
6. Routing TCP/IP
   IP Routing, routing information protocol (RIP), interior gateway routing protocol (IGRP), enhanced interior gateway routing protocol (EIGRP), open shortest path first (OSPF) and advanced routing
7. How TCP/IP Applications Work
   Web browser and Web servers, file transfer protocol (FTP), simple mail transfer protocol (SMTP), network management and simple network management protocol (SNMP) architecture and packet multimedia standards
8. Troubleshooting a TCP/IP Network
   Troubleshooting principles, ipconfig, ping, tracert, nbtstat, netstat, address resolution protocol (ARP), pathping and my trace route (MTR)
Introduction to Networking: Wireless

OVERVIEW

Wireless connectivity to a network has evolved from being a novel concept to an expectation in customer premises, businesses, retail outlets, community centers, airports, stadiums and arenas, etc. Consequently, in addition to knowing and understanding the operation of broadband cable, the technician is also expected to understand all the different possibilities for wireless network connectivity.

This study of wireless networking technology combines radio frequency (RF) and local area networking (LAN) fundamentals to explain the basic concepts and building blocks of wireless LANs. The student is introduced to wireless LAN infrastructure devices, antennas, access points, the 802.11 network architecture, Bluetooth, spread spectrum technology, governing bodies, troubleshooting, RF behavior, installation and security measures. This course targets both novice and experienced technicians who wish to gain a solid understanding of wireless networking to complement their knowledge of legacy connected networks.

NCTI recommends that the student taking this course should have an understanding of electricity and electronics or have completed Installer, Installer Technician and Service Technician. The student should also be familiar with computer networks or have completed the NCTI course Introduction to Networking: Home and Peer-to-Peer Networks and/or Introduction to Networking: Local Area Networks.

Delivery Options:

This course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 22 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» gain a solid understanding of wireless networking to complement their knowledge of traditional wired networking in both home and business applications
» understand the different modes of wireless access
» learn the fundamentals of RF, as well as the features and functions of wireless LAN components
» gain the skills needed to install, configure and troubleshoot wireless LAN hardware, peripherals and protocols
» earn three hours of college credit
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Technical personnel supporting Internet-based services, including:

» broadband technicians
» network technicians
» access bandwidth technicians
» installer service and system technicians

(Continued)
COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. define and apply the basic concepts of RF technology, including how spread spectrum technologies apply to wireless LANs
2. explain the fundamental principles and concepts behind installing, configuring and maintaining wireless LANs
3. describe the organizations and regulations that govern wireless LANs
4. list the different Wi-Fi standards through 802.11ac
5. demonstrate the necessary knowledge for complying with regulations that apply to setting up and maintaining a wireless LAN
6. install, set up and maintain a wireless network using various hardware devices, such as access points, bridges, gateways and antennas
7. analyze and troubleshoot the problems that can occur with wireless LAN data transmission, including multipath, hidden nodes and interference
8. secure the transmission of data over a wireless LAN and identify the different types of attacks that can occur from hackers

COURSE OUTLINE

1. Introduction to Wireless LANs
   - The wireless LAN market and applications

2. RF Fundamentals
   - RF, Voltage Standing Wave Ratio (VSWR), principles of antennas and RF mathematics

3. Spread Spectrum Technology
   - Introducing spread spectrum, Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS) and comparing FHSS and DSSS

4. Wireless LAN Infrastructure Devices
   - Access points, wireless bridges, wireless workgroup bridges, wireless LAN client devices, wireless residential gateways and enterprise wireless gateways

5. Antennas and Accessories
   - RF antennas, Point of Entry (PoE) devices and wireless LAN accessories

6. Wireless LAN Organizations and Standards
   - Federal Communications Commission (FCC), Institute of Electrical and Electronic Engineers (IEEE), major organizations and competing technologies

7. The 802.11 Network Architecture
   - Locating a wireless LAN, authentication and association, service sets and power management features

8. Physical Layers
   - How wireless LANs communicate, interframe spacing, Request to Send/Clear to Send (RTS/CTS) and modulation

9. Troubleshooting Wireless LAN Installations
   - Multipath, hidden node, near/far, system throughput, types of interference and range considerations

10. Wireless LAN Security
    - Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA) and Wi-Fi Protected Access II (WPA2), attacks on wireless LANs, emerging security solutions, corporate security policy and security recommendations

11. Site Survey Fundamentals
    - RF site surveys, preparing a site survey, site survey equipment, conducting a site survey and site survey reporting

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
CUSTOMER MANAGEMENT AND SUPPORT COURSES
NCTI’S COLLEGE CERTIFICATE AND DEGREE PROGRAM

Advance Your Career Through Professional Education

Earn college credit while learning job-specific skills through NCTI’s College Certificate and Degree Program, the only distance-learning, accredited higher education program designed specifically for the broadband and cable industry. The College Certificate and Degree Program allows individuals to apply virtually all NCTI courses to college-level certificates and two-year degrees.

CUSTOMER CARE CERTIFICATE

Individuals pursuing customer service management positions should use this option to learn the necessary verbal, written and supervisory skills needed to perform their jobs effectively. Those who earn this certificate will be uniquely qualified within the industry to manage broadband and cable customer service workgroups.

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 117</td>
<td>Business Writing</td>
<td>1</td>
</tr>
<tr>
<td>CTC 108</td>
<td>Cable Network Overview</td>
<td>1</td>
</tr>
<tr>
<td>CTC 121</td>
<td>Delivering Cable Services</td>
<td>3</td>
</tr>
<tr>
<td>CTC 123</td>
<td>Basic Broadband Troubleshooting</td>
<td>3</td>
</tr>
<tr>
<td>CTC 125</td>
<td>High Speed Data Customer Service</td>
<td>2</td>
</tr>
<tr>
<td>CTC 126</td>
<td>Advanced High Speed Data Customer Service</td>
<td>3</td>
</tr>
<tr>
<td>MAN 212</td>
<td>Negotiation and Conflict Resolution</td>
<td>3</td>
</tr>
<tr>
<td>MAR 111</td>
<td>Principles of Sales</td>
<td>3</td>
</tr>
<tr>
<td>MAR 235</td>
<td>Consumer Behavior</td>
<td>3</td>
</tr>
</tbody>
</table>

TOTAL: **22 CREDIT HOURS**

*Note: Students who complete this certificate may earn an Associate of Applied Science degree in Broadband Technology and Communication by completing an additional 38 specified credit hours (see next page for more information).

GET STARTED TODAY

1. Check with your supervisor on how NCTI works with your company. Many companies cover the expense of your tuition and offer incentives and raises for graduation from a course.
2. Obtain course descriptions and a NCTI enrollment application from your supervisor, your company’s NCTI training coordinator, or your human resources department.
3. You can also obtain course descriptions and a course application by clicking on the Products tab of our website, www.ncti.com, calling 866.575.7206 or emailing info@ncti.com.
4. Fill out the application completely, include your payment and mail to: NCTI, 300 East Mineral Avenue, Suite 5, Littleton, CO 80122
5. Your course will be shipped—if applicable—within 48 hours of receipt of payment.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
ASSOCIATE OF APPLIED SCIENCE IN BROADBAND TECHNOLOGY AND COMMUNICATION DEGREE FROM ACC

Through our partnership with Arapahoe Community College (ACC), regionally accredited by the North Central Association of Colleges and Schools, NCTI is pleased to provide students a straightforward path to advanced skills, opportunities for professional growth and a college degree.

The Associate of Applied Science degree allows students to complete a NCTI Certificate of Customer Care, combined with general education courses, major courses and restricted electives to earn a minimum of 60 credit hours. The result is a versatile, professional degree that demonstrates both job-specific expertise and general business knowledge.

Be advised, while most courses are available anytime, others are only offered up to three times per year. Visit www.ncti.com for course availability and schedules.

**GENERAL EDUCATION REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 131</td>
<td>Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENG 121</td>
<td>English Composition I</td>
<td>3</td>
</tr>
<tr>
<td>MAT 108</td>
<td>Technical Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>COM 125</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>CIS 118</td>
<td>Introduction to PC Applications</td>
<td>3</td>
</tr>
<tr>
<td>BUS 115</td>
<td>Introduction to Business</td>
<td>3</td>
</tr>
<tr>
<td>MAN 116</td>
<td>Effective Supervision</td>
<td>3</td>
</tr>
</tbody>
</table>

**CORE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR 160</td>
<td>Excellence in Customer Service</td>
<td>3</td>
</tr>
<tr>
<td>PSY 116</td>
<td>Stress Management</td>
<td>3</td>
</tr>
<tr>
<td>PSY 101</td>
<td>General Psychology I</td>
<td>3</td>
</tr>
<tr>
<td>BUS 241</td>
<td>Cultural Diversity in Business</td>
<td>3</td>
</tr>
<tr>
<td>MAN 117</td>
<td>Time Management</td>
<td>1</td>
</tr>
</tbody>
</table>

**RESTRICTED ELECTIVES**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 220</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>MAR 111</td>
<td>Principles of Sales</td>
<td>3</td>
</tr>
<tr>
<td>BUS 216</td>
<td>Business Law and the Legal Environment</td>
<td>3</td>
</tr>
<tr>
<td>BUS 217</td>
<td>Business Communication and Report Writing</td>
<td>3</td>
</tr>
<tr>
<td>MAR 216</td>
<td>Introduction to Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MAN 226</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>CTC 117</td>
<td>Computers and Broadband Modems</td>
<td>3</td>
</tr>
<tr>
<td>CTC 118</td>
<td>Broadband Digital Installer</td>
<td>3</td>
</tr>
</tbody>
</table>

**PLAN OF STUDY (SPECIALIZATION)**

**CUSTOMER CARE**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 117</td>
<td>Business Writing</td>
<td>1</td>
</tr>
<tr>
<td>CTC 108</td>
<td>Cable Network Overview</td>
<td>1</td>
</tr>
<tr>
<td>CTC 121</td>
<td>Delivering Cable Services</td>
<td>3</td>
</tr>
<tr>
<td>CTC 123</td>
<td>Basic Broadband Troubleshooting</td>
<td>3</td>
</tr>
<tr>
<td>CTC 125</td>
<td>High Speed Data Customer Service</td>
<td>2</td>
</tr>
<tr>
<td>CTC 126</td>
<td>Advanced High Speed Data</td>
<td>3</td>
</tr>
<tr>
<td>MAN 212</td>
<td>Negotiation and Conflict Resolution</td>
<td>3</td>
</tr>
<tr>
<td>MAR 111</td>
<td>Principles of Sales</td>
<td>3</td>
</tr>
<tr>
<td>MAR 235</td>
<td>Consumer Behavior</td>
<td>3</td>
</tr>
</tbody>
</table>

**DEGREE TOTAL: 60 CREDIT HOURS**

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
## Integrated Career Path for Broadband Customer Care

### NEW HIRE
- **NCTI Courses**
  - Excellence in Customer Service
  - Cable Network Overview
  - Fundamental Selling Skills
- **In House Training**
  - MSO Specific Training
- **NCTI Master Rep Certificates**
  - Account Representative
- **Academics**
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree

### GENERALIST
- **NCTI Courses**
  - Delivering Cable Services
  - Competitive Services
  - Delivering Video
  - Delivering Voice
  - Delivering Data
  - Selling Communication
- **In House Training**
  - MSO Specific Training
- **NCTI Master Rep Certificates**
  - Master Account Representative
  - Master Sales Representative
- **Academics**
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree

### SPECIALIST
- **NCTI Courses**
  - Basic Broadband Troubleshooting
  - High-Speed Data (HSD) Customer Service
  - Advanced HSD
  - Customer Service
  - Principles of Sales
- **In House Training**
  - MSO Specific Training
- **NCTI Master Rep Certificates**
  - Master Technical Services Representative
  - Master High-Speed Data Rep
- **Academics**
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree

### LEAD
- **NCTI Courses**
  - Effective Supervision
  - Principles of Management
  - Negotiation and Conflict Resolution
  - Intro to PC Applications
  - Mentoring 101
- **In House Training**
  - MSO Specific Training
- **NCTI Master Rep Certificates**
  - MSO Specific Training
- **Academics**
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree

### MANAGER
- **NCTI Courses**
  - Introduction to Business
  - Business Communication Skills
  - Introduction to Marketing
  - Stress Management
- **In House Training**
  - MSO Specific Training
- **NCTI Master Rep Certificates**
  - MSO Specific Training
- **Academics**
  - Associate of Applied Science, Broadband Technology Communication Degree

---

Contact NCTI Customer Care at 866.575.7206 to map out your individual career path. You may be on your way to earning your Broadband Technology College Certificate or Associate of Applied Science, Broadband Technology Degree.

NCTI.com | 866.575.7206

Instant Knowledge for Field Teams
Mobile learning puts immediate, relevant and custom content directly into the hands of field teams.
Integrated Career Path for Broadband Technical Support

**NEW HIRE**
- Excellence in Customer Service
- Cable Network Overview
- Fundamental Selling Skills
- Delivering Cable Services

**TIER I**
- Basic Broadband Troubleshooting
- High-Speed Data (HSD) Customer Service
- Consumer Digital Electronics

**TIER II**
- Advanced HSD Customer Service
- Operations Center Technical Support (OCTS) I
- OCTS II
- OCTS III
- Understanding Voice & Data Networks
- Introduction to Networking: Home and Peer to Peer Networks
- Principles of Sales

**LEAD**
- Effective Supervision
- Principles of Management
- Negotiation and Conflict Resolution
- Intro to PC Applications
- Mentoring 101

**MANAGER**
- Introduction to Business
- Business Communication Skills
- Introduction to Marketing
- Stress Management

**NCTI COURSES**
- MSO Specific Training
- Account Representative
- Master Technical Services Rep
- Master High-Speed Data Rep
- Operations Center Rep
- Master Network Operations Center Rep

**IN HOUSE TRAINING**
- MSO Specific Training
- MSO Specific Training
- MSO Specific Training

**NCTI MASTER REP CERTIFICATES**
- Account Representative
- Master Account Representative
- Master Technical Services Rep
- Master High-Speed Data Rep
- Operations Center Rep
- Master Network Operations Center Rep

**ACADEMICS**
- PROGRESSING TOWARD:
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree
- PROGRESSING TOWARD:
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree
- PROGRESSING TOWARD:
  - Customer Care College Certificate
  - Associate of Applied Science, Broadband Technology Communication Degree
- OVER 50% DEGREE REQUIREMENTS COMPLETED:
  - Associate of Applied Science, Broadband Technology Communication Degree

Contact NCTI Customer Care at 866.575.7206 to map out your individual career path. You may be on your way to earning your Associate of Applied Science Degree.

