

Campus:

Rice Lake



WISCONSIN
INDIANHEAD
TECHNICAL
COLLEGE

Program Overview

The Telecommunication Technologies program prepares students for occupations in four distinct areas of the telecommunications industry—telephony, cable television, computer information systems, and wireless communications. Students will become knowledgeable in all four merging technologies. They will be trained on the installation and maintenance of business and residential electronic equipment; on coaxial, twisted pair, and fiber optic cable systems; and on wireless technologies. Students will develop hands-on skills, computer skills, and also interpersonal relations skills. Specific areas of interest can be selected according to the student's career choice.

Special Features

This program is unique in the state.

WITC is an ETA-I (Electronics Technicians Association, International) approved training provider for the following certifications:

- Fiber Optics Installer
- Certified Computer Service Technician
- Certified Satellite Installer



Admission Requirements

Students in this program must:

- Complete application form and submit with fee (fee waiver may apply if previously submitted)
- Complete Accuplacer entrance assessment to determine placement (waiver may apply with acceptable alternative test scores and/or postsecondary degree completion)
- Pass a color blind test
- Complete admissions interview with a WITC counselor (above requirements should be completed prior to interview)

Student Profile

Telecommunication Technologies students should be able to:

- Apply scientific principles and technical knowledge
- Handle and manipulate tools and equipment skillfully
- Perform mathematical computations accurately
- Assume responsibility for their work
- Enjoy working independently
- Have good hand/eye coordination
- Have color vision
- Enjoy scientific and technical work using precision
- Enjoy mechanical work
- Be adaptable when handling a variety of duties with interruptions
- Enjoy working outdoors
- Manipulate small parts and tools

Preparation for Admission

Students should strive to reach a comfort level in the following courses or skills:

- Energy
- Electronics
- Algebra
- Physics
- Principles of Technology
- English
- Speech
- Creative Writing
- Accounting
- Business Law
- Economics

Program Outcomes

Employers will expect the Telecommunication Technologies graduate to be able to:

- Follow Safety Procedures and policies
- Diagnose problem areas using electrical principles and solid-state/digital electronics
- Perform installations, repairs, and troubleshooting of special systems
- Test broadband network levels for customer standards
- Calculate voltage, current, and power for systems outputs
- Perform layout and construction of aerial and buried fiber optic and paired cable systems
- Interpret system maps
- Perform routine installation and service activities

Collegewide outcomes and indicators will also be addressed to develop personal awareness, career effectiveness, and professionalism. See page 5 for a list of collegewide outcomes and indicators.

Career Outlook

Graduates of this program will be ready to start their career as a:

- Cellsite Technician
- Telecommunications Technician
- Telecommunications Consultant
- Telephone Installer/Repairer
- Repairer of Systems/Equipment
- Cable Splicer (Fiber Optics)

- Central Office Repairer or Installer
- Private Branch Installer/Repairer
- Residential/Business Installer
- Aerial and Buried Cable Construction
- Construction Inspector
- Network Technician
- RF Engineer
- Microwave Technician

Curriculum

Number	Course Title	Credits
Occupational Specific Courses		
32150301	IP Networking ▲	3
32451341	Telephone Networking	3
32451342	Intro to HFC/Cable TV	3
32451343	Fiber Optics Operations ▲	3
32451344	Internship ▲	1
32451345	Multi-Line Phone Systems ▲	2
32451346	Telecommunication Safety	1
32451347	Construction Practices ▲	2
32451348	Signal Testing ▲	2
32451349	HFC Cable TV Operation ▲	3
32451350	Telecommunication Industry Concerns	2
32451351	Telecommunication Transmission ▲	3
32451352	Introduction to Cellular Technology ▲	2
32451353	Infrastructure Cabling ▲	3
32451354	Digital Telephone Applications ▲	3
32451355	Security Systems Applications ▲	3
32451356	PBX Installations ▲	2
32451357	Advanced Cellular Technology ▲	2
32451358	Fiber Design and Implementation	2
32451359	Geographic Information Systems	2
32605300	Communications Electricity 1	2
32605301	Communications Electricity 2 ▲	2
32605302	Communications Electronics 1 ▲	2
32605303	Communications Electronics 2 ▲	2
		55
Occupational Supportive/General Studies Courses¹		
32801361	Applied Communications 1	2
32801363	Applied Communications 2 ▲	2
32804355	Math 355	3
32804364	Math 364	2
32809371	Applied Human Relations	2
		11
	PROGRAM REQUIREMENTS	66

▲ Requires a prerequisite and/or corequisite that must be completed with a grade point of 2.0 or better.
¹ See page 40 for General Studies course descriptions.

Course Descriptions

(See page 40 for General Studies course descriptions)

32150301

IP Networking - Credits: 3

Students will learn to identify and describe the various components of a computer network, identify and compare the different networking topologies, and select appropriate cabling and connections options. Identification of hardware and software components that make up a local area network and configuration of the TCP/IP protocol, including planning and implementation, will be covered. Students will gain an understanding of the concept of resource sharing and network troubleshooting tools and procedures and apply them to their work. PREREQUISITES: 32605301 Communications Electricity 2 and 32605303 Communications Electronics 2.

