



**Telecommunications Installation and Maintenance  
 Credential: Diploma in Telecommunications  
 Installation and Maintenance  
 D50380**

The Telecommunications Installation and Maintenance curriculum prepares individuals for jobs in the telecommunications industry. It provides fundamental training for new students and provides upgrade training for current employees of telecommunications companies. Course work includes basic electricity, cable splicing, fiber optics, LAN-copper, cable fault location and repair, central office administration and other related topics. Emphasis is placed on hands-on installation and maintenance training. A graduate should be prepared to work in the telecommunications industry in outside plant operations, on central office equipment, and on business communication equipment.

Program Length: 3 semesters

Career Pathway Options: Diploma in Telecommunications Installation and Maintenance

Program Sites:

N. C. School of Telecommunications - Day

**Course Requirements for Telecommunications Installation and Maintenance Diploma**

A. General Education Courses (6 SHC)		C-L-SHC
ENG 102	Applied Communication II	3-0-3
	Social/Behavioral Science Elective	3-0-3

B. Required Major Core Courses (17 SHC)		
TCT 103	Installer Level I Cabling	1-2-2
TEL 100	Telecommunications Basic Electricity	3-0-3
TEL 105	Fiber Optics: Splicing	1-2-2
TEL 106	Fiber Optics: Connectors	1-2-2
TEL 108	Comdial Key Systems	0-2-1
TEL 201	Station Installation and Repair	1-2-2
TEL 202	Cable Splicing	1-2-2
TEL 203	Cable Fault Location	0-2-1
TEL 205	Digital Central Office Administration	1-2-2

C. Other Major Hours Required for Graduation (18 SHC)		
	Business Elective	3
CIS 111	Basic PC Literacy	1-2-2
MAT 101	Applied Mathematics I	2-2-3
TEL 209	ADSL Installation	0-2-1
	Major Electives	9

Business Electives (Choose one course)		
BUS 110	Introduction to Business	3-0-3
BUS 125	Personal Finance	3-0-3
BUS 137	Principles of Management	3-0-3
BUS 151	People Skills	3-0-3
BUS 152	Human Relations	3-0-3
BUS 230	Small Business Management	3-0-3
BUS 255	Organizational Behavior in Business	3-0-3
BUS 270	Professional Development	3-0-3
BUS 280	REAL Small Business	4-0-4

Major Elective Course Listing - Select a minimum of 9 SHC from one of the following groups:

(Telecommunications Group)		
ELC 144	OTDR Operation	1-0-1
NET 113	Home Automation Systems	2-2-3
TEL 101	Conductor Connections	0-2-1
TEL 102	Pole Climbing	0-2-1
TEL 104	CATV Installation and Repair: Distribution	0-2-1
TEL 109	T-1 Span Line Maintenance	0-2-1
TEL 204	Transmission Fundamentals	2-0-2
TCT 104	Installer Level 2 Copper	1-2-2
TCT 105	Installer Level 2 Fiber	1-2-2
TCT 106	Technician Level Cabling	1-2-2
OR		

(Small Home/Small Office Networking Group)		
NET 113	Home Automation Systems	2-2-3
NET 125	Networking Basics	1-4-3
NET 126	Routing Basics	1-4-3
NET 175	Wireless Technologies	2-2-3
OR		

(Networking Infrastructure Group)		
NET 116	Fundamentals of Voice/Data Cable	2-2-3
NET 125	Networking Basics	1-4-3
NET 126	Routing Basics	1-4-3
NET 225	Routing and Switching	1-4-3
NET 230	Wide Area Networking	2-2-3

Total Semester Hours Credit required for Graduation: 41

**Semester Curriculum for Telecommunications Installation and Maintenance Diploma**

1st Semester (Fall)		C-L-SHC
TCT 103	Installer Level I Cabling	1-2-2
TEL 100	Telecommunication Basic Electricity	3-0-3
TEL 105	Fiber Optics: Splicing	1-2-2
TEL 106	Fiber Optics: Connectors	1-2-2
TEL 108	Comdial Key Systems	0-2-1
TEL 201	Station Installation and Repair	1-2-2
TEL 202	Cable Splicing	1-2-2
TEL 203	Cable Fault Location	0-2-1
TEL 205	Digital Central Office Administration	1-2-2
TEL 209	ADSL Installation	<u>0-2-1</u>
		9-18-18

2nd Semester (Spring)		
BUS	Business Elective	3
CIS 111	Basic PC Literacy	1-2-2
ENG 102	Applied Communication II	3-0-3
	Social/Behavioral Science Elective	3-0-3
MAT 101	Applied Math I	2-2-3
	Major Elective	<u>3-0-3</u>
		12-4-17
3rd Semester (Summer)		
	Major Elective	6