NCTI.com | 866.575.7206
NCTI’S CUSTOMER CARE
MASTER REPRESENTATIVE PROGRAM

You Can Be One Of The Best

Created as a means to recognize the best of the best, the NCTI Customer Care Master Representative Program is an industry-recognized way of identifying a select group of broadband service representatives who have mastered the skills necessary to be regarded as the industry's elite. To be qualified as a Master Representative, individuals must successfully complete a defined set of courses specifically related to service representative operations. The following recognitions can be earned:

ACCOUNT REP (AR)
An AR has mastered the fundamentals of selling and customer service in a broadband telecommunications environment. To qualify, an individual must complete the following courses:
» Excellence in Customer Service
» Cable Network Overview
» Fundamental Selling Skills

MASTER ACCOUNT REP (MAR)
The MAR has attained the fundamentals of selling and customer service in a broadband telecommunications environment and has garnered basic troubleshooting skills and understands the industry's historical background. To qualify, an individual must complete the following program/courses:
» Account Rep (AR) Program
» Delivering Cable Services
» Basic Broadband Troubleshooting

MASTER SALES REP (MSR)
The MSR is highly knowledgeable in the techniques of selling the varied services offered by the broadband industry. To qualify, an individual must complete the following program/courses:
» Account Rep (AR) Program
» Competitive Services
» Delivering Video
» Delivering Voice
» Delivering Data
» Selling Communication Services

MASTER TECHNICAL SERVICES REP (MTSR)
The MTSR has gained the historical, troubleshooting and customer service knowledge to troubleshoot broadband service delivery problems with confidence and expertise. To qualify, an individual must complete the following program/courses:
» Master Account Rep (MAR) Program
» High-Speed Data Customer Service

OPERATIONS CENTER REP (OCR)
The OCR has the ability to troubleshoot more advanced technical problems from the office or another remote location and help guide the field service and maintenance technicians to resolution with speed and accuracy. To qualify, an individual must complete the following courses:
» Operations Center Technical Support I
» Operations Center Technical Support II
» Operations Center Technical Support III

Ready to achieve field success?
Learn with NCTI:
ncti.com  |  866.575.7206
NCTI’S CUSTOMER CARE MASTER REPRESENTATIVE PROGRAM
(CONTINUED)

MASTER HIGH-SPEED DATA REP (MHSDR)
The MHSDR is highly knowledgeable in the skills and support services required to install, service and troubleshoot the high speed data connection. To qualify, an individual must complete the following program/courses:
» Account Rep (AR) Program
» Delivering Cable Services
» High-Speed Data Customer Service
» Advanced High-Speed Data Customer Service

MASTER NETWORK OPERATIONS CENTER REP (MNOCR)
Unparalleled in their expertise, the MNOCR possesses all of the skills and abilities to sell, support, service and troubleshoot virtually any facet in the broadband telecommunications arena. This associate is a professional of the highest caliber and is recognized by the industry as an authority in the field of broadband telecommunications. To qualify, an individual must complete the following programs/courses:
» Account Rep (AR) Program
» Operations Center Rep (OCR) Program
» Delivering Cable Services

Ready to achieve field success?
Learn with NCTI:
ncti.com  |  866.575.7206
The NCTI Master Dispatcher Certification recognizes highly-skilled and trained broadband technology personnel responsible for successful deployment and daily management of service requests.

An NCTI Master Dispatcher is adept at the skills necessary for efficient technical workforce management and to support organizational initiatives to enrich the customer experience.

To be qualified as a Master Dispatcher, industry professionals must successfully complete a defined set of courses related to specific dispatch operations.

Contact NCTI to map out your career path. You may be on your way to earning a College Certificate or Degree.
Excellence in Customer Service

Part of the Customer Care Master Representative Certification Series

OVERVIEW

Excellence in Customer Service discusses broadband-specific topics such as account maintenance, effective communication techniques, stress management, sales processes and service level differentiation. The course also explores the history of cable TV, technology and regulatory bodies. Graduates of Excellence in Customer Service will be uniquely qualified within the cable industry to provide the highest levels of broadband-specific customer service.

Delivery Options:

- The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:

- The estimated completion time for this course is 20 hours.
- The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

- understand fundamental broadband troubleshooting practices
- increase customer satisfaction levels and retention rates
- increase customer awareness of revenue-generating services
- better determine when a customer call requires a dispatch
- more accurately handle customer account information and billing
- utilize stress management techniques
- earn three hours of college credit
- receive credit toward NCTI Customer Care Master Representative certification
- receive an industry-recognized NCTI certificate of graduation

Ideal for:

- All nontechnical personnel interfacing with the customer, including:
  - customer service representatives
  - customer service supervisors and managers

 COURSE OBJECTIVES

Upon completion students will be able to:

1. explain how cable TV evolved from rural master antenna systems to high-tech broadband networks of today
2. discuss the roles of regulatory bodies including the FCC, local franchising authorities and other local, state and federal agencies as they pertain to cable TV systems
3. describe the difference between various video services provided in a cable system
4. briefly tell how video, data and voice signals are transported between the cable system headend and individual customers
5. tell how customer accounts are managed to maintain accurate customer information, including billing, services, address information and more

(Continued)
**COURSE OBJECTIVES (Continued)**

6. practice effective communication skills, including listening, asking questions, overcoming objections, utilizing good telephone answering techniques and more

7. follow proper sales process to complete a sale

8. handle a cancellation request in a manner that will promote retention of the customer

9. manage stress by using effective coping skills, heeding emotional overload warning signs and practicing various relaxation techniques.

10. briefly describe a process for conducting simple technical troubleshooting to resolve a customer problem or provide valuable information for a technician to respond to a service call

**COURSE OUTLINE**

1. Exploring the History of Broadband Cable
   Understanding original signal reception quality, exploring improved signal reception quality, examining system operation development, considering service expansion, delivering “over-the-air” programming, delivering microwave programming, delivering satellite programming, learning about local government regulations, discussing state government regulations, looking at federal government regulations and discussing the Federal Communications Commission

2. Presenting Cable Video Services
   Reviewing basic cable service, understanding expanded basic service, defining premium cable service, understanding digital and high-definition video cable services, exploring high-speed data, understanding cable telephony services and listing cable video services

3. Understanding How a Broadband Cable System Works
   Identifying signal sources, exploring the headend, distributing broadband signals, organizing the workforce and interacting for success, defining external and internal customers and understanding customer service processes

4. Managing Customer Accounts and Data
   Adjusting accounts, understanding damaged or lost equipment policies, dealing with non-sufficient funds (NSF) check returns, providing refunds, explaining the customer’s bill, understanding the billing process, collecting on delinquent accounts, understanding payment responsibilities, batching and posting payments, collecting cash payments, discussing cash drawer reconciliation, entering data, entering orders and looking at company reports

5. Communicating Effectively
   Visualizing the communication model, overcoming obstacles, using strategic communication techniques, hearing vs. listening, understanding listening obstacles, listening effectively, using proper voice quality, asking effective questions, avoiding dangerous phrases, exhibiting professional courtesy and answering incoming calls

6. Selling Broadband Services
   Knowing your service offerings, organizing a sales kit, responding honestly, following the first-person principle, matching services to the customer’s viewing interests and presenting features, benefits and value, greeting the customer, verifying information, identifying the type of call, identifying the customer’s interests, building your presentation, recommending services, maintaining the customer’s commitment, looking for buying signs, closing the sale, identifying the customer’s concerns, addressing the customer’s concerns and completing the sale

7. Understanding the Role of Customer Service
   Reviewing the Cable and Telecommunications Association for Marketing (CTAM) report, looking at NCTA standards, defining quality customer service, serving your customer, understanding the four Cs, learning communication strategies and maintaining a professional image

8. Retaining Customers
   Using the “stop, look, and listen” technique, understanding basic problem-resolution steps, dealing with an irate customer, handling a service cancellation request, appreciating the customer, seeking feedback and improving service

9. Managing Stress
   Understanding stress, using effective coping skills, avoiding sabotaging behaviors, improving your resistance to stress, responding positively, relieving stress physically, assessing your stress level, heeding emotional overload warning signs, practicing various relaxation techniques, avoiding destructive style patterns, considering work-related musculoskeletal disorders (WMSDs), preventing WMSDs and using exercises to reduce the risk of WMSDs

10. Troubleshooting Fundamentals
    Handling technical problems, defining types of video and Internet problems and understanding what to avoid when troubleshooting

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Cable Network Overview

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW

Cable Network Overview introduces students to broadband cable systems, providing a general knowledge of broadband equipment, operation, terminology and competitive services. Those taking this course will gain a fundamental understanding of how broadband cable’s revenue-generating operations work, without being overburdened by too much information on technology. The online course carefully explains and extensively illustrates how antennas, signal processing equipment, amplifiers and other electronic devices work in the HFC network to process, control and transport signals from the system headend to the customer premises equipment and back again.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 10 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» understand the fundamental, revenue-generating services broadband business is providing for its customers
» more effectively function in a broadband industry environment
» more efficiently work with technical personnel
» compare and contrast broadband cable to its competition
» earn one hour of college credit
» receive credit toward NCTI Customer Care Master Representative certification
» receive credit toward NCTI Master Dispatcher certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:

All non-technical personnel interfacing with the customer including:

» entry-level employees
» customer service representatives
» dispatch staff
» sales and marketing staff
» administrative personnel

COURSE OBJECTIVES

Upon completing this course the student will be able to:

1. explain the major functions that occur in a headend
2. describe some of the drop system’s major components and their functions
3. identify active and passive components of the HFC system
4. describe how aerial and underground networks are constructed
5. describe how radio frequency signals are combined

(Continued)
**COURSE OBJECTIVES (Continued)**

6. identify test equipment used to verify proper system performance of the HFC system
7. describe actions that contribute to making customer service a priority
8. list the most common customer-provided equipment
9. understand the Digital Act of 2005

**COURSE OUTLINE**

1. **Broadband Cable System Overview**
   - Exploring the signal path, categorizing cable services and organizing departments for interaction

2. **Understanding the Trunk System**
   - Introducing the trunk, identifying trunk system components, constructing the plant and maintaining the trunk

3. **Understanding the Feeder System**
   - Introducing the feeder, describing feeder components and maintaining the feeder

4. **Installing at the Drop**
   - Preparing a quality install, performing the aerial drop install and performing the underground drop install

5. **Understanding Competitive Services**
   - Summarizing the competitive background, examining competing telecommunications services and bringing to light the value of cable

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Delivering Cable Services

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW

Delivering Cable Services describes the delivery of video, voice and high-speed Internet services. It begins with an excellent overview of the technology of broadband cable systems, defines the terminology associated with that technology and outlines how broadband systems operate. The course takes the student through each part of the cable system and demonstrates the practices that personnel must follow to perform installations at the customer premises. Triple-play service delivery and customer equipment connections are taught in detail. Also included are lessons on system maintenance, troubleshooting, federal and local regulations and safety procedures and guidelines.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:

Varies based on a student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:

» discuss the processes and technology related to installing, operating and maintaining broadband systems
» assist the customer in understanding how broadband technology will work in the home
» learn how consumer electronics are connected in the premises
» understand how federal and local regulations impact broadband technology deployment
» earn three hours of college credit
» receive credit toward NCTI Customer Care Master Representative certification
» receive credit toward NCTI Master Dispatcher certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:

Personnel needing to understand how cable services are delivered to the customer, especially those handling technical issues via the phone; including:

» customer service representatives
» new technical support staff
» network operations center (NOC) staff
» sales staff
» marketing employees

COURSE OBJECTIVES

Upon completing this course students will understand:

1. how the broadband cable signals travel from the headend to the customer premises and from the customer premises to the headend

(Continued)
COURSE OBJECTIVES (Continued)

2. how signal modulation and processing are accomplished in the headend
3. describe video technologies, formats and services
4. how VoIP handles a phone call in a broadband cable network
5. how a cable modem and EMTA are provisioned and how they function
6. how fiber-optic equipment functions
7. procedures that technicians must use when handling fiber optic cable
8. what causes signal outages in the cable system
9. what steps are involved in routing and connecting drop cable in aerial and underground installations
10. how consumer electronics equipment is connected
11. what methods are involved in performing signal leakage monitoring
12. what personal safety practices are necessary for technical and non-technical employees

COURSE OUTLINE

1. Technology Overview
   Discussing broadband technology basics, introducing the electromagnetic spectrum and understanding electronics basics

2. Understanding Signals and the Headend
   Learning about signals, discussing microwave and satellite signals and exploring the headend

3. Understanding Fiber Optics and HFC Networks
   Introducing fiber optics, constructing fiber networks, the evolving HFC network and optimizing the HFC network

4. Aerial Drop Installations
   Introduction to safety standards organizations, routing aerial drop cable, attaching drop cable to the strand and aerial drop attachment to the premises

5. Underground Drop Installations
   Underground drop cable routing, how the cable is placed underground and service drop connection to the customer tap

6. Video Standards, Definitions and Services
   Understanding television standards, identifying television formats, accessing digital television and examining digital television services

7. Delivering Voice
   Reviewing the traditional telephone system, describing voice over Internet protocol, examining the evolution of cable telephony and explaining packet cable operations

8. Delivering Data
   Describing cable’s managed network, provisioning cable modems and activating cable modem service

9. Connecting Consumer Electronics
   Making video connections, making audio connections and bringing consumer electronics together as a system

10. Understanding Network Maintenance
    Introducing maintenance programs, performing routine procedures, examining signal leakage measurement equipment and understanding test equipment

11. Understanding Broadband Cable Regulatory Issues
    Understanding government regulations, regulating network technical performance and complying with industry rules

12. Broadband Cable Safety and Safety Regulations
    Ensuring safety on the job and understanding safety codes
Basic Broadband Troubleshooting
Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW
This course takes the knowledge gained in the NCTI course Delivering Cable Services and applies it to troubleshooting video, data, and voice services. The student will learn the cognitive elements of troubleshooting and how to bring a logic-based approach to the troubleshooting process that includes the following steps: identifying the problem, analyzing the symptoms, isolating the problem area, diagnosing the cause, resolving the problem and verifying the resolution. Additionally, the student will gain a thorough understanding of the hardware that comprises a drop system; such as coaxial cable, fiber-optic cable, and twisted-pair cable; and what can go wrong with this hardware.

