

Computer network technologies

**COMPUTER NETWORK TECHNOLOGY – CNT**

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**Possible career opportunities**

These CNT-courses prepare students for a career path in computer network technologies. These courses teach terminology and provide hands-on laboratory experience with operating systems and network devices. These courses begin to prepare the student for popular vendor certifications such as MCSE, MCSA, MSDBA, CCNA, CCNP, CCDA, CCDP, and copper/fiber cabling to name a few.

The job titles of people employed in computer networking include: systems administrator, network administrator, network engineer, database administrator, LAN specialist and network designer.

**Program-level student learning outcomes**

Program learning outcomes are subject to change. The most current list of program learning outcomes for each program is published on the DVC website at [www.dvc.edu/slo](http://www.dvc.edu/slo).

**Associate in science degree  
 Information and communication technology  
 Students completing the program will be able to...**

- A. terminate, install, and test copper and fiber.
- B. troubleshoot wireless access points and connections.
- C. install, configure, and troubleshoot hardware, operating systems, and software applications.
- D. identify computer components to make informed decisions when purchasing computer hardware and software.
- E. apply the fundamentals of good programming structure and good programming practices.
- F. analyze and communicate problem specifications.
- G. build a simple Ethernet network that includes end-deices and intermediary devices.

This two-year associate in science degree program is intended to prepare the student for jobs in business and government as introductory positions such as network control specialist, computer system specialists, or specialist network control, entry-level help desk analyst, computer technician, to name a few. A graduate of this program will be able to sit for the Cisco Certified Network Associate (CCNA) exam, the CompTia A+ exam, the CompTia Net+ exam and other industry recognized exams depending on course selection. A graduate will have the required skills to install and configure local area networks that carry data, voice, and video communications, install, operate and maintain network services, routers, switches, and other network devices, resolve network communication problems, support and troubleshoot Personal Computers (PCs), work with a team and demonstrate desirable customer service and communication skills. NOTE: exact skills will depend on course selection.

DVC information and communication technology students who intend to transfer must consult with a program advisor or counselor to ensure that the requirements for transfer to four-year institutions of their choice are met. Students who intend to transfer are advised to select either General Education Option 2 (IGETC) or Option 3 (CSU GE). General Education Option 1 (DVC General Education) is appropriate for students who do not intend to transfer.

To earn an associate in science degree with a major in information and communication technology, students must complete each course used to meet a major requirement with a "C" grade or higher and complete general education requirements as listed in the catalog. Degree requirements can be completed by attending classes in the day, the evening, or both. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

*major requirements:*

	<i>units</i>
CNT-103 Voice, Video and Network Cabling.....	2
CNT-104 IT Essentials (A+).....	4
CNT-106 Introduction to Networks.....	3
COMSC-101 Computer Literacy.....	4
COMSC-110 Introduction to Programming.....	4

*plus at least 6 units from:*

BUS-250 Business Communications I.....	3
CNT-114 Microsoft Windows Operating System Essentials/Administration.....	3
CNT-120 Routing and Switching Essentials.....	3
CNT-140 Introduction to Information Systems Security.....	3
CNT-148 Introduction to Cybersecurity: Ethical Hacking.....	3
CNT-149 Digital Forensics Fundamentals.....	3
COMSC-121 Database Administration.....	4

*plus at least 3 units from:*

BUS-240 Business Statistics.....	3
MATH-142 Elementary Statistics with Probability.....	4
MATH-144 Statway II.....	4
MATH-181 Finite Mathematics.....	3
MATH-182 Calculus for Management, Life Science and Social Science I.....	4
MATH-191 Pre-Calculus.....	5
MATH-192 Analytic Geometry and Calculus I.....	5

**total minimum required units 26**

**Certificate of achievement  
 Information and communication technology  
 Students completing the program will be able to...**

- A. terminate, install, and test copper and fiber.
- B. troubleshoot wireless access points and connections.
- C. install, configure, and troubleshoot hardware, operating systems, and software applications.
- D. identify computer components to make informed decisions when purchasing computer hardware and software.
- E. apply the fundamentals of good programming structure and good programming practices.
- F. analyze and communicate problem specifications.
- G. build a simple Ethernet network that includes end-deices and intermediary devices.

