

Computer network technologies

**COMPUTER NETWORK TECHNOLOGY – CNT**

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Business, Computer Sciences, and Culinary Arts Division

**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.

**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-devices and intermediary devices.
- H. identify security issues with communications, email, web, remote access, and wireless technology.
- I. differentiate between physical security, disaster recovery, and business continuity.
- J. identify current network threats and ramifications.
- K. troubleshoot threats and implement security methods against such threats.

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.

<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 .....	3
CNT-114	Microsoft Windows Operating System Essentials/Administration .....	3
CNT-120	Routing and Switching Essentials .....	3
CNT-140	Introduction to Information Systems Security .....	4
CNT-148	Introduction to Cybersecurity:	
	Ethical Hacking .....	3
CNT-149	Digital Forensics Fundamentals .....	3

<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-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 units for the major 26**

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### 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-devices and intermediary devices.
- H. identify security issues with communications, email, web, remote access, and wireless technology.
- I. differentiate between physical security, disaster recovery, and business continuity.
- J. identify current network threats and ramifications.
- K. troubleshoot threats and implement security methods against such threats.

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

*plus at least 6 units from:*

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

*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 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, email, 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.

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<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 .....	4
CNT-146 Internetworking Security .....	2
CNT-148 Introduction to Cybersecurity: Ethical Hacking .....	3
CNT-149 Digital Forensics Fundamentals .....	3
<b>total minimum required units.....</b>	<b>19</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-devices and intermediary devices.

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.

<i>required courses:</i>	<i>units</i>
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-102 Exploring Cyber Defense**

- 1 unit SC
- 13.5 hours lecture/13.5 hours laboratory per term
  - Advisory: CNT-101
  - Note: This course is open to all, but is particularly appropriate for students in 7th through 12th grade.

This course builds on skills presented in CNT-101 and focuses on more advanced cybersecurity principles and skills needed to work with virtual machines. Emphasis is placed on security policies, tools, and account management of both Windows and Linux operating systems. The fundamentals of network connectivity and security are presented. CSU

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

- 2 units SC
- 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
  - Advisory: 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. C-ID ITIS 110, CSU

**CNT-101 Exploring Cyber Safety**

- 1 unit SC
- 13.5 hours lecture/13.5 hours laboratory per term
  - Note: This course is open to all, but is particularly appropriate for students in 7th through 12th grade.

This course introduces cybersecurity career opportunities, cyber ethics, online safety, how computers work, and cyber threats. Topics include cybersecurity principles, virtual machines, basic Windows and Linux security policies, tools, account management, fundamental network connectivity, and security. CSU

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**CNT-106 Introduction to Networks**

3 units SC

- 36 hours lecture/54 hours laboratory per term
- Advisory: 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 introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The course uses the Open Systems Interconnection (OSI) and Transmission Control Protocol (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 Internet Protocol (IP) addressing, and the fundamentals of Ethernet concepts, media, and operations are introduced. Students build simple Local Area Network (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 one of the three courses required to prepare for Cisco Certified Network Associate (CCNA) certification exam. C-ID ITIS 150, CSU

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

3 units SC

- 45 hours lecture/27 hours laboratory per term
- Advisory: 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-120 Routing and Switching Essentials**

3 units SC

- 36 hours lecture/54 hours laboratory per term
- Advisory: 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.

This course presents the architecture, components, and operations of routers and switches in a small network. Students configure and troubleshoot routers and switches for basic functionality and resolve common issues with wireless Local Area Networks (LANs) static routing, virtual LANs, and inter-VLAN (Virtual Local Area Network) routing in both IPv4 (Internet Protocol) and IPv6 networks. This course is one of the three courses required to prepare for Cisco Certified Network Associate (CCNA) certification exam. C-ID ITIS 151, CSU

**CNT-125 Introduction to Virtualization Technology**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Advisory: 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. Topics include 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
- Advisory: CNT-106 or equivalent; 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. C-ID ITIS 160, CSU

**CNT-146 Internetworking Security**

2 units SC

- 27 hours lecture/27 hours laboratory per term
- Advisory: 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 a study of network security principles as well as the tools and configurations required to secure a network. CSU

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

3 units LR

- 36 hours lecture/54 hours laboratory per term
- Advisory: 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.

This course is intended to prepare students for the following certifications: AccessData Certified Examiner credential, Certified Information Systems Security Professional (CISSP), Cisco Certified Security Professional (CCSP), Security+, and Microsoft Security Certification. Students will analyze computers and networks for vulnerabilities, collect data, and 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. C-ID ITIS 164, CSU

**CNT-149 Digital Forensics Fundamentals**

3 units SC

- 36 hours lecture/54 hours laboratory per term
- Advisory: 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 introduces the methods used to properly conduct a computer forensics investigation. Topics include ethics, objectives of the International Association of Computer Investigative Specialists (IACIS) certification, computer forensics as a profession, the computer investigation process, operating systems boot processes and disk structures, data acquisition and analysis, technical writing, and computer forensics tools. C-ID ITIS 165, 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-296 Internship in Occupational Work Experience Education in CNT**

2-4 units SC

- May be repeated eight times
- 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. 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. Each unit represents five hours of paid work or four hours of unpaid work per week or 75 hours of paid work or 60 hours of unpaid work per term. Students may earn up to a total of 16 units in any combination of WRKX courses. Repetition allowed per Title 5, Section 55253. CSU