Total Semester Hours Credit: 41

## COURSE DESCRIPTIONS

### **BUS 110 Introduction to Business** 3-0-3

This course provides a survey of the business world. Topics include the basic principles and practices of contemporary business. Upon completion, students should be able to demonstrate an understanding of business concepts as a foundation for studying other business subjects. *This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a premajor and/or elective course requirement. This course is also available through +the Virtual Learning Community (VLC).*

### **BUS 125 Personal Finance** 3-0-3

This course provides a study of individual and family financial decisions. Emphasis is placed on building useful skills in buying, managing finances, increasing resources, and coping with current economic conditions. Upon completion, students should be able to develop a personal financial plan.

### **BUS 137 Principles of Management** 3-0-3

This course is designed to be an overview of the major functions of management. Emphasis is placed on planning, organizing, controlling, directing, and communicating. Upon completion, students should be able to work as contributing members of a team utilizing these functions of management. *This course is also available through the Virtual Learning Community (VLC). This course has been approved to satisfy the Comprehensive Articulation Agreement for transferability as a premajor and/or elective course requirement. (TAC – 05/24/06)*

### **BUS 151 People Skills** 3-0-3

This course introduces the basic concepts of identity and communication in the business setting. Topics include self-concept, values, communication styles, feelings and emotions, roles versus relationships, and basic assertiveness, listening, and conflict resolution. Upon completion, students should be able to distinguish between unhealthy, self-destructive, communication patterns and healthy, non-destructive, positive communication patterns.

### **BUS 152 Human Relations** 3-0-3

This course introduces the concepts of effective human interaction in the business work environment. Topics include effective communication techniques, motivation, ego states, stress, and

conflict. Upon completion, students should be able to explain the importance of human relations, apply motivational techniques, and implement strategies for resolving work-related conflicts.

### **BUS 230 Small Business Management** 3-0-3

This course introduces the challenges of entrepreneurship including the startup and operation of a small business. Topics include market research techniques, feasibility studies, site analysis, financing alternatives, and managerial decision making. Upon completion, students should be able to develop a small business plan. *This course is also available through the Virtual Learning Community (VLC).*

### **BUS 255 Org Behavior in Business** 3-0-3

This course covers the impact of different management practices and leadership styles on worker satisfaction and morale, organizational effectiveness, productivity, and profitability. Topics include a discussion of formal and informal organizations, group dynamics, motivation, and managing conflict and change. Upon completion, students should be able to analyze different types of interpersonal situations and determine an appropriate course of action.

### **BUS 270 Professional Development** 3-0-3

This course provides basic knowledge of self-improvement techniques as related to success in the professional world. Topics include positive human relations, job-seeking skills, and projecting positive self-image. Upon completion, students should be able to demonstrate competent personal and professional skills necessary to get and keep a job.

### **BUS 280 REAL Small Business** 4-0-4

This course introduces hands-on techniques and procedures for planning and opening a small business, including the personal qualities needed for entrepreneurship. Emphasis is placed on market research, finance, time management, and day-to-day activities of owning/operating a small business. Upon completion, students should be able to write and implement a viable business plan and seek funding.

### **CIS 111 Basic PC Literacy** 1-2-2

This course provides an overview of computer concepts. Emphasis is placed on the use of personal computers and software applications for personal and fundamental workplace use. Upon completion, students should be able to demonstrate basic personal computer skills.

### **ELC 144 OTDR Operation** 1-0-1

This course covers the use of the Optical Time Domain Reflectometer (OTDR), principles of operations, typical displays and signature interpretations. Topics include cable acceptance testing, splice loss testing, reflection, troubleshooting line breaks, and usage of the OTDR for fiber optics maintenance and restoration. Upon completion, students should be able to test for attenuation bandwidth and cable length, identify backscatter, connector loss, cable breaks, and perform acceptance testing.

**ENG 102 Applied Communications II** 3-0-3

*Prerequisites: RED 080 and ENG 090 or appropriate placement test scores*

This course is designed to enhance writing and speaking skills for the workplace. Emphasis is placed on generating short writings such as job application documents, memoranda, and reports and developing interpersonal communication skills with employees and the public. Upon completion, students should be able to prepare effective, short, and job-related written and oral communications. The computer is used as a writing and design tool for this course. *This is a diploma-level course.*

**MAT 101 Applied Mathematics I** 2-2-3

*Prerequisites: MAT 060, MAT 070, or MAT 080 or appropriate placement test scores*

This course is a comprehensive review of arithmetic with basic algebra designed to meet the needs of certificate and diploma programs. Topics include arithmetic and geometric skills used in measurement, ratio and proportion, exponents and roots, applications of percent, linear equations, formulas, and statistics. Upon completion, students should be able to solve practical problems in their specific areas of study. This course is intended for certificate and diploma programs.