Delivery Options:
The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
» effectively resolve technical problems with data, voice and video for the customer
» reduce the need for expensive truck rolls by providing a convenient and immediate solution for the customer
» apply more efficient approaches and effective techniques for phone troubleshooting
» earn three hours of college credit
» receive credit toward NCTI Customer Care Master Representative certification
» receive credit toward NCTI Master Dispatcher certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Personnel wanting to broaden their customer service abilities to handle technical related problems via the phone including:
» customer service and support staff
» technical support staff

COURSE OBJECTIVES
Upon completing this course the student will be able to:
1. outline activities to unlock creative thinking and problem solving
2. distinguish between using intuition, deductive, and inductive reasoning for problem solving
3. describe pitfalls with voice tone that prohibit clear communications
4. identify ways to overcome obstacles associated with effective listening practices
5. explain possible problems and impairments that affect coaxial cable and its connectors
6. analyze the two types of fiber-optic cable used in cable systems

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OBJECTIVES (Continued)

7. examine the causes and results of fiber-optic equipment failures
8. compare the types of drop amplifiers used to increase signals in the home
9. describe the differences between a loop-through system and a home-run system
10. explain over-the-air/impulse noise ingress and its effects on digital TV signals
11. identify the possible sources and causes of ingress and egress
12. examine the use of punch-down blocks and cross connect cables for telephone and Internet connection

COURSE OUTLINE

1. **Thinking Skills for Troubleshooting**
   Introducing the process of troubleshooting, troubleshooting with the customer and broadband cable

2. **Communication Skills for Troubleshooting**
   Identifying soft communication skills, understanding the importance of spoken and unspoken communications and learning how to listen

3. **Troubleshooting Coaxial Cables and Connectors**
   Describing the drop and inside wire elements, understanding coaxial cable test equipment and explaining how to install connectors

4. **Troubleshooting Fiber-Optic Cables and Connectors**
   Discussing characteristics of fiber-optic cable and examining how to troubleshoot problems and repair fiber-optic cable and components

5. **Troubleshooting Drop Splitters, DC’s and Drop Amps**
   Examining splitter and directional coupler problems and discussing basic troubleshooting techniques for drop amplifiers

6. **Troubleshooting Ingress and Egress**
   Understanding ingress and egress, examining ways to isolate and diagnose the cause of ingress and examining UHF signal leakage and ingress

7. **Troubleshooting Inside Wiring, Powering Elements and Bonding**
   Identifying insider wiring plugs and jacks, understanding how to troubleshoot inside wiring, power cables and connectors

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
High-Speed Data Customer Service

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW

High-Speed Data Customer Service provides an invaluable and unparalleled base of knowledge of high-speed data services, equipment, operations and troubleshooting, including extensive information regarding DOCSIS cable modems through version 3.1 and the return path’s effect on high-speed data service. Personnel completing this course will be uniquely qualified to provide immediate and effective customer support for high-speed data service.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 16 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
» earn two hours of college credit
» receive credit toward NCTI Customer Care Master Representative certification
» receive credit toward NCTI Master Dispatcher certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Customer contact personnel responsible for supporting cable modem customers, including:
» high-speed data customer service representatives
» high-speed data sales representatives
» tier 1, 2 and 3 technical service representatives
» administrative and marketing employees

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. describe how cable modem data is transported in the cable network
2. list the phases of interaction between the cable modem and the cable modem termination system during modem initialization
3. describe the steps required to certify the reliability of a customer’s cable drop system
4. describe what should be checked when verifying operation of the cable modem and its computer connection
5. describe the funneling effect and the access technology used for return path transmissions

(Continued)
COURSE OBJECTIVES (Continued)

6. describe why regular maintenance is important for return path reliability
7. describe how long-loop automatic gain control adjusts the upstream carrier level of cable modems
8. describe the cause of typical return signal impairments
9. describe the information that must be gathered before troubleshooting a high-speed data problem
10. explain how the cable modem status lights are used to diagnose modem-related problems
11. explain the finer points of how the brain works during troubleshooting

COURSE OUTLINE

1. **Introduction to DOCSIS**
   Introducing cable modems, examining the different versions of Data Over Cable Service Interface Specification (DOCSIS) and considering DOCSIS in the network

2. **DOCSIS Modem Operations**
   Obtaining DOCSIS single carrier radio frequency (RF) operating parameters, obtaining DOCSIS 3.1 RF operating parameters, establishing an identity in the DOCSIS network and maintaining DOCSIS modem security

3. **Installing a DOCSIS Cable Modem**
   Preparing to install a cable modem, activating cable modem service and educating the customer

4. **Return Path Operations Overview**
   Understanding signal flow in the return path, identifying common technical issues and maintaining the return path

5. **Introducing Return Path Fundamentals**
   Describing the return path, examining how the return path works and examining the return path in the drop system

6. **Installing the Home Media Network**
   Recognizing the home media network, identifying the elements of the home media network and looking at home networking technologies

7. **Thinking Skills for Troubleshooting**
   Preparing your mental processes and thinking about thinking

8. **Troubleshooting High-Speed Data Service**
   Delivering high-speed data service, detailing the evolution of DOCSIS and resolving problems in the customer premises
Advanced High-Speed Data Customer Service

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW
Advanced High-Speed Data Customer Service builds upon the knowledge gained in NCTI’s High-Speed Data Customer Service course. The course provides the industry’s most in-depth and thorough training for customer contact personnel regarding core digital concepts and personal computers (PC). Students completing this course gain a thorough understanding of personal computers and mobile devices as well as their operating systems. The student will also learn key digital concepts and how digital relates to analog as well as insight into troubleshooting high-speed data (HSD) service.

Delivered online, the Advanced High-Speed Data Customer Service course includes videos and activities that are intended to help the student retain key points of information. The computer videos are hosted by Mike Meyers, author and holder of multiple IT industry certifications, whose colorful and humorous presentation style makes the course entertaining and effective. Topics of study include a detailed description of the major components in a PC and how they interact in the computer system; a review of Microsoft Windows operating systems with explanations of their respective features and vulnerabilities; an overview of mobile devices and their operating systems; computer security; an explanation of basic digital signaling and troubleshooting high-speed data service. This course provides valuable and necessary information for anyone that provides assistance to customers that are experiencing computer related issues.

Delivery Options:

- The course is delivered online with in-course activities to promote learning. Lesson and final exams are also taken online.

Completion Time:
Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:

- have the breadth and depth of knowledge to sell and support any high-speed data related services
- reduce expensive truck rolls and improve customer satisfaction rates by providing advanced levels of troubleshooting on all high-speed data service
- have the product knowledge required to move to a supervisory level for high-speed data customer service
- earn three hours of college credit
- receive credit toward NCTI Customer Care Master Representative certification
- receive credit toward NCTI Master Dispatcher certification
- receive an industry-recognized NCTI certificate of graduation

(Continued)
BENEFITS (Continued)

Ideal for:
Customer service and sales representatives needing advanced training to sell or troubleshoot high-speed data services, including:
» graduates of NCTI’s High-Speed Data Customer Service course
» tier 2 and 3 technical service representatives

COURSE OBJECTIVES
Upon completing this course students will be able to:
1. identify the main components of a computer system
2. describe how to maneuver in the different Windows operating systems to perform common tasks
3. explain the meaning of 32- and 64-bit processing
4. explain the labeling of the different types of random access memory (RAM)
5. describe the basic input/output services (BIOS) in a computer system
6. describe the computer motherboard and the different available form factors
7. list important considerations when choosing a computer power supply
8. describe the internal components of a hard drive
9. identify different types of media for storing and playing back data
10. explain how to configure common input devices in a computer system
11. understand the terms resolution, refresh rate and color depth as they relate to a computer’s video configurations.
12. describe the terms Transmission Control Protocol (TCP), User Datagram Protocol (UDP) and ports in reference to Internet applications
13. describe the waveform audio file format (WAV) and musical instrument digital interface (MIDI) file formats
14. identify different laptop types and features that make laptops versatile
15. describe mobile device operating systems
16. identify how to keep computer systems in an optimal operating condition
17. understand how digital devices are used to duplicate the physiological characteristics of the human eye and ear
18. apply the divide and conquer troubleshooting method

COURSE OUTLINE
1. Operational Procedures
   Discuss professionalism in appearance and communications, identify the biggest hazards to a computer, discuss safety for those working on a computer and for the computer while being worked on.

2. The Visible PC
   Review how computers work, identify and explain the function of the main components inside a computer and describe the different computer interfaces to peripheral devices.

3. Visible Windows
   Learn about the different Windows operating systems and about some of the utilities available to help resolve computer problems.

4. Microprocessors
   Understanding central processing units (CPU), investigating CPU speeds and cores, exploring CPU caches, understanding 32-bit and 64-bit processors, installing a CPU and cooling a CPU.

5. Random Access Memory (RAM)
   Understanding RAM, looking at types of RAM, adding RAM to a system, troubleshooting RAM and understanding virtual memory.

6. Basic Input/Output Services (BIOS)
   Defining the purpose of BIOS, describing the power-on self-test (POST) and troubleshooting BIOS.

7. Motherboards
   Understanding form factor, ATX and ITX form factors, chipsets, the expansion bus, installing a motherboard and configuring for two CPUs.

8. Power Supplies
   Electricity basics, describing the power supply and connections, choosing a power supply, power protection and troubleshooting the power supply.

9. Hard Drive Technologies
   Understanding how hard drives store data, discussing ATA hard drives, installing hard drives and recognizing small computer system interface (SCSI) hard drive.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
10. **Removable Media**
   Remembering floppy discs and drives, investigating optical drives and flash media.

11. **Input Devices**
   Supporting common ports and connecting input devices.

12. **Video**
   Investigating video displays, connectors, and video settings, working with projectors, setting up multiple monitors, installing graphics cards and troubleshooting video issues.

13. **The Internet**
   Understanding Internet tier structures, connecting to the Internet, investigating Internet application protocols and analyzing Internet issues.

14. **Multimedia**
   Recognizing sound formats, working with volume, and using tuners and video cards.

15. **Portable computing**
   Looking at laptop computers, managing and maintaining portable computers and troubleshooting laptop computers.

16. **Mobile Devices**
   Comparing smart phones and tablets, describing mobile operating systems, syncing mobile devices, connecting mobile devices to a network, connecting mobile devices to email and securing mobile devices.

17. **Securing Computers**
   Exploring physical security, securing the environment against unauthorized use and against software threats, using firewalls and destroying data and complying with acceptable use policies.

18. **Digital Basics**
   Compare decimal and binary numbering, understand logic gates and integrated circuits and learn about pulse code modulation.

19. **Troubleshooting HSD**
   Modem emulators and other test equipment, house amplifiers and examining troubleshooting techniques.
Operations Center Technical Support I

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW
This course teaches key technical skills and the knowledge required to allow network operations center personnel to quickly identify customer and network issues, isolate network difficulties and provide troubleshooting solutions. Specifically, Operations Center Technical Support I focuses on maintaining network reliability for digital video, telephony and high-speed data services. The course also provides a basic explanation of computer software and protocols, network topologies and the Open Systems Interconnection (OSI) reference model.

Delivery Options:
The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 32 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» use this course to help prepare for SCTE’s Broadband Premises Installer certification
» receive credit toward NCTI Customer Care Master Representative certification
» receive credit toward NCTI Master Dispatcher certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Network support personnel, including:
» network dispatch technicians
» network trouble isolation technicians
» network operations center personnel

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. explain how communication signals travel over various mediums in a network
2. identify and characterize broadband cable services
3. describe the basics of digital video services
4. describe the basics of cable modems
5. explain how to effectively and efficiently troubleshoot cable services
6. convert decimal and binary numbers
7. explain the composition and basic functionality of an integrated circuit
8. examine data over cable service interface specification (DOCSIS) through version 3.1
9. describe twisted and untwisted-pair cables, connectors and their applications
10. explain voice services from traditional telephony to voice over Internet protocol (VoIP) services with PacketCable over a managed network

RECOMMENDED PREREQUISITES
» Delivering Cable Services

RELATED COURSES
Students completing this course should then enroll in:
» Operations Center Technical Support II
» Operations Center Technical Support III

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OBJECTIVES (Continued)

11. characterize home media networks, including WiFi and multimedia over coax alliance (MoCA) technologies
12. identify the functions of computer hardware and software inside and outside of a network using Windows, OS X, Linux and Unix operating systems
13. describe protocols used by computers to communicate over networks

COURSE OUTLINE

1. Digital Fundamentals
   Looking at digital history, decimal and binary numbering systems, examining character codes, reviewing data compression, understanding logic gates, understanding integrated circuits and exploring pulse code modulation

2. Introduction to DOCSIS
   Introducing cable modems, examining the different versions of DOCSIS and considering DOCSIS in the network

3. Introducing Twisted Pair Inside Wiring
   Introducing the network interface device, untwisted and twisted-pair cables, twisted-pair cable hardware and twisted-pair cable routing wiring topologies

4. Introducing VoIP
   Reviewing the traditional telephone system, describing VoIP, examining the evolution of cable telephony and explaining PacketCable operations

5. Installing the Home Media Network
   Recognizing the home media network, identifying the elements of the home media network and looking at home networking technologies

6. Troubleshooting IP Voice
   Understanding how to troubleshoot IP Voice service, examining the embedded multimedia terminal adapter and diagnosing IP Voice service problems

7. Troubleshooting High-Speed Data Service
   Delivering high-speed data service, detailing the evolution of DOCSIS and resolving problems in the customer premises

8. Troubleshooting Digital Video Service
   Dissecting digital video troubleshooting, troubleshooting the digital set-top box, examining potential high definition multimedia interface (HDMI) problems, troubleshooting audio issues associated with digital video and attacking advanced digital video issues

9. Computers and Software in Networks
   Devices on networks; internal computer components: central processing unit (CPU), input/output (I/O), memory and network interface card (NIC); software; and popular operating systems

10. Carrier Signals, Cable Types and Network Topologies
    Communications and signals, network topologies, copper cable, fiber optic cable, wireless transmission and structured cable plant overview

11. Computer Protocols and Services
    Protocols, layers of protocols and services and communicating across a network

12. The OSI Reference Model (OSI/RM)
    Introduction to the OSI reference model, the physical layer, the data link layer, the network layer, the transport layer, the session layer, the presentation layer and the application layer
Operations Center Technical Support II

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW

Operations Center Technical Support II provides key technical skills and knowledge that allow network operations center personnel to quickly identify customer and network issues, perform troubleshooting to isolate the issue and direct the fix. This course specifically focuses on the reliability of the entire broadband network. Its coverage of electronic circuit theory provides a foundation for understanding decibels (dB), decibel millivolts (dBmV), signal leakage detection and troubleshooting techniques. The course’s basic mathematics review prepares the broadband professional to tackle equations and formulas relating to basic electronic theory and signal level calculations. The course also addresses networking technologies, such as wired and wireless LAN’s (local area networks), WAN’s (wide area networks), as well as how antennas work. An understanding of these networking technologies is critical for network operations personnel in the networked world where we live and work. The course concludes with basic characteristics and functions of line extender amplifiers used in the distribution portion of the network.