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This certificate of achievement program is intended to prepare the student for jobs in business and government as introductory positions such as network control specialist, computer system specialists, or specialist network control, entry-level help desk Analyst, computer technician, to name a few. A graduate of this program will be able to sit for the Cisco Certified Network Associate (CCNA) exam, the CompTia A+ exam, the CompTia Net+ exam and other industry recognized exams depending on course selection. A graduate will have the required skills to install and configure local area networks that carry data, voice, and video communications, install, operate and maintain network services, routers, switches, and other network devices, resolve network communication problems, support and troubleshoot Personal Computers (PCs), work with a team and demonstrate desirable customer service and communication skills. NOTE: exact skills will depend on course selection.

To earn a certificate of achievement in information and communication technology, students must complete each course used to meet a major requirement with a "C" grade or higher. Certificate requirements can be completed by attending classes in the day, evening, online, or a combination of those.

<i>major requirements:</i>		<i>units</i>
CNT-103	Voice, Video and Network Cabling .....	2
CNT-104	IT Essentials (A+).....	4
CNT-106	Introduction to Networks .....	3
COMSC-101	Computer Literacy .....	4
COMSC-110	Introduction to Programming.....	4

<i>plus at least 6 units from:</i>		
BUS-250	Business Communications I.....	3
CNT-114	Microsoft Windows Operating System Essentials/Administration .....	3
CNT-120	Routing and Switching Essentials .....	3
CNT-140	Introduction to Information Systems Security .....	3
CNT-148	Introduction to Cybersecurity: Ethical Hacking .....	3
CNT-149	Digital Forensics Fundamentals .....	3
COMSC-121	Database Administration .....	4

<i>plus at least 3 units from:</i>		
BUS-240	Business Statistics.....	3
MATH-142	Elementary Statistics with Probability.....	4
MATH-144	Statway II.....	4
MATH-182	Calculus for Management, Life Science and Social Science I.....	4
MATH-191	Pre-Calculus.....	5
MATH-192	Analytic Geometry and Calculus I .....	5

**total minimum required units** **26**

**Certificate of achievement  
Network cybersecurity**

Students completing the program will be able to...

- A. identify computer components to make informed decisions when purchasing computer hardware and software.
- B. build a simple Ethernet network that includes end-deices and intermediary devices.
- C. identify and implement safeguards against common attacks.
- D. identify security issues with communications, E-mail, web, remote access, and wireless technology.
- E. differentiate between physical security, disaster recovery, and business continuity.
- F. demonstrate appropriate and ethical behavior and good work habits.
- G. identify current network threats and ramifications.
- H. troubleshoot threats and implement security methods against such threats.

This program prepares students for a variety of entry-level positions in IT network security and cybersecurity. This program builds on the foundation obtained after completing the Network technology fundamentals certificate of achievement. A student completing this program can apply for jobs such as Computer Network Support Specialist, Computer Network Defense Analysis, Computer Network Defense Infrastructure Support, network Services, Penetration Tester, Systems Security Analyst; to name a few. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

<i>required courses:</i>		<i>units</i>
CNT-106	Introduction to Networks .....	3
CNT-120	Routing and Switching Essentials .....	3
CNT-140	Introduction to Information Systems Security .....	3
CNT-146	Cisco Certified Network Associate (CCNA) Security .....	2
CNT-148	Introduction to Cybersecurity: E Ethical Hacking .....	3
CNT-149	Digital Forensics Fundamentals .....	3
<b>total minimum required units</b> .....		<b>18</b>

**Certificate of achievement  
Network technology fundamentals**

Students completing the program will be able to...

- A. terminate, install, and test copper and fiber.
- B. troubleshoot wireless access points and connections.
- C. install, configure, and troubleshoot hardware, operating systems, and software applications.
- D. identify computer components to make informed decisions when purchasing computer hardware and software.
- E. build a simple Ethernet network that includes end-deices and intermediary devices.

