Course Outline/Description—
Telecommunications Technician

DIPLOMA PROGRAM
24 weeks – 38 semester credit hours (DAY)
52 weeks – 38 semester credit hours (EVENING)
Total 720 hours

OBJECTIVE
Through a combination of theory and hands-on training, Telecommunications Technician* students learn how communications networks are designed, constructed and made operational. Hands-on instruction is provided on network construction techniques, the handling and splicing of telephone, cable television, satellite and fiber optic cables. Students learn how to use the tools and test equipment associated with the telecommunications industry to measure the communications signal and proper system maintenance procedures. Graduates are capable of performing residential and commercial communications cabling installations, as well as installing and programming associated equipment.

EMPLOYMENT OPPORTUNITIES
Graduates are employable in entry-level positions such as Cable Installer, Telecommunications Technician, Electronics Technician, Home and Entertainment Technician, Telephone Systems Technician, Wiring Technician, Satellite Television Installer, Low Voltage Electrical Installer, Fiber Optic Cabling Technician, Copper Cabling Technician, and Communication Technician.

	COURSE TITLE	CREDIT HOURS
TC101	Customer Service	2.0
TC102	Basic Mathematics	2.0
TC103	Nature of Electricity	2.0
TC104	OHM's Law	2.0
TC105	Safety	2.0
TC106	Circuit Fundamentals	2.5
TC107	Voltage	1.5
TC108	Cable Wall Finishing	3.0
TC109	Residential Electricity	3.0
TC110	Introduction to Telecommunications	3.0
TC111	Introduction to Network Cabling Copper-Based Systems	3.0
TC112	Introduction to Network Cabling Fiber Optic Based Systems	3.0
TC113	Integrated Systems and Voice Messaging	2.5
TC114	Introduction to Home Entertainment	3.0
616	Professional Development	3.5

** Students in this program are eligible to receive industry recognized certification from C-Tech Associates upon successful completion of certification exams.*

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TC101 CUSTOMER SERVICE
Customer Service for the workforce focuses on positive communication skills, the best techniques for working with difficult customers, proper attitudes, and understanding the needs of the customers. Students learn through role play and problem solving while being critiqued by the instructor and guest employers.

TC102 BASIC MATHEMATICS
Students learn arithmetic, basic mathematics, and word problem applications. Problem exercises and examples in this module are presented in on-the-job scenarios. Components include addition and subtraction; multiplication and division; fractions, percents, proportions, and angles; formulas, geometric figures, and Introduction to Algebra.

TC103 NATURE OF ELECTRICITY
Students are taught about atomic theory, electricity, and the properties of various materials associated with electricity. They are taught about identifying the relationship between elements and compounds, learning about atomic weight and atomic number, a review of the law of charges, how electric current, voltage, and resistance work, as well as distinguishing between conductors, insulators, and semi-conductors.

TC104 OHM's LAW
The students learn to derive, explain, manipulate and calculate resistance, voltage and current of a given circuit using Ohm's Law. They learn to identify the three components used in Ohm's; derive equations from Ohm's Law to define current, voltage, and resistance; explain the relationship between resistance, current flow, and voltage drop in an electric circuit; calculate the current in a circuit given resistance and applied voltage; and manipulate equations and solve problems using Ohm's Law.

TC105 SAFETY
Students learn the hazards of working with electrical, electronics, and cabling systems and state the use and method of operation for common types of fire extinguishers. They also learn to select safety rules which apply to the proper use of hand tools, safety rules which should be observed when using power tools, and rules for the safe use of electrical cords. Students will be introduced to the various terms and definitions, facts about electrical shock, and treating a victim of electrical shock. Students will identify the different classifications of fires and demonstrate the use of the fire extinguisher and different methods of putting out fires. Students will understand safety color coding, general lab safety rules, hand tool safety, power tool safety, and electrical cord safety. In addition, students will learn the OSHA safety regulations for electricity including improper use of electrical extensions and flexible cords; misused equipment including overloading the wattages of fuses and circuit breakers, using tools or wires with worn insulation or worn wires, attaching ungrounded, two-prong adapter plugs to three prong tools and cords. Students will prevent falls by looking for unprotected sides, wall openings, and floor holes as well as misuse of ladders; how to properly set up a work zone; and blocking lanes of traffic. Students also learn the safety rules for working in mobile homes where there is no electrical ground and the safety precautions in this situation.

TC106 CIRCUIT FUNDAMENTALS
Students learn about the relationship of charges according to Coulomb's law and true statements concerning the relationship of voltage, current, and resistance according to Ohm's law. The student will identify basic elements in a circuit schematic and construct a basic circuit from a schematic. They are taught the terms associated with circuit fundamentals with their correct definitions; complete a chart of circuit characteristics, match basic schematic symbols with the circuit elements they identify as well as identify basic elements in a circuit schematic; and understand about open and closed circuits. They will also be required to construct a basic circuit from a schematic using a breadboard and appropriate wires and components.