**NET 113 Home Automation Systems** 2-2-3

This course covers the design, installation, testing, troubleshooting, and customer service of a fully automated home. Emphasis is placed on a structured wiring system that integrates the home phone, TV, home theater, audio, video, computer network, lighting, security systems, and automation systems into a pre-wired, remote controlled system. Upon completion, students should be able to design, install, and maintain home automation systems.

**NET 116 Fund of Voice/Data Cable** 2-2-3

This introductory course to Voice and Data Cabling focuses on cabling issues related to data and voice connections. Topics include skills in design documentation, determining cabling equipment, pulling, mounting and managing cable, selecting wiring closets, terminating cable, installing jacks, and testing cable. Upon completion, students should be able to understand of the industry, media and cabling, physical and logical networks, and signal transmission.

**NET 125 Networking Basics** 1-4-3

This course introduces the networking field. Emphasis is placed on network terminology and protocols, local-area networks, wide-area networks, OSI model, cabling, router programming, Ethernet, IP addressing, and network standards. Upon completion, students should be able to perform tasks related to networking mathematics, terminology, and models, media, Ethernet, subnetting, and TCP/IP Protocols.

**NET 126 Routing Basic** 1-4-3

This course focuses on initial router configuration, router software management, routing protocol configuration, TCP/IP, and access control lists (ACLs). Emphasis will be placed on the fundamentals of router configuration, managing router software, routing protocol, and

access lists. Upon completion, students should have an understanding of routers and their role in WANs, router configuration, routing protocols, TCP/IP, troubleshooting, and ACLs.

**NET 175 Wireless Technology** 2-2-3

*Prerequisites: NET 110 or NET 125*

This course introduces the student to wireless technology and interoperability with different communication protocols. Topics include Wireless Application Protocol (WAP), Wireless Mark-up language (WML), link manager, service discovery protocol, transport layer and frequency band. Upon completion, students should be able to discuss in written and oral form protocols and procedures required for different wireless applications.

**NET 225 Routing & Switching I** 1-4-3

*Prerequisites: NET 126*

This course focuses on advanced IP addressing techniques, intermediate routing protocols, command-line interface configuration of switches, Ethernet switching, VLANs, STP, and VTP. Emphasis will be placed on application and demonstration of skills acquired in pre-requisite courses. Upon completion, students should be able to perform tasks related to VLSM, routing protocols, switching concepts and configuration, STP, VLANs, and VTP.

**NET 230 Wide Area Networking** 2-2-3

*Prerequisites: NET 110 or NET 125*

This course is designed to introduce significant aspects of network interconnectivity. Topics include LAN-to-LAN, LAN-to-host, LAN-to-WAN connectivity, Internet connections, and voice-video-data transmission. Upon completion, students should be able to demonstrate an understanding of wide area networking.

**TCT 103 Installer Level 1 Cabling** 1-2-2

This course covers structured premises cabling for the beginning level installer. Emphasis is placed on Installer Level 1 knowledge of standards and codes for the telecommunications industry and properly structured premises cabling techniques. Upon completion, students should be prepared to take the Building Industry Consulting Service International (BICSI) Installer Level 1 certification examination and install premises cabling systems. *This is a diploma-level course.*

\*TCT 103 replaces TEL 206 – CRC 03/26/09

**TCT 104 Installer Level 2 Copper** 1-2-2

This course introduces the foundation for copper-based structured cabling system installation for intermediate installers. Emphasis is placed on copper transmission principles, installation, termination, testing, retrofitting, pathways and spaces, grounding, bonding and protection, fire stopping, and life safety. Upon completion, students should be prepared to take the Building Industry Consulting Service International (BICSI) ITS Installer 2, Copper examination. *This is a diploma-level course.*

**TCT 105 Installer Level 2 Fiber** 1-2-2

This course introduces the foundation for fiber-based structured cabling system installation for intermediate installers. Emphasis is

placed on fiber transmission principles, installation, termination, testing, retrofitting, pathways and spaces, grounding, bonding and protection, fire stopping, life safety, and field coordination. Upon completion, students should be prepared to take the Building Industry Consulting Service International (BICSI) ITS Installer 2, Optical Fiber examination. *This is a diploma-level course.*

**TCT 106 Technician Level Cabling**

This course covers structured premises cabling at the technician level. Emphasis is placed on technician level knowledge of standards and codes for the telecommunications industry and properly structured premises cabling techniques. Upon completion, students should be prepared to take the Building Industry Consulting Service International (BICSI) technician level certification examination and install premises cabling systems. *This is a diploma-level course.*