Delivery Options:

Learning takes place online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 48 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» use this course to help prepare for SCTE’s Broadband Premises Installer and Broadband Distribution Specialist certifications

» receive credit toward NCTI Customer Care Master Representative certification

» receive credit toward NCTI Master Dispatcher certification

» receive an industry-recognized NCTI certificate of graduation

Ideal for:

Network support personnel, including:

» network dispatch technicians

» network trouble isolation technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:

1. understand and apply basic DC electronic theory and discuss relevant broadband cable applications

2. perform basic mathematical calculations using equations and formulas related to installed cable systems

3. explain dB and dBmV fundamentals and their broadband cable applications, including the performance of gain and loss calculations

(Continued)
COURSE OBJECTIVES (Continued)

4. describe the operation and maintenance of signal level meters and signal leakage detection equipment
5. troubleshoot to isolate, identify and direct the repair of common problems from the customer premises and the broadband network
6. describe what a MAC (media access control) address is
7. describe common Ethernet configurations
8. explain the differences amongst the Electrical and Electronics Engineers (IEEE) 802.11 wireless LAN (local area network) standards
9. describe various aspects of WANs (wide area networks) including frame relay, ATM (asynchronous transfer mode) and VPN (virtual private network)
10. describe various spread spectrum technologies and the FCC (Federal Communications Commission) rules governing them
11. explain the equipment associated with wireless LANs
12. describe the basic attributes, purpose and functions of the general RF antenna types used in wireless networks
13. explain the theory of operation of line extender amplifiers and the function of amplifier passives and actives

COURSE OUTLINE

1. Exploring Electrons and Electricity
   Establishing electron characteristics, identifying element categories, understanding electron current flow, electric current and electrical force

2. Understanding Magnetism and Electromagnetism
   Understanding magnetism and electromagnetism and exploring magnetic and electromagnetic applications

3. Using Positive and Negative Numbers, Decimals and Fractions
   Positive and negative numbers, understanding common fractions and decimal fractions

4. Using Equations and Powers of Numbers
   Using equations and powers of numbers

5. Understanding Electrical Circuits
   Understanding circuit essentials and diagrams, differentiating current flow conditions and defining circuit types

6. Understanding Resistance
   Exploring resistance, changing and controlling resistance

7. Using Ohm’s Law for Power and Energy
   Describing basic electrical characteristics, working with Ohm’s law, solving power equations and other related electrical equations

8. DC Series Circuits
   Citing basic DC circuit requirements, describing circuit characteristics and solving various circuit calculations

9. Understanding Decibels
   Reviewing the history of decibels, making comparisons between two values, explaining the concept of bels and decibels and understanding power and voltage ratios

10. Using dB (decibel) and dBmV (decibel millivolt)
    Working with dBmV and performing signal level calculations

11. Detecting Signal Leakage
    Reviewing signal leakage basics and selecting and operating signal leakage measuring equipment

12. Introduction to Wireless LANs
    The wireless LAN market and applications

13. Spread Spectrum Technology
    Introducing spread spectrum, FHSS (frequency-hopping spread spectrum), DSSS (direct sequence spread spectrum) and comparing FHSS and DSSS

14. Wireless LAN Infrastructure Devices
    Access points, wireless bridges, wireless workgroup bridges, wireless LAN client devices, wireless residential gateways and enterprise wireless gateways

15. Antennas and Accessories
    RF antennas, PoE (powered Ethernet) devices and wireless LAN accessories

16. Extender Amplifier Operation
    Examining the amplifier housing, line extender AC/DC powering systems and RF passives and controls and the amplifier module and classifying line extender specifications

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Operations Center Technical Support III

Part of the Customer Care Master Representative and Master Dispatcher Certification Series

OVERVIEW

This course provides network operations center personnel with invaluable information on the coaxial distribution system and teaches the necessary AC (alternating current) electronic theory and application needed to perform in-depth troubleshooting of the broadband network. Network technicians will also learn the fundamentals of maintaining network reliability in the return path. The course concludes with a thorough exploration of the fiber-optic system, including optical node operations, design topologies, basic testing methods and restoration.

Delivery Options:
- The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is 40 hours. The maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:
- receive credit toward NCTI Customer Care Master Representative certification
- receive credit toward NCTI Master Dispatcher certification
- receive an industry-recognized NCTI certificate of graduation

Ideal for:
Network support personnel, including:
- network dispatch technicians
- network trouble isolation technicians

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. describe and apply AC electronic theory
2. explain the theory of passive equipment operation in the coaxial distribution system
3. describe and apply the theory of operation for power supplies and RF (radio frequency) amplifiers
4. describe the return path signal flow and major transmission elements
5. explain the concept and effects of noise funneling on the return path
6. discuss procedures for improving overall return path performance
7. explain sources of return path impairments and learn troubleshooting techniques
8. describe and apply the theory of operation for forward and return optical receivers
9. describe and apply fiber-optic topologies and design requirements
10. explain the process of fiber-optic fault location using the OTDR (optical time-domain reflectometer)
11. outline both emergency and permanent optical system restoration procedures

(Continued)
COURSE OUTLINE

1. Distribution System Overview
   Applying basic electronics to distribution systems, comparing distribution system architectures, examining distribution system transmission equipment, measuring system vital signs and faults and troubleshooting signal problems and outages

2. Alternating Current
   Understanding AC and AC power and recognizing AC waveforms

3. Understanding AC Waveform Fundamentals
   Examining AC waveform characteristics and expressing AC waveform values

4. Resistive AC Circuits
   Understanding basic relationships, eddy currents and the skin effect; solving sample problems

5. Inductance and Transformers
   Investigating induction, inductance, inductors and transformers

6. Capacitance
   Discovering capacitance and capacitors

7. RF Directional Couplers and Power Inserters
   Explaining directional couplers and power inserters

8. Working with RF Taps
   Identifying types of taps and RF tap mechanical components, examining tap electrical characteristics, understanding the theory of tap operation and considering RF tap system design criteria

9. Understanding Fiber Optics and HFC (Hybrid-Fiber-Coaxial) Networks
   Introducing fiber optics, constructing fiber networks, the evolving HFC network and optimizing the HFC network

10. Transmitting and Receiving Optical Signals
    Studying optical transmitters, understanding optical receivers and transmitting optical signals, using amplifiers, repeaters and regenerators

11. Understanding Fiber Optic Network Design
    Establishing network design guidelines, analyzing the network design route and discussing network documentation

12. Return Path Operations Overview
    Understanding signal flow in the return path, identifying common technical issues and maintaining the return path

13. Introducing Return Path Fundamentals
    Describing the return path, investigating how the reverse path works and examining the return path in the drop system

14. Troubleshooting the Return Path
    Describing return path test equipment, troubleshooting the return path in the drop system and using the spectrum analyzer to troubleshoot the HFC network

15. Maintaining Return Path Signals
    Describing return path amplitude levels, setting return amplifier levels and balancing the return path

16. Examining Signals in the Return Path
    Modulating return path signals, examining spectrum sharing technologies and analyzing return path carriers

17. Examining the Optical Return Path
    Introducing optical return technologies, optimizing optical return path performance and introducing optical return path multiplexing

18. Trunk System Overview
    Understanding system design symbols and architectures, constructing and powering the cable plant, examining transmission components, and verifying plant reliability

19. Presenting OTDR Basics
    Introducing OTDRs, describing OTDR types and examining OTDR features

20. Planning for Fiber-Optic Restorations
    Explaining a fiber restoration plan, understanding causes of optical failures and planning efficiently and effectively for fiber restorations

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Fundamental Selling Skills
Part of the Customer Care Master Representative Certification Series

OVERVIEW
Successful selling is the key to remaining competitive in today’s market. It is critical for sales representatives to understand what it takes to close the sale! Fundamental Selling Skills (FSS) will provide call center agents with the knowledge, skills and tools of a process called Consultative Selling. Agents will learn how to effectively and successfully establish rapport with customers and ultimately gain and retain the business of new and existing customers. FSS will benefit individuals in the cable industry who wish to sharpen and perfect their selling skills, or who wish to gain a further understanding of best-practice selling techniques.

Delivery Options:
All learning, lesson and final exams are delivered and taken online.

Completion Time:
Varies based on a student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
» know how to establish and maintain rapport with the customer
» understand the sales process from initial contact to closing the sale
» receive credit toward NCTI® Customer Care Master Representative certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Call center personnel, including:
» newly hired employees
» employees with sales responsibilities

COURSE OBJECTIVES
Upon completing this course sales professionals will be able to:
1. recognize each step in the consultative selling process
2. identify and apply the techniques necessary to establish rapport with a customer
3. interview customers using effective probing techniques to uncover customer needs
4. use a five-step process to improve active listening
5. overcome common barriers to active listening
6. match products and services to the identified needs of the customer based on the product’s unique selling points
7. use the skills of explaining, proving and offsetting to overcome objections
8. select the appropriate closing technique, based on the customer’s buying signs
9. draft a professional development plan and create SMART goals to successfully accomplish that plan

(Continued)
COURSE OUTLINE

1. Fundamental Selling Skills
   - Introduction, establishing rapport, interviewing, active listening, matching and presenting products and services, overcoming objections, closing the sale and setting goals
Competitive Services
Part of the Customer Care Master Representative Certification Series

OVERVIEW
Created specifically for the broadband industry, Competitive Services takes the broadband cable professional on a ride through the competitive landscape of the broadband industry. The regulatory issues surrounding competition are addressed for a deeper understanding of how we got to where we are. After successful course completion, the cable professional will be better equipped to communicate with the customer as well as sell their services against their competition.

Delivery Options:
The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» become familiar with the competitive landscape
» be better prepared to sell cable services
» learn about regulatory issues affecting broadband competition
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Customer Care Master Representative certification

Ideal for:
All non-technical personnel interfacing with the customer including:
» entry-level employees
» customer service representatives
» dispatch staff
» sales and marketing staff
» administrative personnel

COURSE OBJECTIVES
Upon completing this course, the student will be able to:
1. discuss the development of early cable systems and what led to wireless video service
2. explain the major effects of the Telecommunications Act of 1996
3. list key advanced services that came to the marketplace in the first part of the 21st century
4. explain the major effects of the Digital Transition and Public Safety Act of 2005
5. describe the competitive role of high-speed data providers
6. describe DSL television and hybrid telco technologies
7. describe the competitive role of satellite service providers
8. describe how fixed wireless networks deliver high-speed data to the customer
9. describe technologies providing both fixed and mobile broadband wireless
10. explain regulatory factors contributing to broadband cable overbuilds and user access

(Continued)
11. describe how broadband cable operators have improved technology to remain competitive
12. explain the benefits of Voice over Internet Protocol (VoIP) in broadband networks
13. describe how Video on Demand (VOD) services are provided to the broadband cable customer
14. describe how Digital Video Recorder (DVR) services are provided to the broadband cable customer
15. describe how gaming services are provided to the broadband cable customer

**COURSE OUTLINE**

1. **Summarizing the Competitive Background**
   Describing early cable competition, examining the Telecommunications Act of 1996, developing advanced services and looking at the Digital Act of 2005

2. **Examining Competing Telecommunications Services**
   Discussing telco data services, looking at Digital Subscriber Line (DSL) television and hybrid service, discussing satellite video and data services, discussing fixed wireless and fixed optical data services, defining Wi-Fi and WiMAX, redefining over-the-air broadcasting, understanding overbuilds and widening user access and observing broadband cable developments

3. **Bringing to Light the Value of Cable**
   Exploring VoIP telephony, examining interactive television history, looking at VOD and DVR service, discussing broadband gaming and looking at future trends
Delivering Video

Part of the Customer Care Master Representative Certification

OVERVIEW
Created specifically for the broadband industry, Delivering Video teaches the broadband cable customer care professional what they need to know about digital video including standards, formats and services. After successful course completion, the cable professional will be better equipped to communicate with the customer about their video services and sell these services to the customer as a result of an increased understanding of the services and the technology used to deliver them to the customer.