32451341

Telephone Networking - Credits: 3

This course will introduce the student to the basics of the telephone network portion of the telecommunications industry. It will focus on four (4) primary areas: cable and wire - the design of the cables physically and electrically and how to splice them; print reading - construction drawing, system maps, and circuit diagrams; station installation - installation of customer wiring and equipment and teaching the customer how to properly use the equipment; basic troubleshooting - finding and repairing trouble in materials and equipment.

32451342

Intro to HFC/Cable TV - Credits: 3

This course introduces the student to the basics of the HFC (Hybrid Fiber Coaxial) portion of the telecommunications industry. It will focus on four (4) primary areas: cable and wire - the design of the cables physically and electrically and how to splice them; print reading - construction drawings and system maps/circuit diagrams; station installation - installation of customer materials and equipment and teaching the customers how to properly use the equipment; basic trouble shooting - finding and repairing trouble in materials and equipment.

32451343

Fiber Optics Operations - Credits: 3

This course will introduce the students to industry specifications and practices for understanding fiber optic communication systems. Topics covered include fiber optic design, installation, test and maintenance for multimode and singlemode networks. This class will benefit those with little or no fiber experience. COREQUISITE: 32605300 Communications Electricity 1.

32451344

Internship - Credits: 1

Internship is designed to provide students with on-the-job experience in actual work situations. These experiences strengthen student competencies through participation in a wide variety of occupational experiences, ranging from routine assignments to specialized work-related duties. PREREQUISITES: 32451341 Telephone Networking, 32451342 Intro to HFC/Cable TV, 32451343 Fiber Optics Operations, 32451346 Telecommunication Safety, 32605300 Communications Electricity 1, and 32605301 Communications Electricity 2.

32451345

Multi-Line Phone Systems - Credits: 2

This course focuses on the generic installation and maintenance concerns of multi-line telephone systems. System prints, charts, and manuals are used to familiarize students with the step-by-step procedures of installing and troubleshooting multi-line telephone systems. PREREQUISITES: 32451341 Telephone Networking and 32605301 Communications Electricity 2.

32451346

Telecommunication Safety - Credits: 1

This course is intended for students in the telecommunications industry. It will be used to familiarize the student with rule setting organizations such as OSHA, DILHR, and NEC. It will focus on the safe use of equipment such as hand tools, power tools, ladders, and bucket trucks. The course will certify the student in first aid in the Medic First Aid program.

32451347

Construction Practices - Credits: 2

This course introduces the student to the safe use and care of construction equipment such as climbing equipment (belt/climbers), lashing equipment, and vibratory/backhoe. It will familiarize the student with both aerial and buried construction specifications and practices used in the telecommunications industry in the placement of coaxial, twisted pair, and optic cables. PREREQUISITES: 32451341 Telephone Networking, 32451342 Intro to HFC/Cable TV, and 32451343 Fiber Optics Operations.

32451348

Signal Testing - Credits: 2

The student is introduced to the processing requirements for various signals used in the HFC system. Bench sweeping, head end equipment alignment, and testing as well as spectrum analyzers and waveform analysis are covered. Telephone central office signaling to the subscriber and signaling from the subscriber to the central office are analyzed. How voice and data signals are transmitted to the subscriber and back to the central office are studied. Troubleshooting and fault locating techniques are used to repair and maintain subscriber loop equipment. PREREQUISITES: 32451341 Telephone Networking and 32451342 Intro to HFC/Cable TV.

32451349

HFC Cable TV Operation - Credits: 3

Introduces the student to hybrid fiber optic/coaxial cable systems. Basic alignment, testing, and troubleshooting techniques are taught. System performance standards and measurement parameters are also covered. COREQUISITE: 32451348 Signal Testing.

32451350

Telecommunication Industry Concerns - Credits: 2

This course will introduce the students to the telecommunications industry. It will help them understand the three distinct areas and how they operate independently, as well as together, to provide services to the customer. It will help them understand the need for good customer relations regarding problem solving for the customer and for the industry. It will discuss methods of introducing and teaching customers about new equipment and technologies and how to use them.

32451351

Telecommunication Transmission - Credits: 3

This course contains the study of subscriber carrier and "T" carrier systems. Emphasis will be placed on the alignment, testing, and troubleshooting of end-to-end transmission systems. Also introduced in this course are basic AC and DC signaling arrangements. PREREQUISITE: 32605301 Communications Electricity 2.

32451352

Introduction to Cellular Technology - Credits: 2

This course is an introduction to the world of wireless communications. It will provide an understanding of how we use radio frequencies to transmit signals, data, and voice over the airwaves. Information will be provided to correctly set up and troubleshoot a variety of equipment used in radio communications. COREQUISITE: 32451351 Telecommunication Transmission.

32451353

Infrastructure Cabling - Credits: 3

The student will design and install network cabling. The focus will be to understand voice and data networking. The basic cable installer will be able to build and administrate the physical layer of network infrastructure and gain a deeper understanding of the networking devices that this layer interconnects. PREREQUISITE: 32605301 Communications Electricity 2 and COREQUISITE: 32605303 Communications Electronics 2.