**\*TCT 106 replaces TEL 208 – CRC 03/26/09**

**TEL 100 Telecom Basic Electricity 3-0-3**

This course covers DC and AC theory with specific emphasis on the specialized needs of telecommunications personnel. Emphasis is placed on electron theory, conductors, insulators, Ohm's Law, capacitance, and inductance as it relates to small gauge, twisted-pair copper wire. Upon completion, students should be able to understand trouble symptoms and correct faults on the telephone physical plant network. *This is a diploma or certificate-level course.*

**TEL 102 Pole Climbing 0-2-1**

This course covers basic skills in pole climbing and working aloft. Emphasis is placed on safety, climbing techniques, maintenance of climbing gear, working aloft, and potential hazards. Upon completion, students should be able to safely climb and work aloft. *This is a diploma-level course.*

**TEL 104 CATV I & R: Distribution 0-2-1**

This course provides training in the fundamentals of the CATV distribution system, including home and business installations. Emphasis is placed on plant construction, subscriber terminal installation, cabling, wiring, separation and clearance, proper grounding procedures, and safety. Upon completion, students should be able to install, test, and correct faults on the CATV distribution system, including home and business installations. *This is a diploma-level course.*

**TEL 105 Fiber Optics: Splicing 1-2-2**

This course covers splicing and maintaining aerial or buried, single mode, loose-tube buffered fiber optic cable. Emphasis is placed on hands-on cleaving, fusion splicing, and maintaining aerial or buried, single mode, loose-tube buffered fiber optic cable. Upon completion, students should be able to locate faults and splice, test, and return fibers to service. *This is a diploma or certificate-level course.*

**TEL 106 Fiber Optics: Connectors 1-2-2**

This course covers installing, splicing, and maintaining fiber optic cables, connectors, and patch panels in local area networks. Emphasis is placed on installing ST type connectors and level meter and OTDR testing of fiber optic local area networks. Upon

completion, students should be able to install and maintain fiber optic local area networks. *This is a diploma or certificate-level course.*

**TEL 108 Comdial Key Systems 0-2-1**

This course covers programming and maintaining Comdial 616X and 816X Key Systems. Emphasis is placed on programming new systems and moves and changes in working systems. Upon completion, students should be able to install new systems, complete the initial programming, and perform routine moves and changes. *This is a diploma or certificate-level course.*

**TEL 109 T-1 Span Line Maintenance 0-2-1**

This course provides training in design, construction, turn-up testing, troubleshooting, and maintenance of T-1 span lines. Emphasis is placed on method of transmission, troubleshooting, testing, and repair of T-1 span lines. Upon completion, students should be able to install, test, and repair T-1 span lines. *This is a diploma-level course.*

**TEL 201 Station I and R 1-2-2**

This course covers the fundamentals of trouble-free telephone installation from aerial and buried cable in homes and businesses. Emphasis is placed on drop-wire attachments, station protection, and wire runs, as well as methods for testing and checking stations for customer satisfaction. Upon completion, students should be able to correctly install, test, and repair telephone stations and wiring up to entry into the cable plant. *This is a diploma or certificate-level course.*

**TEL 202 Cable Splicing 1-2-2**

This course covers the cable color-code, splicing methods, and closures used throughout the telephone industry. Emphasis is placed on cable color-code, engineering drawings, proper splicing methods, and cable closures. Upon completion, students should be able to perform the basic functions of a cable splicer and meet telephone industry standards. *This is a diploma or certificate-level course.*

**TEL 203 Cable Fault Location 0-2-1**

This course covers identifying fault types and using test equipment to locate the faults in aerial and underground cable. Emphasis is placed on identifying fault types and correct uses of various types of test equipment to precisely locate the fault. Upon completion, students should be able to identify fault type, properly use test equipment, and locate the fault within inches. *This is a diploma or certificate-level course.*

**TEL 205 Digital CO Administration 1-2-2**

This course covers data modifications in DMS-10 digital central office switches from remote or on-site locations. Emphasis is placed on normal day-to-day data modification procedures to support customer-originated service orders, including any required hardware changes. Upon completion, students should be able to successfully perform any software or hardware modifications involved in normal daily operations of the DMS-10 digital switch. *This is a diploma or certificate-level course.*

**TEL 209      ADSL Installation**

0-2-1

This course provides the hands-on skills necessary for installing and troubleshooting digital subscriber lines (DSL). Topics include DSL technology, services and operation, network wiring, cable pair specifications, computer configuration for DSL operation, and G.977 technology. Upon completion, students should be able to install, test, and repair DSL services.