Delivery Options:
The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Customer Care Master Representative certification

Ideal for:
All personnel interfacing with the customer including:
» entry-level employees
» customer service representatives
» dispatch staff
» sales and marketing staff
» administrative personnel
» front counter personnel

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. describe the National Television System Committee’s and Advanced Television Systems Committee’s roles in establishing television standards
2. distinguish the characteristics of standard, enhanced and high definition television
3. describe the next-generation high definition television technologies
4. identify the different digital television signal types and how they are delivered
5. describe the digital terminal adapter and its purpose
6. explain how access to broadband cable television content is controlled
7. describe video-on-demand service
8. describe digital video recorder service
9. describe whole home entertainment
10. list the different levels of VoIP services

RELATED COURSES
Students completing this course should then enroll in:
» Delivering Voice

TRAINING FEATURES
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OUTLINE

1. Understanding Television Standards
   Visiting the origins of television standards, introducing the national television system committee standards, elevating television to the next step, recognizing digital television standards organizations and discussing the conversion from analog-to-digital television

2. Identifying Television Formats
   Describing standard definition television, recognizing enhanced definition television, defining high definition television and looking beyond high definition television

3. Accessing Digital Television
   Distinguishing digital television tuning, introducing the digital terminal adapter and controlling access to broadband cable television content

4. Examining Digital Television Services
   Defining different television services and examining the evolution of video-on-demand
Delivering Voice

Part of the Customer Care Master Representative Certification

OVERVIEW

Created specifically for the broadband industry, Delivering Voice teaches the broadband cable professional everything they need to know about digital voice, including how the broadband cable industry’s PacketCable™ IP voice solution differs from traditional telephone service and from other digital voice service providers. After successful course completion, the cable professional will be better-equipped to communicate with the customer about their voice services as well as to more successfully sell the service.

Delivery Options:
- The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
- receive an industry-recognized NCTI certificate of graduation
- receive credit toward NCTI Customer Care Master Representative certification

Ideal for:
All personnel interfacing with the customer including:
- entry-level employees
- customer service representatives
- dispatch staff
- sales and marketing staff
- administrative personnel
- front counter personnel

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. describe the public switched telephone network
2. describe the meaning of plain old telephone service (POTS)
3. describe how packet switching compares to circuit switching technology
4. describe the applications of the different Internet protocol (IP) networks
5. describe the benefits of the different versions of DOCSIS
6. describe the embedded multimedia terminal adapter (ETMA)
7. describe how PacketCable is different from other voice over Internet protocol (VoIP) services
8. describe how cable telephony is installed
9. list the different levels of VoIP services

(Continued)
COURSE OUTLINE

1. Reviewing the Traditional Telephone System
   Explaining the public switched telephone network and describing the traditional telephone service

2. Describing Voice Over Internet Protocol (VoIP)
   Introducing packet switching and defining an IP network

3. Examining the Evolution of Cable Telephony
   Introducing DOCSIS, introducing PacketCable, describing PacketCable telephony and exploring PacketCable VoIP architecture

4. Explaining PacketCable Operations
   Examining the customer VoIP interface, explaining PacketCable VoIP connections, describing PacketCable telephone calls, installing cable telephony service, explaining premises devices, calling benefits and features and defining VoIP competition
Delivering Data

Part of the Customer Care Master Representative Certification Series

OVERVIEW

Created specifically for the broadband industry, Delivering Data teaches broadband cable customer care professionals what they need to know about high-speed data service including how broadband cable high-speed data service differs from what is offered by other service providers. After successful course completion, the cable professional will be better equipped to communicate with the customer about their high-speed data services and to sell these services to the customer as a result of an increased understanding of these services and those of the competition.

Delivery Options:
❖ The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
❖ become educated in Data Over Cable Service Interface Specification (DOCSIS) standards, the platform by which high-speed data service is delivered to the customer
❖ be better prepared to sell data services through an understanding of the service, its delivery, and the competition
❖ receive an industry-recognized NCTI certificate of graduation
❖ receive credit toward NCTI Customer Care Master Representative certification

Ideal for:
All personnel interfacing with the customer including:
❖ entry-level employees
❖ customer service representatives
❖ dispatch staff
❖ sales and marketing staff
❖ administrative personnel

COURSE OBJECTIVES

Upon completing this course, the student will be able to:
1. describe the function of each major component in a data-over-cable system
2. describe how cable modem data is transported in the cable network
3. describe how shared networks factor into delivering guaranteed data rates
4. describe the features of each DOCSIS version
5. describe the transmission control protocol/Internet protocol (TCP/IP) and simple network management protocol
6. describe how long-loop automatic gain control adjusts the upstream carrier level of cable modems
7. describe the data sent downstream from a cable modem termination system

(Continued)
COURSE OBJECTIVES (Continued)

8. describe the cable modem’s upstream transmission parameters
9. describe how the cable modem acquires its IP address
10. identify the point at which a modem is authorized for service during initialization
11. understand how the cable modem status lights can be used to diagnose modem-related problems
12. describe some considerations for locating the cable modem in the customer premises
13. list the typical connections on a cable modem
14. identify the preferred connection between the cable modem and customer’s computer
15. describe how the cable modem’s identity is established
16. describe how customer privacy and security is maintained
17. describe how multiple computers can be used to operate with a single modem

COURSE OUTLINE

1. Describing Cable’s Managed Network
   Examining the architecture of a DOCSIS system, describing DOCSIS transmission, defining shared networks, examining the different versions of DOCSIS, understanding data traffic protocols and describing long-loop automatic gain control

2. Provisioning Cable Modems
   Synchronizing DOCSIS data, obtaining upstream parameters, describing ranging and automatic adjustments, obtaining an IP address, obtaining time and date, transferring operational parameters, registering the modem and characterizing cable modem status indicators

3. Activating Cable Modem Service
   Determining computer and modem location, describing the cable modem connections, connecting the cable modem to the customer’s computer, activating the cable modem in the customer’s home, verifying operation of the modem and computer, discussing privacy and security and discussing routers and switches
Selling Communication Services

Part of the Customer Care Master Representative Certification Series

OVERVIEW

Created specifically for the broadband industry, Selling Communication Services teaches the broadband cable professional how to systematically sell broadband services. Various selling strategies are presented, including using information kits, honesty and the “first-person principle”. A 12-step sales process is examined in detail so potential sales opportunities are not lost.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:

The estimated completion time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» become proficient in a systematic sales process
» be better prepared to sell broadband services through an understanding of the customer’s interests and their perceived value of the product
» receive an industry-recognized NCTI certificate of graduation
» receive credit toward NCTI Customer Care Master Representative certification

Ideal for:

All personnel interfacing with the customer including:

» entry-level employees
» customer service representatives
» dispatch staff
» sales and marketing staff
» administrative personnel
» customer facing technical staff

COURSE OBJECTIVES

Upon completing this course, the student will be able to:

1. design and use an information kit to help sell the company’s broadband services
2. explain the importance of being honest with a customer
3. describe the “first-person principle” and how it applies to promoting broadband services
4. confidently and effectively investigate customer interests and service needs
5. discuss specific strategies for selling broadband services
6. demonstrate the steps involved in selling broadband services

(Continued)
7. explain how to address a customer’s concerns about purchasing broadband services
8. explain the procedures for closing the sale
9. identify steps to completing the sale

**COURSE OUTLINE**

1. **Preparing a Sales Presentation**
   Knowing your service offerings, organizing an information kit and responding honestly

2. **Examining Key Selling Concepts**
   Following the first-person principle, matching services to the customer’s interests, and presenting features, benefits and value

3. **Following the Proper Sales Process**
   Selling to the customer, greeting the customer, verifying information, identifying the customer’s interests, building your presentation, recommending services, maintaining the customer’s commitment, identifying the customer’s concerns, addressing the customer’s concerns, looking for buying signs, closing the sale, completing the sale and following up

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Retaining Customers

OVERVIEW

Created specifically for the broadband industry, Retaining Customers teaches the broadband cable professional how to handle difficult situations with customers. Various advanced customer service skills are presented, including the “stop, look, and listen” technique and the acronyms PREFER and RESPECT.

Delivery Options:

The course is delivered online. An ebook is also provided. Lesson and final exams are taken online.

Completion Time:

The estimated time for this course is two hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» become proficient in handling difficult situations with customers

» be well on the way to becoming an expert in advanced customer service skills

» receive an industry-recognized NCTI certificate of graduation

Ideal for:

All non-technical personnel interfacing with the customer including:

» entry-level employees

» customer service representatives

» dispatch staff

» sales and marketing staff

» administrative personnel

COURSE OBJECTIVES

Upon completing this course, the student will be able to:

1. explain the “stop, look, and listen” technique

2. describe the problem resolution steps identified in the acronym PREFER

3. describe alternative words, phrases, and behaviors to use when dealing with an irate or disappointed customer

4. explain how to focus on finding a solution to a customer’s problem

5. explain how empathy is used for managing emotions

6. relate the importance of expressing appreciation to and seeking feedback from a customer

7. help the company use customer feedback to improve service

8. explain the meaning of the acronym RESPECT

(Continued)
COURSE OUTLINE

1. Managing Customer Problems
   Using the “Stop, Look and Listen” technique and understanding basic problem resolution steps

2. Responding to an Irate Customer
   Dealing with an irate customer and handling a service cancellation request

3. Ensuring Customer Retention
   Appreciating the customer, seeking feedback and improving service
GENERAL EDUCATION COURSES
NCTI’S CERTIFICATE AND DEGREE PROGRAM

Advance Your Career Through Professional Education

Earn college credit while learning job-specific skills through NCTI's College Program, the only distance-learning, accredited higher education program designed specifically for the broadband and cable industry. The College Program allows individuals to apply virtually all NCTI courses to college-level certificates and two-year degrees.

BROADBAND LEADERSHIP CERTIFICATE

By developing the skills that prepare them to be effective leaders, students completing this certificate set themselves apart from their peers by further qualifying themselves as candidates for a promotion. With an emphasis in leadership, communication and management, graduates of this certificate will be well-suited to manage those who install, repair and service cable modems, telephony and digital video equipment as well as those who build and maintain broadband networks.

Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAN 224</td>
<td>Leadership</td>
<td>3</td>
</tr>
<tr>
<td>COM 125</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>COM 220</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>MAN 116</td>
<td>Effective Supervision</td>
<td>3</td>
</tr>
<tr>
<td>MAN 226</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL:</td>
<td></td>
<td>15 CREDIT HOURS</td>
</tr>
</tbody>
</table>

*Note: Students who complete this certificate may earn an Associate of Applied Science degree in Broadband Technology and Communication by completing an additional 46 specified credit hours (see next page for more information).

GET STARTED TODAY

1. Check with your supervisor on how NCTI works with your company. Many companies cover the expense of your tuition and offer incentives and raises for graduation from a course.
2. Obtain course descriptions and a NCTI enrollment application from your supervisor, your company’s NCTI training coordinator, or your human resources department.
3. You can also obtain course descriptions and a course application by clicking on the Products tab of our website, www.ncti.com, calling 866.575.7206 or emailing info@ncti.com.
4. Fill out the application completely, include your payment and mail to: NCTI, 300 East Mineral Avenue, Suite 5, Littleton, CO 80122
5. Your course will be shipped—if applicable—within 48 hours of receipt of payment.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
ASSOCIATE OF APPLIED SCIENCE IN BROADBAND TECHNOLOGY AND COMMUNICATION DEGREE FROM ACC

Through our partnership with Arapahoe Community College (ACC), regionally accredited by the North Central Association of Colleges and Schools, NCTI is pleased to provide students a straightforward path to advanced skills, opportunities for professional growth and a college degree.

The Associate of Applied Science degree allows students to complete a NCTI Certificate of Broadband Leadership, combined with general education courses, major courses and restricted electives to earn a minimum of 60 credit hours. The result is a versatile, professional degree that demonstrates both job-specific expertise and general business knowledge.

Be advised, while most courses are available anytime, others are only offered up to three times per year. Visit www.ncti.com for course availability and schedules.

**GENERAL EDUCATION REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 131</td>
<td>3</td>
</tr>
<tr>
<td>ENG 121</td>
<td>3</td>
</tr>
<tr>
<td>MAT 108</td>
<td>4</td>
</tr>
<tr>
<td>COM 125</td>
<td>4</td>
</tr>
<tr>
<td>CIS 118</td>
<td>3</td>
</tr>
<tr>
<td>BUS 115</td>
<td>3</td>
</tr>
<tr>
<td>MAN 116</td>
<td>3</td>
</tr>
</tbody>
</table>

**CORE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAR 160</td>
<td>3</td>
</tr>
<tr>
<td>PSY 116</td>
<td>3</td>
</tr>
<tr>
<td>PSY 101</td>
<td>3</td>
</tr>
<tr>
<td>BUS 241</td>
<td>3</td>
</tr>
<tr>
<td>MAN 117</td>
<td>1</td>
</tr>
</tbody>
</table>

**RESTRICTED ELECTIVES**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 220</td>
<td>3</td>
</tr>
<tr>
<td>MAR 111</td>
<td>3</td>
</tr>
<tr>
<td>BUS 216</td>
<td>3</td>
</tr>
<tr>
<td>BUS 217</td>
<td>3</td>
</tr>
<tr>
<td>MAR 216</td>
<td>3</td>
</tr>
<tr>
<td>MAN 226</td>
<td>3</td>
</tr>
<tr>
<td>CTC 117</td>
<td>3</td>
</tr>
<tr>
<td>CTC 118</td>
<td>3</td>
</tr>
</tbody>
</table>

**PLAN OF STUDY (SPECIALIZATION)**

**BROADBAND LEADERSHIP**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 117</td>
<td>1</td>
</tr>
<tr>
<td>COM 220</td>
<td>3</td>
</tr>
<tr>
<td>CTC 108</td>
<td>1</td>
</tr>
<tr>
<td>CTC 129</td>
<td>3</td>
</tr>
<tr>
<td>CTC 121</td>
<td>3</td>
</tr>
<tr>
<td>CTC 107</td>
<td>3</td>
</tr>
<tr>
<td>CTC 123</td>
<td>3</td>
</tr>
<tr>
<td>MAN 212</td>
<td>3</td>
</tr>
<tr>
<td>MAN 224</td>
<td>3</td>
</tr>
<tr>
<td>MAN 226</td>
<td>3</td>
</tr>
<tr>
<td>MAR 235</td>
<td>3</td>
</tr>
</tbody>
</table>

**DEGREE TOTAL: 61 CREDIT HOURS**

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
An NCTI Certified Emerging Leader has mastered the critical skills necessary to be recognized as an effective mentor, manager, and leader.

To be qualified as an NCTI Emerging Leader, industry professionals must successfully complete a defined set of courses related to specific and essential leadership skills.