TC107 VOLTAGE
Students are taught to measure and compare the voltage of different batteries and measure the voltage drops in a DC circuit. They study the three common sources of voltage and learn the principal parts of a voltmeter. Kirchhoff's law of voltage is studied as it relates to electronics. They will learn to match the terms associated with voltage and measurement with their definitions; name three common sources of voltage; select principal parts of a typical voltmeter; match symbols and abbreviations related to voltage and measurement with their definitions; arrange in order the procedures for measuring current with a DC voltmeter; state Kirchhoff's law of voltage; discuss current flow in a resistive circuit; state the formulas for voltage drops in resistive circuits; read voltmeter indications; demonstrate the ability to measure and compare current at two points of a circuit as well as measure and compare current in a circuit at two different voltage levels.

TC108 CABLE WALL FISHING
Students learn to work with stud finders to identify what is inside the residential walls including electrical lines and studs. Students will drill a hole in drywall and a notch in the wood top plate that runs along the upper edge of the stud wall. They prepare holes for fishing cable from a ceiling electrical box to a new switch box or electrical socket. They also fish cable through drywall from a switch or socket in the wall to an electrical box using one long fish tape and fish cable through drywall from a switch or socket to a wall to an electrical box using two fish tapes. They also learn how to minimize the damage when drilling or opening a hole in the wall. Students work on the proper ways to use power drills and fish tape and fish hooks. Students learn to fish an electrical line, phone line, and cable line and install them into a wall.

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TC109 RESIDENTIAL ELECTRICITY
Students learn to how to mount a power supply unit in residential buildings and how to wire it to a terminal or other electrical device. Students learn the proper way to install electrical outlets, put in a switch, and identify safety hazards. Proper safety procedures are followed in accordance with the National Electrical Code (N.E.C.) guidelines including the correct size and use of conductors and circuit breakers. Students also learn about station protection and NID (Network Interface Device) boxes to protect against lightning and electrical surges.

TC110 INTRODUCTION TO TELECOMMUNICATIONS
Students learn the first layer of the Open Standards Interconnection (OSI) model for communication networks—the physical layer. Students learn the basics and the history of Data, Voice, and Video systems. They build their own working telegraph keys, construct the cables to connect them, and send messages to each other. Students apply their knowledge by using a Telecommunications Board (ITB). This teaching aid contains simulated 4-pair data systems, coaxial cable systems, and a fiber optic system all in one compact unit. They learn how to make and test 4 wire and coax patch cables. They use electronic testing equipment to test a 4-pair UTP system, test a coaxial system, perform a "tone and trace" on a copper cabling system, and perform an optical continuity test on a Fiber Optic cabling system. Problem-solving and analysis are emphasized, and the ability to relate abstract representations to the concrete realities they depict.

TC111 INTRODUCTION TO NETWORK CABLING COPPER-BASED SYSTEMS
Students are introduced to network cabling with copper-based systems. They learn proper tool use and construction techniques, various industry standards, and troubleshooting and repair. Students construct, test, and troubleshoot copper-based cabling systems used in networking, cable television, and satellite communications systems for both commercial and residential settings. Troubleshooting includes testing copper-based systems and networks which are wired and wireless. Information is studied regarding the National Electric Code safety, VoIP, and smart homes.

TC112 INTRODUCTION TO NETWORK CABLNG FIBER OPTIC BASED SYSTEMS
Students learn a theoretical and hands-on knowledge of Fiber Optics. Students learn the basics of cable termination, testing and troubleshooting using sophisticated electronic equipment. They terminate fiber optic cables with ST and SC connectors, two of the industry standards, and perform a mechanical splice. They get into the theory of fiber optics and calculate a system loss budget.

TC113 INTEGRATED SYSTEMS: VOICE AND MESSAGING
Students learn the skills to work on Key PBX Telephone Systems and Voice Mail. Key Systems are the telephone switches found in businesses and homes. Students are taught to install, program, maintain, and upgrade these systems by completing project-based activities.

TC114 INTRODUCTION TO HOME ENTERTAINMENT
Students learn the basics of home entertainment including the basics of sound, speakers and how sound travels in different environments, and how ears detect sound. They will test and troubleshoot speakers and connections on an Interactive Audio Trainer that depicts a multi-room whole home audio system. They will calculate real life examples such as the time, material, cost and customer fee for wiring a new home under construction for a whole home audio system. They also work with a 5.1 home theater system, including installation, testing, and troubleshooting. They hook up the system in the classroom to the IAT and confirm it is working properly.

616 PROFESSIONAL DEVELOPMENT
Students learn the skills employers require for positive work relationships and long-term employment. They include targeted workplace competencies: problem solving and other cognitive skills, oral communication skills, personal qualities, work ethic, and customer service, interpersonal and teamwork skills. Students also learn about the importance of professionalism on the jobsite and employer expectations. Employment Specialists teach students effective Internet, interviewing, and job search skills.