Course Description
TCN0320 | Advanced Telecommunications Systems | 3.83 credits
This comprehensive course delves into cutting-edge telecommunications technologies and advanced network architectures. Students will explore the intricacies of modern communication systems, including 5G networks, Internet of Things (IoT) infrastructures, and software-defined networking (SDN).

Course Competencies
Competency 1: The student will learn to design and implement advanced fiber optic networks by:
1. Developing comprehensive fiber optic network designs based on specific client requirements and industry best practices
2. Calculating power budgets and link loss to ensure optimal network performance over long distances
3. Implementing wavelength division multiplexing (WDM) systems to increase network capacity and efficiency
4. Integrating fiber optic networks with existing copper-based infrastructures for seamless connectivity

Competency 2: The student will learn to perform advanced fiber optic splicing and termination techniques by:
1. Executing ribbon fiber splicing techniques to efficiently join multiple fibers simultaneously
2. Implementing specialized splicing methods for challenging environments, such as underwater or high-temperature locations
3. Terminating fiber optic cables with advanced connector types, including MPO/MTP for high-density applications
4. Applying advanced polishing techniques to achieve ultra-low-loss connections in critical network segments.

Competency 3: The student will learn to use advanced test equipment, including Optical Time-Domain Reflectometer (OTDR), by:
1. Configuring OTDR parameters to optimize measurements for various fiber types and network configurations
2. Analyzing complex OTDR traces to identify and locate multiple events and faults in fiber optic links
3. Utilizing advanced features of OTDRs, such as multi-wavelength testing and macro bend detection
4. Integrating OTDR results with other test equipment data for comprehensive network performance analysis

Competency 4: The student will learn to Troubleshoot complex fiber optic systems by:
1. Diagnosing intermittent issues in long-haul fiber optic networks using systematic troubleshooting approaches
2. Identifying and resolving crosstalk and interference problems in dense wavelength division multiplexing (DWDM) systems
3. Troubleshooting fiber optic amplifier malfunctions and optimizing their performance in long-distance networks
4. Analyzing and resolving complex polarization mode dispersion (PMD) issues in high-speed fiber optic links

Competency 5: The student will learn to apply fiber optic network standards and codes by:
1. Implementing fiber optic installations in compliance with national and international standards (e.g., TIA, IEC, ITU-T)
2. Adhering to industry-specific codes and regulations when designing and installing fiber optic networks in specialized environments
3. Documenting fiber optic network installations according to standardized formats and labeling conventions
4. Evaluating existing fiber optic networks for compliance with current standards and recommending necessary upgrades

Competency 6: The student will learn to implement fiber optic network security measures by:

Updated: Fall 2026

1. Designing and implementing physical layer security measures to prevent unauthorized access to fiber optic networks
2. Configuring optical encryption systems to secure data transmission over fiber optic links
3. Implementing intrusion detection systems specifically designed for fiber optic networks
4. Developing and enforcing security policies and procedures for fiber optic network maintenance and access control

Learning Outcomes

- Solve problems using critical and creative thinking and scientific reasoning
- Formulate strategies to locate, evaluate, and apply information