## Computer network technologies

This program prepares students for a variety of entry level positions in IT networking and the beginning foundation for a student wanting to pursue a career in cyber defense, network forensics, network security and eventually cyber security. To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher.

required courses:	units
CNT-103 Voice, Video and Network Cabling .....	2
CNT-104 IT Essentials (A+).....	4
CNT-106 Introduction to Networks .....	3
CNT-114 Microsoft Windows Operating System Essentials/Administration .....	3
CNT-120 Routing and Switching Essentials .....	3
COMSC-101 Computer Literacy .....	4
<b>total minimum required units.....</b>	<b>19</b>

### **CNT-103 Voice, Video and Network Cabling**

2 units LR

- 27 hours lecture/27 hours laboratory per term

This course presents the practical aspects of design, installation, testing, and troubleshooting cable carrying voice, data, video, and wireless signals. Successful completion of this course makes a student eligible to sit for the Fiber Optics Association (FOA) certification examination. CSU

### **CNT-104 IT Essentials (A+)**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Recommended: COMSC-101 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course provides an introduction to the computer hardware and software skills needed to help meet the growing demand for entry-level IT professionals. The fundamentals of computer hardware and software as well as advanced concepts such as security, networking, and the responsibilities of an IT professional will be introduced. Preparation for CompTIA's A+ certification exam is provided. CSU

### **CNT-106 Introduction to Networks**

3 units SC

- 36 hours lecture/54 hours laboratory per term
- Recommended: COMSC-101 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.
- Formerly CNT-105

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The course uses the OSI and TCP layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. Students build simple LAN topologies by applying basic principles of cabling; performing basic configurations of network devices, including routers and switches; and implementing IP addressing schemes. This course is preparation for the CompTIA Network +, Cisco Certified Entry-Level Network Technician (CCENT) and Cisco Certified Network Associate (CCNA) certification exams. CSU

### **CNT-114 Microsoft Windows Operating System Essentials/Administration**

3 units SC

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-106 or equivalent; COMSC-101 or equivalent

This course is an introduction to Microsoft Windows server operating system and network support. Topics include user accounts, groups and group scopes, permissions, security, Active Directory terminology, optimizing Internet Protocol (IP) address allocation, utilities, and Web Services. CSU

### **CNT-116 Implementing Windows Server Enterprise**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-114 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course introduces students to the installation and configuration of Microsoft Windows Professional on stand-alone computers and on client computers connected to a work-group or domain. The skills and knowledge necessary to install and configure Windows Server, to create files, print, and Terminal Servers will be covered. Students will also administer an organizational unit within a single domain structure. CSU

## Computer network technologies

**CNT-117 Implementing Microsoft Windows Directory Services**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-116 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents an overview of installation, configuration, and administration of Microsoft Windows Active directory services. The course focuses on implementing Group Policy and understanding the Group Policy tasks required to centrally manage users and computers. Through lecture and laboratory experiences students will use Group Policies to configure and manage the user desktop environment, to configure and manage software, and implement and manage security settings. Students will also install and manage Windows Domains, and Domain Controllers through Active Directory. CSU

**CNT-118 Implementing a Microsoft Windows Network Infrastructure**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-116 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents an overview of the installation, configuration, management and support of network infrastructures that use Microsoft Windows Server products. The course focuses on TCP/IP and related services, including DHCP Server service, DNS Server service, WINS, network security protocols, Public Key Infrastructure (PKI), Internet Protocol Security (IPSec), and remote access. The students will also gain experience configuring Windows as a network router, configuring Internet access for a network, configuring a Web server, and managing a Windows deployment using Remote Installation Services (RIS).CSU

**CNT-120 Routing and Switching Essentials**

3 units LR

- 36 hours lecture/54 hours laboratory per term
- Prerequisite: CNT-106 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.
- Formerly CNT-161

This course presents the architecture, components, and operations of routers and switches in a small network. Students will configure routers and switches for basic functionality. Students will configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks. This course is preparation for the Cisco Certified Entry-Level Network Technician (CCENT) and Cisco Certified Network Associate (CCNA) certification exams. CSU

**CNT-125 Introduction to Virtualization Technology**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-118 or equivalent
- Note: Students may petition to repeat when software and networking technologies are upgraded. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents an overview of the installation and configuration of both Microsoft and VMWare Virtualization Technologies. Students will be introduced to storage systems, business continuity, storage security and management, virtualization technology and concepts. Deployment and administration of various operating systems, Hyper-V, Virtual machine networks will also be covered. CSU

