



Course Number and Title: ELC 205 Computer Networks and Systems I

Campus Location:

Stanton

Effective Date:

2018-51

Prerequisite:

CEN 150, CEN180, ELC 125

Co-Requisites:

none

Course Credits and Hours:

4.00 credits

3.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course introduces the fundamentals of data communications and computer network principles and applications. Students install, configure, and troubleshoot basic network hardware, peripherals, emphasizing hands-on practical experiences. Topics include network topologies, protocols, cabling systems, wireless transmission, and security.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:

USB flash-drive for lab work and internet access

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Explain the basic concepts of computer networks and networking. (CCC 2, 3; PGC 1, 2)
2. Analyze the features and usage of network modeling systems. (CCC 2, 3; PGC 1, 2)
3. Compare current network technologies in terms of speed, access method, operation, topology, and media. (CCC 2, 3; PGC 1, 2)
4. Evaluate the operation of Ethernet networks. (CCC 2, 3; PGC 1, 2)
5. Design and plan an installation of a physical network. (CCC 2, 3; PGC 1, 2)
6. Explain protocols, services, and standards in computer networks. (CCC 2, 3; PGC 1, 2)
7. Evaluate the operations of wireless network technology. (CCC 2,3; PGC 1,2)
8. Explain the characteristics of a wide area network (WAN) models, protocols, devices, and standards for configuring and troubleshooting. (CCC 2,3; PGC 1,2)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):

Upon completion of this course, the student will:

1. Explain the basic concepts of computer networks and networking.
 1. Describe the use of networking in the commercial, industrial, and residential sectors.
 2. Discuss the differences between peer-to-peer and client/server networks.
 3. Compare local area network (LANs), metropolitan area network (MANs), wide area network (WANs), and small office home office (SOHO) networks.
 4. Compare wired and wireless networking.
 5. Differentiate common features available for network servers and workstations.
2. Analyze the features and usage of network modeling systems.
 1. Examine the function of each layer of the International Standards Organization's (ISO) open standards interconnect (OSI) model.
 2. Identify the services that function at each layer of the OSI model.
 3. Examine the function of each layer of the transmission control protocol/Internet protocol (TCP/IP).
 4. Identify the services that function at each layer of the TCP/IP model.

5. Compare the layers of the TCP/IP and OSI models.
6. Identify the layers that networking components such as repeaters, hubs, bridges, switches, routers, network interface controller (NICs), and wireless access point (WAPs) operate.
3. Compare current network technologies in terms of speed, access method, operation, topology, and media.
 1. Summarize how information is transmitted, stored, categorized, and accessed in common networks.
 2. Identify and evaluate the differences among the following basic topologies: mesh, star, bus, ring, hybrid, and tree.
 3. Describe the different types, speed, and distance limitations of network transmission media.
 4. Describe the differences between broad band and base band data transmission.
 5. Identify bandwidth characteristics of different copper based transmission media.
 6. Identify and evaluate the differences among coaxial, unshielded twisted pair (UTP), shielded twisted pair (STP), and fiber-optic cable.
 7. Explain the difference between vertical and horizontal cabling.
 8. Design a network solution for multiple floors and multiple buildings.
 9. Describe and explain the Institute of Electrical and Electronics Engineers (IEEE) standards used in networking and communications.
 10. Identify the characteristics of a virtual local area network (VLAN).
4. Evaluate the operation of Ethernet networks.
 1. Summarize the evolution of Ethernet network technology.
 2. Compare and contrast the variety of Ethernet network technologies.
 3. Compare access methods such as: carrier sense multiple access with collision detection (CSMA/CD), tokens, and carrier sense multiple access with collision avoidance (CSMA/CA).
 4. Describe methods to extend and enhance Ethernet networks.
5. Design and plan an installation of a physical network.
 1. Develop a network plan based on the needs of an organization.
 2. Construct and verify network cables using proper tools and components.
 3. Diagnose and repair physical network cables.
 4. Describe the process of testing cable runs.
 5. Compare structured cabling and patch cables of LANs to Internet backbone and last mile connections.
 6. Set up and install a network interface card (NIC).
 7. Explain the function of commonly used network devices such as multiplexers, bridges, routers, hubs, switches, and gateways, and determine when to use each device.
 8. Install and configure hubs, switches, and routers.
 9. Diagnose faults in the networks.
6. Explain protocols, services, and standards in computer networks.
 1. Explain the difference between connectionless and connection oriented protocols.
 2. Describe the difference between routable and routing protocols.
 3. Compare the differences between common network layer protocols.
 4. Explain Internet protocol (IP) address, subnet masks, and subnetting.
 5. Compare common network application protocols such as: Hyper Text Transport Protocol (HTTP), Secure Hyper Text Transport Protocol (HTTPS), Post Office Protocol (POP), Internet Mail Application Protocol (IMAP), and File Transport Protocol (FTP).
 6. Identify ports associated with common network services, protocols, and
7. Evaluate the operations of wireless network technology.
 1. Summarize the features and configuration settings available for wireless networking.
 2. Explain wireless networking standards.
 3. Compare and contrast the frequencies used in wireless networking.
 4. Explain the differences in non-traditional networks, such as Bluetooth, *radio frequency identification* (RFID), and Zigbee.
 5. Install and configure a Wi-Fi network.
 6. Install and configure a non-traditional wireless networks such as Bluetooth, RFID, and Zigbee.
 7. Explain traditional techniques for securing wireless networks.
 8. Use troubleshooting techniques to recognize hardware, software, connectivity and/ or configuration issues in a network.
8. Explain the characteristics of a wide area network (WAN) models, protocols, devices, and standards for configuring and troubleshooting.
 1. Explain WAN connections.
 2. Describe telephone technologies such as synchronous optical networking (SONET), T1, T3, E1, and E3.
 3. Explain TCP/IP and the Internet.
 4. Explain remote connectivity.
 5. Explain interconnectivity between different operating systems.
 6. Create and manage Active Directory accounts and permissions.
 7. Create and manage Linux users and permissions.
 8. Summarize the protocols required for file, folder, and share permissions.
 9. Describe the process of file, print, and email services.

Evaluation Criteria/Policies:

Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	-	100	=	A
83	-	91	=	B
75	-	82	=	C
0	-	74	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Perform the duties of an entry-level technician using the skills, modern tools, theory, and techniques of the electronics engineering technology.
2. Design or improve electrical/electronics systems using critical thinking, theoretical knowledge, and practical understanding.
3. Conduct, analyze, and interpret experiments using analysis tools and troubleshooting methods.
4. Demonstrate basic management, organizational, and leadership skills.
5. Explain the importance of engaging in self-directed continuing professional development.

Disabilities Support Statement:

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.