- Mentoring 101
- Leadership 101
- Working Across Generations and Maximizing Diversity
- Effective Communication
- Healthy Conflict Management
- Building Synergistic Teams
- Managing and Promoting Change
- Organizational Development, Change and Innovation
Mentoring 101

OVERVIEW
This course is a great beginning point for anyone who wants to establish a mentoring relationship, either as a mentor or a mentee. Students will learn how a mentoring relationship can benefit not only the mentor and mentee, but the organization as well. Understanding the mentoring process, steps on finding a mentor, building relationships, and setting goals, are only some of the topics covered in this course. This online course includes an electronic version of the Mentoring 101 Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. This workbook supplements the online course by engaging students with the exercises that are both personal and relevant, and can be utilized immediately to guide the student in creating a mentoring relationship, or getting the most out of the mentoring relationship they currently have.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» effectively engage in the mentoring process as a mentor, a mentee, or both
» create and implement goals by using the S.M.A.R.T. (Specific, Measurable, Achievable, Relevant, Time-bound) strategy
» participate in active listening and asking great questions
» embrace the 5 Critical Skills of Mentoring
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to embark in, or improve a mentoring relationship including:
» any supervisor or manager wanting to support and enhance relationships among team members
» employees wanting to engage in strategic goal setting and active listening

COURSE OBJECTIVES
Upon completing this course students will be able to:
1. explain the purpose of mentoring
2. describe the benefits of mentoring at a personal and organizational level
3. state some of the positive attributes of mentors and mentees
4. explain the 6 Mentoring Relationships everyone should have
5. engage in the mentoring process
6. explain the four stages of the mentoring process
7. identify the 5 Critical Skills of Mentoring

(Continued)
COURSE OBJECTIVES (Continued)

8. describe behaviors you can engage in to increase your proficiency in using the 5 Critical Skills of Mentoring
9. write goals using the S.M.A.R.T. process
10. utilize each of the 5 Critical Skills within your mentoring relationship

COURSE OUTLINE

1. Why Mentoring?
   The purpose of mentoring, the benefits of mentoring, the 6 Mentoring Relationships and personal attributes of effective mentees and mentors

2. The Mentoring Process and the 5 Skills of Mentoring
   The stages of the mentoring process, identifying and using the 5 Skills of Mentoring, developing S.M.A.R.T. goals, finding a mentor, the importance of active listening, how to build and bust trust, inspiring yourself and others, positive and corrective feedback
Leadership 101

OVERVIEW

Leadership 101’s primary aim is to make leadership development relevant and practical for everyone. The lessons in this course will take you through Mentor Leadership Team’s leadership model, the Leadership Essentials, to give you the framework, skills and knowledge to take your leadership to the next level. The Leadership Essentials begin with Authentic Leadership as the foundational component to effective leadership and then moves through the 4 E’s of the Leadership Essentials to give you the skills you need leverage your strengths and the strengths of others to maximize your collective impact. This online course includes an electronic version of the Leadership 101 Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook supplements the online course by engaging students in exercises that are both personal and relevant and can be utilized immediately to guide the student in the quest to improve their leadership expertise.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:

Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:

» discover the meaning of authentic leadership
» embrace the 4 essential aspects of leadership
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve leadership skills such as supervisors, managers, and employees desiring to be supervisors and managers

COURSE OBJECTIVES

Upon completing this course students will be able to:

1. Identify the difference between personality, traits, experiences, and skills.
2. Describe your current leadership weaknesses and list practical ways to better manage your “shadow side” tendencies.
3. Overcome the four common obstacles that leaders face.
4. Grasp the ten core characteristics of an authentic leader.
5. Explain the differences between a manager and a leader.
6. Define Transformational Leadership.
7. Incorporate the six behaviors of leaders who engage.
8. Employ effective ways to increase your credibility and encourage truth telling.
9. Learn ways you can communicate your team’s values and vision to promote unity
10. Craft a corporate narrative that inspires people to join a cause bigger than themselves
11. Describe each of the four steps for enlisting people in a common cause.

(Continued)
COURSE OBJECTIVES (Continued)

12. Understand the power and impact of collaboration and apply practical steps for increasing collaboration in your workplace.
13. Define “empower” and describe why empowering others is necessary for leadership.
14. Circumvent the common barriers to empowering others.

COURSE OUTLINE

1. Authentic Leadership I
   Authentic leadership, the three A’s of authentic leadership, know yourself, recognize your shadow side and manage your shadow side

2. Authentic Leadership II
   Authentic leadership overview, accentuate your uniqueness, clarify your core values, align: determine your passions and desired contributions, activate: define your purpose, focus on self-discipline

3. Introduction to the Leadership Essentials
   Leaders vs. managers, transformational leadership and introducing the 4 essentials of leadership

4. The Leadership Essentials: Engage
   Overview of engage, the basics of engaging, know your followers and connect with them, manage and respond to emotions appropriately, grow in self-awareness and self-management and encourage truth telling

5. The Leadership Essentials: Enlist
   The 4 E’s of the leadership essentials: enlist, the power of a common cause, clarify your vision, believe in your vision, communicate your vision and preserve your vision

6. The Leadership Essentials: Equip
   The 4 E’s of the leadership essentials: equip, situational leadership, four ways to equip your followers, increase competence, remove obstacles, create opportunities, stretch their reach and create a learning culture built on collaboration

7. The Leadership Essentials: Empower
   The 4 E’s of the leadership essentials: empower, empowering others, managing your power and influence, motivate, be a multiplier not a diminisher, manage performance and collaborate and celebrate wins
Working Across Generations and Maximizing Diversity

OVERVIEW
Maximizing diversity means appreciating and using the differences of others to create synergies that enable you to work at a level of productivity that you could not possibly achieve alone. In this course you will learn about different types of diversity and the strategies you can implement to promote understanding and respect for others in order to take full advantage of the power that comes from working with those who are different from you. This online course includes a Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online PDF document. It supplements the online course by engaging students with the exercises that are both personal and relevant, and can be utilized immediately to guide the student in the quest to improve their expertise in diversity.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» discover the meaning of generational diversity
» learn how to reap the benefits of diversity in the workplace
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their awareness of diversity skills, such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. list and explain the “3 G’s” to consider when appreciating diversity
2. list the positive attributes of each of the different generations in the workplace and describe ways these attributes provide valuable perspective
3. understand the cultural continuums and assess where those you work with operate along those continuums
4. describe the positive attributes of men and women and give examples of how those attributes can complement each other by working together
5. understand and apply the skills for bridging cultural differences

(Continued)
COURSE OUTLINE

1. Working Across Differences
   Looking at others, working with people who are different than you, traditional ways of training and the three G’s of diversity

2. Generational Distinctions
   Four generations: characteristics of traditionalists, baby boomers, generation X and millennials (generation Y); statistics about generational distinctions, comparison of stereotypes vs. positive attributes, things you appreciate about different generations, promoting understanding and appreciation of other generations

3. Global and Cultural Diversity
   Nuances of behavior, cultural continuums, how multicultural experiences affect views on differences and appreciating other cultures

4. Gender Differences
   Gender perspectives and executive teams, personal impact of gender differences and how to appreciate gender differences in your organization

5. How to FACE the Issue
   Frustration, appreciation, collaboration, empowerment and observing generational, global and gender differences

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Maximizing Diversity with Inclusion: Benefits, Best Practices and Compliance

OVERVIEW
Maximizing Diversity with Inclusion: Benefits, Best Practices and Compliance: Welcoming diversity and supporting inclusion addresses our shared need to feel we are respected and appreciated in the workplace. While supporting diverse and inclusive organizational culture is important for compliance, it has become a significant business strategy. A clear understanding of diversity and inclusion creates and sustains growth, and fosters a more creative, respectful and productive workplace. In this course, you will learn about the importance of diversity, strategies you can implement to promote inclusion and the nuts and bolts of compliance to an equal opportunity and harassment free workplace.

Delivery Options:
This course is delivered online. Lesson and final exams are taken online.

Completion Time:
The estimated completion time for this course is four hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» receive an industry-recognized NCTI certificate of graduation

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. articulate why diversity matters and identify practical ways you can promote diversity in your workplace.
2. articulate the advantages to inclusion and practical ways to promote inclusion in your company.
3. understand why compliance is important and what behaviors are acceptable and which ones you need to avoid.

COURSE OUTLINE
1. Diversity
   Benefits of diverse workplaces, building diversity throughout an organization, appreciating diversity, diversity of thought, traditional diversity programs, gender generational and global differences

2. Inclusion for Organizational Effectiveness
   The cost of hostile work environments, belonging, growth, types of bias, making the unconscious conscious and tolerance versus inclusion

3. Compliance
   Ensuring equal opportunity, discrimination-free, how does your company stack up, the stoplight of potential harassment, sexual harassment, bullying, mentoring and promoting a healthy culture

RELATED COURSES
Students completing this course should then enroll in:
» Effective Communication
» Organizational Development
» Managing and Promoting Change
» Healthy Conflict Management
» Building Synergistic Teams

TRAINING FEATURES
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Effective Communication

OVERVIEW

We communicate to get our point across. But strong leaders understand that effective communication should also affirm and empower the person or persons you are communicating with. This course will help you maximize your influence to work with the people around you by giving you the knowledge and skills to effectively communicate as a leader and person of influence. This online course includes an electronic version of the Leadership 101 Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online PDF document. It supplements the online course by engaging students with the exercises that are both personal and relevant, and can be utilized immediately to guide the student in their quest to communicate effectively.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS

Upon completion students will:
» be equipped with communication skills that can be practiced in all facets of one’s life
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their ability to communicate more effectively, such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. explain what makes communication effective
2. explain why listening is important and what skills are needed
3. understand the other musts in effective communication
4. articulate the barriers to valuable communication

(Continued)
1. **The Importance of Effective Communication**
   Communicating accurately and what makes an effective communicator

2. **Skillful Listening**
   The most effective style of listening, how you listen, five listening styles and selfless active listening

3. **Helpful Listening Techniques and Tools**
   Two techniques for better active listening, quiet your inside, five types of questions and why to avoid leading questions

4. **Make Communication Effective**
   Developing nonverbal communication, body language, guidelines for making communication effective, examples of poor communication and storytelling

5. **Communication Issues**
   Written communication, oral communication types and problems and types of persuasive communication

---

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Healthy Conflict Management

OVERVIEW
Conflict is a natural result of people working together. When it is handled in an unhealthy manner, productivity declines. When healthy conflict is encouraged and regarded as a necessary ingredient for growth, productivity and morale soar. The purpose of this course is to give you the knowledge you need to resolve unhealthy conflict and to help you promote healthy conflict you can use to increase your organizational impact. This online course includes a Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online PDF document. It supplements the online course by engaging students with the exercises that are both personal and relevant, and can be utilized immediately to guide the student in the quest to improve their ability to deal with conflict.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» know how to manage conflict in a healthy way
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their ability to use conflict to their advantage, such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. explain why conflict is so important in leadership
2. identify characteristics of healthy and unhealthy conflict
3. explain the actions for proactively promoting healthy conflict with your team members
4. know what to do when conflict surfaces

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
1. Healthy and Unhealthy Conflict
   Healthy conflict, discipline and accountability, conflict styles, collaborative style and reaction to conflict

2. Proactively Promoting Healthy Conflict
   Establish expectations, show your teammates that you believe in them, create a learning culture and remain open to other perspectives, act quickly and model healthy behavior and energize and connect people through a compelling vision

3. Resolving Conflict
   Identifying personal “hot buttons”, interpersonal differences, respect and calmer thinking

4. Crucial Conversations
   The three stages of a crucial conversation, “work on me first”, confront with safety and move to action

5. The Essential Ingredient to Good Conflict Management
   Role vs. identity, past reactions to conflict or corrective feedback, skills to managing your reactions, keep confidants and seek sanctuary
Building Synergistic Teams

OVERVIEW
In order to navigate the growing complexity of work that requires cross-discipline collaboration between highly diverse individuals, we must understand how to build strong teams. Healthy teams are essential to success. As a person of influence, you play an important role in enabling teams to reach their full potential. This course will help you understand how to encourage synergies among team members that will supercharge your individual and collective efforts. This online course includes a Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online pdf document. It supplements the online course by engaging students with exercises that are both personal and relevant and can be utilized immediately to guide the student in the quest to improve their ability to build truly functional teams.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» know how to intentionally build a team
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their team building skills such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES
Upon completing this course, the student will be able to:
1. put intentional team building into practice
2. give practical actions to take within each step to build a cohesive and productive team
3. identify team dysfunction and list ways to correct it
4. understand the power of diversity and collaboration

(Continued)
1. **The Power of Synergistic Teams**
   Defining synergy, champion teams and motivation to build synergistic teams

2. **Intentional Team Building, Part 1**
   Team life cycle, stages of team building, stages of team formation, mission to motivation, common values to championing, commitment to contract and intentional team building

3. **Intentional Team Building, Part 2**
   Awareness to appreciation, appreciation of team members, time together to trust, communication to conflict management, curtailing gossip and processes for intentional team building

4. **Team Dysfunction**
   The five dysfunctions of a team, solutions to team dysfunction and recognizing and addressing team dysfunctions

5. **Diverse Teams**
   Statistics about diverse teams, recognizing strengths of diverse team members and difficulty with others in diverse teams

6. **Collaboration**
   Benefits and barriers of collaboration, being part of the solution and putting ideas into action

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Managing and Promoting Change

OVERVIEW
Change is a springboard for creativity because it requires us to come up with new and exciting solutions. Practically speaking, change can be hard to deal with. As a leader, it is essential that you understand how to manage change as well as effectively lead others through the change process. The purpose of this course is to give you the practical know-how to manage change effectively as well as promote change for greater creativity and productivity. This online course includes a Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online PDF document. It supplements the online course by engaging students with exercises that are both personal and relevant, and can be utilized immediately to guide the student in the quest to improve their ability to change.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» be better able to not just manage but actually promote change
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their ability to embrace change, such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. explain why change is important to all leaders
2. appreciate the change process and its powerful effects
3. work out the aspects of promoting personal change
4. describe ways you can advance change by helping others manage change well

(Continued)
1. The Issue of Managing Change
   Resistance to change, four primary issues, control, communication, announcement of change, personality, and your reaction to change, identifying change personalities, customizing your actions, leadership and struggles with changes

2. The Issue of Managing Change
   The change hinge, healthy change management, the phases of change, identifying benefits, understanding change, process of change hinge, phase one—loss, phase two—uncertainty, the critical hinge choice, phase three—anticipation and phase four—integration

3. Promoting Personal Change
   List of challenges in change, identifying wanted personal changes, write goals using the smart method, integrate your goals, make your goals positive, identifying effective goal statements, make your goal visual, make your goals challenging, share, repeat and make goals flexible

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Organizational Development, Change and Innovation

OVERVIEW
This course takes a look at change and innovation from an organizational perspective. What can organizations—and the people within them—do to help build a culture that embraces change, promotes innovation and encourages every individual to own their part in developing their organization to rise above the rest? In this course you are given practical tools and best practices you can use to manage change and encourage innovation. This online course includes a Learner Workbook, which contains thought provoking exercises that are an integral part of successfully completing the course. The workbook is available as an online PDF document. It supplements the online course by engaging students with exercises that are both personal and relevant, and can be utilized immediately to guide the student in their quest to thrive in an organization.