32451354

Digital Telephone Applications - Credits: 3

Advanced technology affecting change and future change in the telecommunications industry will be studied. This course will introduce students to all DSL services on a hybrid fiber system and will demonstrate how DSL services provide the last-mile technology for the public network provider. PREREQUISITE: 32605301 Communications Electricity 2 and COREQUISITE: 32605303 Communications Electronics 2.

32451355

Security Systems Applications - Credits: 3

This course is designed to train those with no previous knowledge in the industry for entry-level employment in the field of security system installation. The course provides comprehensive teacher-led instruction in basic security installer topics and skill sets as well as hands-on experience. Students will be prepared for employment in the security industry as a technician or field installer. PREREQUISITES: 32605301 Communications Electricity 2 and 32605303 Communications Electronics 2.

32451356

PBX Installations - Credits: 2

This course focuses on installation and administration of PBX systems. Students will gain basic understanding of the functions and operation of PBX systems. Manuals are used to administrate specific commands of the PBX. The student will be able to perform installation and removal of extensions and program special features systemwide. PREREQUISITES: 32451345 Multi-Line Phone Systems, 32605301 Communications Electricity 2, and 32605303 Communications Electronics 2.

32451357

Advanced Cellular Technology - Credits: 2

This course will cover the theory of wireless communications. An emphasis will be placed on the design, construction, and troubleshooting of a cellular phone system. Topics will include what equipment goes into a typical base station and the technological process that is followed each time a call is made. PREREQUISITE: 32451352 Introduction to Cellular Technology.

32451358

Fiber Design and Implementation - Credits: 2

Fiber Optic Network Design and Implementation is gaining momentum as a viable solution for bringing fiber relatively inexpensively to our businesses and homes. Many products and solutions are being developed based on PON (passive optical networks) technology. The material in this product is based on the ITU-T G.983 specifications. This class will benefit those with little or no fiber experience.

32451359

Geographic Information Systems - Credits: 2

Geographical Informational Systems (GIS) provides telecommunication businesses with many solutions such as analyzing relationships among signal coverage, test results, trouble tickets, customer inquiries, revenues, and gap analysis. Telecommunications companies use GIS for geocoding antennas, analyzing service areas, geocoding clients, and correlating equipment requirements to service area demand. Students will learn the fundamental concepts and basic functions of a GIS, the properties of GIS maps, and the structure of a GIS database. In course exercises, you will develop basic software skills by working with tools to visualize geographic data, create maps, query a GIS database, and analyze data using common analysis tools.

32605300

Communications Electricity 1 - Credits: 2

This course is an introduction to the basic concepts, principles, and theories of DC electricity, including the analysis of circuits to learn the relationship of current, voltage, and resistance. Knowledge and use of test equipment will focus on multimeters and digital voltmeters. Critical-thinking skills are emphasized to develop competencies in problem solving and troubleshooting using a digital electronics trainer and computer assisted instruction (CAI).

32605301

Communications Electricity 2 - Credits: 2

This course is an introduction to the basic concepts, principles, and theories of AC electricity, including the analysis of circuits to learn the relationship of current, voltage, and resistance. Test equipment usage, including multimeters, digital voltmeters, signal generators, and oscilloscopes are important elements of this course. Critical-thinking skills are emphasized to develop competencies in problem solving and troubleshooting using a digital electronics trainer and computer assisted instruction (CAI). COREQUISITE: 32605300 Communications Electricity 1.

32605302

Communications Electronics 1 - Credits: 2

This course covers the theory of semiconductor devices, including diodes, bipolar transistors, and field effect transistors. Solid-state circuits, including power supplies and multistage amplifiers are also covered. Individuals will develop troubleshooting methods and skills and have laboratory experiences to observe how various electronic circuits function. Critical-thinking skills are emphasized within this course to develop competencies in problem solving and troubleshooting using a digital electronics trainer and computer assisted instruction (CAI). PREREQUISITE: 32605301 Communications Electricity 2.

32605303

Communications Electronics 2 - Credits: 2

This course is an introduction to digital electronics where number systems, logic gates, flip-flops, and counters are covered. Individuals will develop troubleshooting methods and skills and have laboratory experiences to observe how various electronic circuits function. Critical-thinking skills are emphasized within this course to develop competencies in problem solving and troubleshooting using a digital electronics trainer and computer assisted instruction (CAI). COREQUISITE: 32605302 Communications Electronics 1.

Gainful employment information is available at this link: <http://www.witc.edu/pgmpages/telecom/career.htm>. This information is provided as a federal requirement in an effort to help students make informed decisions related to the costs and potential employment in a chosen field.

Graduate Employment Information

(WITC Graduate Survey Responses 2008-2009; for most recent data, go to [witc.edu](http://www.witc.edu))

Number of graduates	7	Number employed	5	% employed in WITC district	67%
Number of responses	7	Percent employed	100%	Range of yearly salary	\$31,198-\$35,097
Number available for employment	5	Employed in related field	3	Average yearly salary	\$32,643

career vision