**CNT-140 Introduction to Information Systems Security**

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Prerequisite: CNT-106 or equivalent
- Recommended: CNT-120 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course provides an introduction to the fundamental principles and topics of information technology security and risk management at the organizational level. Hardware, software, processes, communications, applications, and policies and procedures with respect to organizational cybersecurity and risk management are addressed. Preparation for the CompTIA Security+ certification exams is provided. CSU

**CNT-146 Cisco Certified Network Associate (CCNA) Security**

2 units SC

- 27 hours lecture/27 hours laboratory per term
- Recommended: CNT-140 or equivalent
- Note: Students may petition to repeat this course when software, hardware or certification requirements change. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course presents an in-depth study of network security principles as well as the tools and configurations required to secure a network focused specifically on preparation for the CCNA-Security certification exam. CSU

## Computer network technologies

**CNT-148 Introduction to Cybersecurity: Ethical Hacking**

3 units LR

- 36 hours lecture/54 hours laboratory per term
- Recommended: CNT-114 and CNT-146 or equivalents
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

Students will analyze computers and networks for vulnerabilities and to preserve information for forensic investigation. Laws pertaining to computer and network forensic investigation will be presented and students will complete case studies on cyber attack investigations. This course contributes to the preparation for the following certifications: AccessData Certified Examiner® credential, Certified Information Systems Security Professional (CISSP), Cisco Certified Security Professional (CCSP), Security+, and Microsoft Security Certification. CSU

**CNT-149 Digital Forensics Fundamentals**

3 units SC

- 36 hours lecture/54 hours laboratory per term
- Prerequisite: CNT-140 or equivalent
- Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.

This course is an introduction to the methods used to properly conduct a computer forensics investigation beginning with a discussion of ethics, while mapping to the objectives of the International Association of Computer Investigative Specialists (IACIS) certification. Topics covered include an overview of computer forensics as a profession; the computer investigation process; understanding operating systems boot processes and disk structures; data acquisition and analysis; technical writing; and a review of familiar computer forensics tools. CSU

**CNT-150 Topics in Computer Networking**

.3-4 units SC

- Variable hours

A supplemental course in computer networking to provide a study of current concepts and problems in networking. Specific topics will be announced in the schedule of classes. CSU

**CNT-206 Scaling Networks**

3 units LR

- 36 hours lecture/54 hours laboratory per term
- Prerequisite: CNT 106 or equiv.

This course is the third in a four-course sequence that prepares students for CCNA routing and switching certification. Topics include routing, switching, network applications, protocols, and services. Hierarchical network design model, EtherChannel, OSPF and EIGRP routing protocols, and maintenance of up-to-date IOS images will also be covered. Students will practice on laboratory equipment as well as Cisco Packet Tracer, a network configuration simulation tool. CSU

**CNT-220 Connecting Networks**

3 units LR

- 36 hours lecture/54 hours laboratory per term
- Prerequisite: CNT 106 or equivalent

This is the fourth course in the four-course sequence that prepares students for CCNA routing and switching certification. Topics include WAN technologies such as PPP, HDLC, and PPPoE as well as a systematic approach to implementing and troubleshooting security in addition to network traffic monitoring. Students will practice on laboratory equipment as well as Cisco Packet Tracer, a network configuration simulation tool. CSU

**CNT-296 Internship in Occupational Work Experience Education in CNT**

1-4 units SC

- Variable hours
- Note: In order to enroll in the CNT-296 course, students must be interning or volunteering, register for the course, complete an online Employment Form, and participate in an orientation. The Employment Form can be accessed at [www.dvc.edu/wrkx](http://www.dvc.edu/wrkx). Incomplete grades are not awarded for this course.

CNT-296 is a supervised internship in a skilled or professional level assignment in the student's major field of study or area of career interest. Under the supervision of a college instructor, students will engage in on-the-job and other learning experiences that contribute to their employability skills and occupational or educational goals. Internships may be paid, non-paid, or some partial compensation provided. Five hours work per week or seventy-five hours work per term is equal to one unit (paid) or one unit for four hours work per week or sixty hours per term (unpaid work). Students may earn up to a maximum of sixteen units; repetition allowed per Title 5 Section 55253. CSU