To nurture communication of ideas and opinions across teams, an optional group discussion guide is provided.

Delivery Options:
Learning is a combination of online and workbook activities.

Completion Time:
The estimated completion time for this course is 4 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» utilize practical tools and best practices to manage change and encourage innovation
» receive credit toward the NCTI Emerging Leader certification
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Anyone who wishes to improve their ability to reap the benefits of change and innovation in an organizational setting, such as supervisors, managers and employees desiring professional growth and development

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. understand the perception shifts related to change, organizational structure, leadership and communication
2. describe the steps needed in organizational change
3. understand innovation best practices

(Continued)
COURSE OUTLINE

1. What is Organizational Development
   Changing business landscape, objectives of organizational development, small, big and incremental changes and big ideas

2. Perception Shifts
   Old vs. new perceptions and assessing my organization

3. Guidelines for Organizational Change
   Guiding principles of organizational change, know your direction and leverage your people as internal change agents

4. Innovation
   Things that hinder innovation, how to innovate, ask questions, brainstorm to seek the unique, tips for increasing observation skills, capture every idea, test and experiment, fear of failure and solutions to innovation killers
Effective Supervision

OVERVIEW
Imperative for anyone with supervisory responsibilities, this course teaches how to organize and lead others competently and confidently within the broadband industry. By covering human resource challenges such as hiring needs and practices, appraisal, motivation, conflict resolution and stress management, students will learn the critical people skills necessary to function effectively in a supervisory role. Additionally, the course outlines how to develop leadership skills such as effective communication, problem solving, team building and decision making. Case studies apply these lessons to realistic situations within the broadband industry.

Delivery Options:
Learning is a combination of online and textbook activities.

Completion Time:
Varies based on a student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS
Upon completion students will:
» effectively organize, motivate and lead a department
» efficiently communicate and delegate to establish and achieve business goals
» understand human resource methods and resolve personnel issues
» earn three hours of college credit
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
» aspiring, new and experienced supervisors
» frontline supervisors as well as mid-level or senior managers

COURSE OBJECTIVES
Upon completing this course students will be able to:
1. identify the functions of the management process
2. identify significant changes in the composition of the workforce and how they affect the job of the supervisor
3. describe the four ingredients of an MBO program
4. explain how a supervisor can reduce business costs
5. compare and contrast group vs. individual decision-making
6. explain why an organization is centralized or decentralized
7. identify key laws and regulations affecting human resources practices
8. identify the three most popular sets of criteria supervisors appraise for employee performance
9. identify and define five personality characteristics relevant to understanding employee performance at work
10. describe the difference between a leader and a supervisor
11. list the barriers to effective communication
12. list the five basic techniques for resolving conflict
13. list the steps a supervisor can use to change negative employee attitudes
14. describe OSHA and its impact on supervisors
15. explain job safety problems

Related Courses
Students completing this course should then enroll in:
» Introduction to Business
» Introduction to Marketing
» Principles of Management

Training Features
» Knowledge-based, broadband and job-specific content
» Highly illustrated and easy to read course materials
» Career path advisement
» Online lesson feedback and progress monitoring at www.ncti.com
» Online testing
» Instructor led training available upon request

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
COURSE OUTLINE

1. Supervision Fundamentals
   Organizations and their levels, the management process, changing expectations of supervisors, the transition from employee to supervisor, from concepts to skills and supervisor competencies

2. Supervision Challenges
   Global competitiveness, technology enhancements, working in a diverse organization, changing how business operates, thriving on chaos and the good and profitable organization

3. Planning and Goal Setting
   What is formal planning, productivity, planning and level in the organization, key planning guides and management by objectives

4. Organizing
   What is organizing, basic organizing concepts, organizing your employees and empowering others through delegation

5. Staffing and Recruiting
   Supervisors and the human resources department, understanding Equal Employment Opportunity (EEO), determining staffing needs, from job descriptions to job specifications, recruiting candidates, employee selection and orientation and training and development

6. Controlling
   The control process, types of controls and the focus of control

7. Problem Analysis and Decision Making
   The decision-making process, styles, decision tools, ethics in decision making and group decision making

8. Motivating Followers
   What is motivation, understanding individual differences, the early theories of motivation, contemporary theories of motivation, do employees really get what they expect, motivational challenges for today’s supervisors and designing motivating jobs

9. Leading Followers
   Understanding leadership, are you born to lead, how do you become a leader, leadership behaviors and styles, effective leadership, contemporary leadership roles and leadership issues today

10. Communicating Effectively
    What is communication, methods of communication, barriers to effective communication, active listening and the importance of feedback skills

11. Developing Groups
    What is a group, why do people join groups, understanding informal work groups, the increasing use of teams and team challenges for supervisors

12. Performance Appraisal
    The purpose of employee performance appraisals, when should appraisals occur, your role in performance appraisals, legal issues in performance appraisals, appraising appropriate criteria, how do you gather performance data, performance appraisal methods, potential problems in performance appraisals and responding to performance problems

13. Workplace Health and Safety
    The occupational safety and health act, job safety programs, workplace violence, maintaining a healthy work environment, stress and helping the whole employee

14. Conflict, Politics, Discipline and Negotiation
    What is conflict, understanding organizational politics and negotiation

15. Change Management
    Forces for change, two views on the change process and work-related stress

16. Supervision and Labor
    What is labor relations and a quick review of labor relations

Postscript: Personal Development
The traditional career path, personal career development and some final words of wisdom

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Introduction to Business

OVERVIEW
Introduction to Business focuses on the critical business knowledge needed to succeed in the broadband industry. Combining broadband industry-specific case studies with textbook business theory, this course explores management, marketing, operations, accounting systems and finance. The student will also learn about ethics in the workplace, human resources, labor relations, managerial styles and strategies for improving job satisfaction and work performance. Students completing this course will be uniquely positioned to understand and manage the critical components of a broadband business.

Delivery Options:
☑ The course is delivered online. An e-book is also provided.

Completion Time:
The estimated completion time for this course is 32 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
» understand the fundamental principles that drive, affect and shape broadband businesses
» earn three hours of college credit
» receive an industry-recognized NCTI certificate of graduation

Ideal for:
Technical and nontechnical leadership personnel who require industry and business knowledge for everyday decision making, including:
» financial decision makers
» current managers
» aspiring managers

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. explain the U.S. business system and how business is conducted
2. discuss the global context of business
3. discuss conducting business responsibly and ethically
4. explain how to manage and organize a business
5. explain entrepreneurship and the small business
6. explain managing human resources and labor relations
7. discuss motivating, satisfying and leading employees
8. explain marketing processes and consumer behavior
9. discuss pricing, promoting, developing and distributing products/services
10. discuss quality improvement and production management
11. discuss accounting and information systems
12. discuss money and banking
13. discuss securities and investments
14. be better prepared to organize, motivate and lead a business group

(Continued)
## COURSE OUTLINE

1. **The U.S. Business Environment**  
The concept of business and profit, the external environment of business, economic systems, the economics of market systems and economic indicators

2. **Understanding Business Ethics and Social Responsibility**  
Ethics in the workplace, social responsibility, areas of social responsibility, implementing social responsibility programs and the government and social responsibility

3. **Entrepreneurship, New Ventures and Business Ownership**  
What is a small business, entrepreneurship, starting and operating a new business, trends, successes and failures in new ventures, non-corporate business ownership and corporations

4. **Understanding the Global Context of Business**  
The contemporary global economy, international business management, the cultural environment and barriers to international trade

5. **Managing the Business**  
The management process, types of managers, management roles and skills, strategic management: setting goals, formulating strategy, contingency planning and crisis management, management and the corporate culture

6. **Organizing the Business**  
What is organizational structure, the building blocks of organizational structure, establishing the decision-making hierarchy, basic forms of organizational structure and the informal organization

7. **Operations Management and Quality**  
What operations means today, creating value through operations, business strategy as the driver of operations, operations planning, scheduling and control, quality improvement and Total Quality Management and adding value through supply chains

8. **Employee Behavior and Motivation**  
Forms of employee behavior, individual differences among employees, matching people and jobs, basic motivation concepts and theories, strategies and techniques for enhancing motivation

9. **Leadership and Decision Making**  
The nature of leadership, early approaches and the situational approach to leadership, leadership through the eyes of followers, special issues in leadership, the changing nature and emerging issues in leadership, management and decision making

10. **Human resource Management (HrM) and Labor Relations**  
The foundations of HRM, staffing the organization, developing the workforce, compensation and benefits, the legal context of HRM, new challenges in the changing workplace, dealing with organized labor and collective bargaining

11. **Marketing Processes and Consumer Behavior**  
What is marketing, target marketing and market segmentation, understanding consumer behavior, organizational marketing and buying behavior, what is a product, developing new products, identifying products, the international marketing mix, small business and marketing mix

12. **Developing and Pricing Products**  
Developing new products, product life cycle

13. **Distributing and Promoting Products**  
Wholesaling, retailing, physical distribution, promotions and personal selling

14. **Information Technology (IT) for Business**  
A driver of change for business, IT building blocks, harnessing the competitive power of IT, IT risks and threats and IT protection measures

15. **The Role of Accountants and Accounting Information**  
What is accounting, the accounting equation, financial statements, reporting standards and practices, analyzing financial statements, accounting ethics and internationalizing accounting

16. **Understanding Money and the Role of Banking**  
The U.S. financial system, how financial institutions create money and are regulated, the federal reserve system and international banking and finance

17. **Managing Business Finances**  
Maximizing capital growth, investing to fulfill financial objectives, the business of trading securities, the risk-return relationship, financing the business firm, becoming a public corporation and regulating securities markets

---

*For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com*
Introduction to Marketing

OVERVIEW

Introduction to Marketing explores the cornerstone concepts that influence customers’ buying habits. The course describes how broadband companies aim to understand consumers, develop marketing strategies, conduct research and analyze information to target and sell to key market segments. The curriculum combines textbook principles, workbook exercises, industry-specific case studies and real-life situations to show how to translate marketing theory to everyday business. Some of the topics covered include: creating marketing for new products, implementing pricing strategies, handling distribution channels, forming integrated marketing communications with advertising, sales promotion, public relations, personal selling and direct marketing.

Delivery Options:
- Learning is a combination of online and textbook activities.

Completion Time:
- Varies based on the student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:
- bring a customer-centric approach to business
- understand the marketing components of today’s technology-driven businesses
- apply marketing strategies and tactics to win, influence and retain customers
- understand how to develop and implement successful marketing plans for new and existing products
- earn three hours of college credit
- receive an industry-recognized NCTI® certificate of graduation

Ideal for:

Employees directly interacting with the customer or personnel needing a better understanding of what factors influence customer satisfaction, including:
- customer service personnel
- sales staff
- supervisory staff
- programming managers
- management
- technical staff

COURSE OBJECTIVES

Upon completing this course, students will be able to:
1. define marketing and discuss its core concepts
2. explain functional planning strategies and assess marketing’s role in strategic planning
3. discuss how companies conduct e-commerce to profitably deliver more value to customers
4. explain how changes in demographic and economic environments affect marketing decisions
5. explain how companies analyze and distribute marketing information (Continued)
COURSE OBJECTIVES (Continued)

6. understand the consumer market, including the major factors that influence consumer buying behavior
7. explain how companies identify market segments and choose a market-coverage strategy
8. describe the roles of product and service branding, packaging, labeling and product support services
9. explain how companies find and develop new product ideas
10. identify and explain the external and internal factors affecting a firm’s pricing decision
11. explain how companies select, motivate and evaluate channel members
12. explain the marketing decisions facing retailers and wholesalers
13. describe and discuss the major decisions involved in developing an advertising program
14. identify the major forms of direct marketing
15. explain how companies adapt their marketing for international markets
16. describe the principles of socially responsible marketing

COURSE OUTLINE

1. Marketing: Managing Profitable Customer Relationships
   What is marketing, understanding the marketplace and customer needs, designing a customer-driven marketing strategy, preparing a marketing plan and program, capturing value from customers and the new marketing landscape

2. Company and Marketing Strategy: Partnering to Build Customer Relationships
   Companywide strategic planning: defining marketing’s role, planning marketing, partnering to build customer relationships, marketing strategy and the marketing mix and managing the marketing effort

3. The Marketing Environment
   The company’s microenvironment, the company’s macroenvironment and responding to the marketing environment

4. Managing Marketing Information
   Assessing marketing information needs, developing marketing information, marketing research, analyzing marketing information, distributing and using marketing information other marketing information considerations

5. Consumer and Business Buyer Behavior
   Consumer markets and consumer buyer behavior, business markets and business buyer behavior

   Market segmentations, target marketing and positioning for competitive advantage

7. Product, Services, and Branding Strategy
   What is a product, product and service decisions, branding strategy, building strong brands, services marketing and additional product considerations

8. New-Product Development and Product Life-Cycle Strategies
   New-product development strategy and product life-cycle strategies

9. Pricing: Understanding and Capturing Customer Value
   What is price, new-product pricing strategies, price-adjustment strategies, price changes and public policy and pricing

10. Marketing Channels and Supply Chain Management
    The nature and importance of marketing channels, channel behavior and organization, channel design decisions, channel management decisions, public policy and distribution decisions and marketing logistics and supply chain management

11. Retailing and Wholesaling
    Retailing and wholesaling

12. Communicating Customer Value: Advertising, Sales Promotion and Public Relations
    The promotion mix, integrated marketing communication, shaping the overall promotions mix, advertising, sales promotion and public relations

13. Communicating Customer Value: Personal Selling and Direct Marketing
    Personal selling, managing the sales force, the personal selling process and direct marketing

14. Marketing In the Digital Age
    The digital age, marketing strategy in the digital age, e-marketing domains, marketing on the web and the promise and challenges of e-commerce

15. The Global Marketplace
    Global marketing in the twenty-first century, looking at the global marketing environment, deciding whether to go international, deciding which markets to enter, deciding how to enter the market, deciding on the global marketing program and deciding on the global marketing organization

16. Marketing Ethics and Social Responsibility
    Social criticisms of marketing, citizen and public actions to regulate marketing and business actions toward socially responsible marketing

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Principles of Management

OVERVIEW
This course focuses on today’s global, technology-driven business environment, covering topics such as strategic planning and change management. It provides a detailed exploration of what is needed to develop a successful business in a multicultural environment: leadership, setting objectives, decision making, staffing, communication, motivation and organizing. Also, students will draw on management theory in order to apply the organizational concepts that are needed to function effectively as a manager today. The curriculum combines textbook principles with online activities. Industry-specific case studies apply textbook theory to real-life situations.

Delivery Options:
- The course is delivered online. An e-book is also provided.

Completion Time:
The estimated completion time for this course is 44 hours. The maximum allotted time is four months from enrollment.

BENEFITS
Upon completion students will:
- earn three hours of college credit
- receive an industry-recognized NCTI certificate of graduation

Ideal for:
Technical and nontechnical leadership personnel throughout the organization, including:
- current managers
- aspiring managers

COURSE OBJECTIVES
Upon completing this course, students will be able to:
1. develop a successful leadership style
2. make better decisions affecting the organization
3. properly motivate employees to work toward organizational goals
4. recognize and address challenges related to multicultural business environments
5. establish effective leadership and business goals
6. plan and manage change
7. successfully build and lead teams
8. improve decision making about staffing

COURSE OUTLINE
1. Introducing Modern Management: Concepts and Skills
   A manager’s task, management process and organizational resources, the key to management success and management careers

(Continued)
2. Management and Entrepreneurship: Handling Start-Ups and New Ventures
Fundamentals of entrepreneurship, types of opportunities, opportunity identification, opportunity evaluation, opportunity exploitation, financing exploitation, corporate entrepreneurship and social entrepreneurship

3. Society, Ethics and Sustainability
Fundamentals of social responsibility, social responsiveness, the social audit challenge, the philanthropy challenge, the sustainable organization challenge and managers and ethics

4. Management and Diversity
Defining diversity, advantages of diversity in organizations, management challenges with diverse populations, strategies for promoting diversity in organizations and how managers promote diversity

5. Managing in the Global Arena
Fundamentals of international management, categorizing organizations by international involvement, multinational corporations, the workforce of multinational corporations, management functions and the multinational corporations, transnational organizations and international management special issues

6. Creativity and Innovation
Creativity in individuals, increasing creativity in organizations, innovation and creativity, the innovation process, catalyst for creativity and innovation: total quality management, the quality improvement process

7. Plans and Planning Tools
General characteristics of planning, types of plans, planning process steps, planning’s foundation, management by objectives (MBO) and planning tools

8. Making Decisions
Fundamentals of decisions, rational decision making, decision-making and intuition, decision-making tools and group decisions

9. Strategic Planning: Strategies, Tactics and Competitive Dynamics
Strategic planning and strategy, strategic management process, environmental analysis, establishing organizational direction, strategy formulation tools, strategy implementation, strategic control, tactical planning and competitive dynamics

10. Fundamentals of Organizing
Organizing and organizing skill, Weber’s bureaucratic model, division of labor, structure and types of departmentalization

11. Responsibility, Authority and Delegation
Responsibility and job descriptions, dividing job activities, clarifying job activities, authority, delegation and centralization and decentralization

Appropriate human resources, recruitment, selection, training and performance appraisal

13. Changing Organizations: Stress, Conflict and Virtuality
Fundamentals of changing an organization, factors to consider, change and stress and conflict and virtuality

14. Influencing and Communication
Influencing, emotional intelligence, communication, interpersonal communication and encouraging organizational communication

15. Leadership
Approaches to leadership, how leaders make decisions, leaders changing organizations, leaders coaching others and emerging concepts for modern times

16. Motivation
Process theories, content theories: human needs, importance of motivation and motivation strategies

17. Groups and Teams
Kinds of Groups, managing work groups, team development stages and collaboration and effective teams

18. Building Organization Culture
Fundamentals, functions and types of organizational culture, building a high-performance organization culture and keeping organization culture alive and well

19. Controlling, Information and Technology
Fundamentals, the controlling process, power and control, essentials of information and the information system

20. Production and Control
Production and productivity, Quality and productivity, operations management and control and control tools

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Business Law and the Legal Environment

OVERVIEW

Covering eight distinct areas of business-based legal practices, Business Law is a must for executives and management-level employees. The course teaches a practical approach to law that covers topics such as legal procedures and regulations, business transactions, employment and employee relations, contracts, property, business organization and sales. Business Law utilizes a textbook to detail the coverage of law pertaining to general business, and it provides extensive lists of up-to-date Internet resources. Accompanying exercises apply the concepts learned to a cable and broadband setting.

Delivery Options:
Learning is a combination of online and textbook activities.

Completion Time:
Varies based on a student’s self-study pace, however, the maximum time allowed is four months from enrollment.

BENEFITS

Upon completion students will:
"» understand critical elements of e-commerce contracts
"» recognize the importance of ethics and social responsibility
"» have a thorough understanding of the role of law in business
"» recognize how laws apply to a broadband and cable business environment
"» understand key aspects of how laws affect employees and employers
"» know the components of contractual obligations, how contracts are written and how they are applied in business
"» understand the makeup and roles of sole proprietorships, partnerships and corporations
"» earn three hours of college credit
"» receive an industry recognized NCTI® certificate of graduation

Ideal for:
Executive, management and supervisory personnel, including:
"» business operations executives
"» general managers
"» human resource professionals
"» technical operations personnel
"» call center management

Visit www.ncti.com and click FAQ for important information on computer hardware/software requirements and NCTI course policies.
COURSE OBJECTIVES

Upon completing this course students will be able to:
1. explain the meaning of law and give examples of the law in terms of rules and social conduct
2. describe the effect of law on business and identify portions of the law which are considered to comprise Business Law
3. explain the criteria necessary for a valid electronic contract
4. distinguish between the federal and the state courts systems and identify the types of courts which make up each system
5. distinguish between torts and crimes and identify the necessary components of criminal liability
6. describe the nature of torts in a business context and define what is meant by negligence in tort liability
7. describe the behaviors necessary to meet current ethical standards
8. explain the laws governing equal opportunity to employees
9. define the meaning of the term contract and identify the elements of a contract
10. define the term mutual assent and identify and describe methods by which an offer can be terminated
11. define consideration and identify and discuss circumstances under which a court will enforce an agreement despite absence of consideration
12. define capacity and relate the concept of contractual capacity to the right of insane persons, intoxicated persons, aliens and convicts
13. define legality as it relates to contract law and identify special circumstances under which an illegal agreement will be upheld
14. define reality of consent, duress, undue influence and distinguish between fraud and misrepresentation
15. describe the basic elements of a written contract
16. distinguish between a condition and a promise and explain the intent of parole evidence
17. explain the circumstances under which the court will or will not enforce the rights of third persons and examine the criteria a court uses in determining the rights
18. explain intellectual property and Internet law

COURSE OUTLINE

1. Legal Heritage and Critical Legal Thinking
2. Constitutional Law for Business and Online Commerce
3. Traditional, Alternative and E-Commerce Dispute Resolution
4. Torts and Privacy
5. Business and Cyber Crimes
6. Ethics and Social Responsibility of Business
7. Contracts: Classification, Agreement and Consideration
8. Contract: Capacity, Legality, Assent and Writing
9. Contracts: Third-Party Rights, Performance, Breach and Remedies
10. Sales and Lease Contracts: Formation, Title and Risk
11. Sales and Lease Contracts: Performance and Breach
12. Warranties, Product Liability and Consumer Protection
13. E-Commerce Contracts
14. Sole Proprietorships, Partnerships and Limited Liability Companies
15. Corporations
16. Agency and Employment
17. Equal Opportunity in Employment
18. Intellectual Property and Internet Law
19. Real Property and Environmental Protection
20. Personal Property, Bailments and Insurance

For more information, call 866.575.7206, email sales@ncti.com or visit www.ncti.com
Introduction to PC Applications

Introduction to PC Applications teaches the basics of computer use while also providing a thorough understanding of application suite software. The course covers Microsoft Office, the most common suite of software applications found in the business environment. By completing a series of tutorial exercises, the student will learn how to use Word, Excel, Access and PowerPoint. The course also demonstrates how specific functions can be shared by these applications.

Delivery Options:
- Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a ten week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit ncti.com/course/introduction-pc-applications for a complete course description and to view a list of start dates.

Stress Management

Work related stress has an enormous impact on job performance and health. Stress Management, a Web Classroom course, is an invaluable resource that teaches working professionals how to better manage and minimize the impact of stress. The course helps people understand how to identify and minimize the negative physiological, emotional and behavioral impact of stress. It also shows how to recognize stress related symptoms and the skills and techniques needed to apply to handle stress. In particular, it provides specific information on how to best manage anger in the workplace. It also demonstrates the relationship between stress and issues such as time management, attitude, assertiveness, exercise and nutrition. Those completing this course will be better able to identify and cope with rising levels of stress and, in turn, maximize their effectiveness on the job.

Delivery Options:
- Web Classroom: Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a ten week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/stress-management for a complete course description and access the ACC Schedule of Classes.
Technical Writing

Students in the Technical Writing course will develop skills that can be applied to a variety of technical documents. The course focuses on the principles for organizing, writing and revising clear, readable documents for industry, business and government.

**Delivery Options:**
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit [http://ncti.com/course/technical-writing](http://ncti.com/course/technical-writing) for a complete course description and access the ACC Schedule of Classes.

Technical Mathematics

Technical Mathematics covers material designed for career technical or general studies for students who need to study particular mathematical topics. Topics will include measurement, algebra, geometry, trigonometry, graphs and finance. These are presented on an introductory level and the emphasis is on applications.

**Delivery Options:**
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit [http://ncti.com/course/technical-mathematics](http://ncti.com/course/technical-mathematics) for a complete course description and access the ACC Schedule of Classes.
Cultural Diversity in Business

Cultural Diversity in Business is the business person’s guide to cultural, travel and information resource needs in the international arena. The course also covers specifics in negotiation, communication (verbal and nonverbal), networking and understanding what individual countries’ needs are as to business culture.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/cultural-diversity-business for a complete course description and access the ACC Schedule of Classes.

Business Writing

Business Writing focuses on specific business writing processes needed to produce business memos, email, good and bad news messages, reports, graphics in writing, electronic presentations and proofreading.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a ten week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/business-writing for a complete course description and access the ACC Schedule of Classes.
Time Management

Time Management provides students with the conceptual knowledge and tools to make better use of their time in the management function.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/time-management for a complete course description and access the ACC Schedule of Classes.

Leadership

Focuses on the leadership skills necessary to bring about change in an organization. Students learn to develop and communicate a shared vision, empower employees, manage conflict as well as negotiate and develop organizations so that all are working toward common goals.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions or transfers.

Visit http://ncti.com/course/leadership for a complete course description and access the ACC Schedule of Classes.
Intercultural Communications

Intercultural Communications explores the link between culture and communication and will enhance communication skills and the abilities appropriate to a multicultural society. Emphasis will be on understanding diversity within and across cultures. Relevant concepts include perception, worldview, context, ethics, language and nonverbal communication.

**Delivery Options:**
- Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit [http://ncti.com/course/intercultural-communications](http://ncti.com/course/intercultural-communications) for a complete course description and access the ACC Schedule of Classes.

Interpersonal Communication

Interpersonal Communication examines the communication involved in interpersonal relationships occurring in family, social and career situations. Relevant concepts include self-concept, perception, listening, nonverbal communication and conflict.

**Delivery Options:**
- Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit [http://ncti.com/course/interpersonal-communication](http://ncti.com/course/interpersonal-communication) for a complete course description and access the ACC Schedule of Classes.
Business Communication and Report Writing

Business Communication and Report Writing emphasizes effective business writing and covers letters, memoranda, reports, application letters and resumes. Includes the fundamentals of business communication and an introduction to international communication.

**Delivery Options:**
- Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.


Consumer Behavior

Consumer Behavior enables the student to understand the variables that affect consumer behavior in the marketplace and the implications of this knowledge for marketing decisions and strategies.

**Delivery Options:**
- Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

**Completion Time:**
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit [http://ncti.com/course/consumer-behavior](http://ncti.com/course/consumer-behavior) for a complete course description and access the ACC Schedule of Classes.
Negotiation and Conflict Resolution

Negotiation and Conflict Resolution presents proper techniques in negotiation and conflict resolution. Key practices that determine successful negotiation are explored. This course covers principles of conflict resolution including business policies, accepted business practices contracts, labor union contracts, pay raises and starting salaries.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a ten week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/negotiation-conflict-resolution for a complete course description and access the ACC Schedule of Classes.

Principles of Sales

Principles of Sales enables the student to understand and develop ethical sales techniques and covers the role of selling in the marketing process. Areas of emphasis include behavioral considerations in the buying and selling process and sales techniques.

Delivery Options:
Learning takes place with an instructor in an online classroom and will include homework activities and weekly assignments.

Completion Time:
This is a 10 week accelerated course which will require weekly assignments and periodic online communication with an instructor. This course is not eligible for extensions.

Visit http://ncti.com/course/principles-sales for a complete course description and access the ACC Schedule of Classes.