

Computer network technologies

**COMPUTER NETWORK TECHNOLOGY – CNT**

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 Math and Computer Sciences Division  
 Math Building, Room 267

**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. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

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 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-181	Finite Mathematics.....	3
MATH-182	Calculus for Management, Life Science and Social Science I.....	4
MATH-192	Analytic Geometry and Calculus I.....	5
<b>total minimum required units</b>		<b>26</b>

**Associate in science degree  
 Server and system administration**

**Students completing the program will be able to...**

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

**Computer network technologies**

The associate in science degree in server and system administration prepares students to enter the workforce as a server and/or system administrator.

Server and system administrators are responsible to manage an organization’s servers and desktop and mobile equipment. They ensure that email and data storage networks work properly. They also make sure that employees’ workstations are working efficiently and stay connected to the central computer network. Some administrators manage telecommunications networks.

In some cases, administrators help network architects design and analyze network models. They also participate in decisions about buying future hardware or software to upgrade their organization’s network. Some administrators provide technical support to computer users, and they also may supervise computer support technicians who help solve users’ problems.

Graduates are prepared and eligible to sit for various industry certification exams.

DVC server and system administration 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 server and system administration, students must complete each course used to meet a major requirement with a “C” grade or higher and complete all general education requirements listed in the catalog. Degree requirements can be completed by attending classes in the day, the evening, or both. Certain courses may satisfy both a major and a graduation requirement; however the units are only counted once.

<i>major requirements:</i>		<i>units</i>
BUS-250	Business Communications I .....	3
CNT-104	IT Essentials (A+) .....	4
CNT-106	Introduction to Networks .....	3
CNT-114	Microsoft Windows Operating System Essentials/Administration .....	3
CNT-117	Implementing Microsoft Windows Directory Services .....	3
COMSC-101	Computer Literacy .....	4

<i>plus at least 6 units from:</i>		
CNT-116	Implementing Windows Server Enterprise .....	
CNT-118	Implementing a Microsoft Windows Network Infrastructure .....	
CNT-125	Introduction to Virtualization Technology .....	
CNT-138	Implementing and Managing Microsoft Exchange Server .....	
CNT-148	Introduction to Cybersecurity: Ethical Hacking .....	
<b>total minimum required units</b>		<b>26</b>

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

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

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

<i>plus at least 3 units from:</i>		
BUS-240	Business Statistics .....	
MATH-142	Elementary Statistics with Probability .....	
MATH-181	Finite Mathematics .....	
MATH-182	Calculus for Management, Life Science and Social Science I .....	
MATH-192	Analytic Geometry and Calculus I .....	
<b>total minimum required units</b>		<b>26</b>

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**Certificate of achievement**

**Network cybersecurity**

Students completing the program will be able to...

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

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

**total minimum required units..... 18**

**Certificate of achievement**

**Network technology fundamentals**

Students completing the program will be able to...

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

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

**total minimum required units..... 19**

**Certificate of achievement**

**Server and system administration**

Students completing the program will be able to...

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

The certificate of achievement in server and system administration prepares students to enter the workforce as a server and/or system administrator.

Server and system administrators are responsible to manage an organization's servers and desktop and mobile equipment. They ensure that email and data storage networks work properly. They also make sure that employees' workstations are working efficiently and stay connected to the central computer network. Some administrators manage telecommunications networks.

In some cases, administrators help network architects design and analyze network models. They also participate in decisions about buying future hardware or software to upgrade their organization's network. Some administrators provide technical support to computer users, and they also may supervise computer support technicians who help solve users' problems.

Certificate completers are prepared and eligible to sit for various industry certification exams.

To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grader or higher.

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<i>required courses:</i>		<i>units</i>
BUS-250	Business Communications I .....	3
CNT-104	IT Essentials (A+).....	4
CNT-106	Introduction to Networks .....	3
CNT-114	Microsoft Windows Operating System Essentials/Administration .....	3
CNT-117	Implementing Microsoft Windows Directory Services.....	3
COMSC-101	Computer Literacy .....	4

<i>plus at least 6 units from:</i>		
CNT-116	Implementing Windows Server Enterprise .....	3
CNT-118	Implementing a Microsoft Windows Network Infrastructure .....	3
CNT-125	Introduction to Virtualization Technology.....	3
CNT-138	Implementing and Managing Microsoft Exchange Server.....	3
CNT-148	Introduction to Cybersecurity: Ethical Hacking .....	3
<b>total minimum required units</b>		<b>26</b>

**Certificate of accomplishment  
Microsoft Windows systems administration**  
Students completing the program will be able to...

- A. list, describe, and configure TCP/IP protocols and ports.
- B. apply and configure appropriate security measures.
- C. maintain and upgrade computer systems.
- D. install and configure Microsoft Windows operating systems and applications.
- E. document and communicate system design and architecture.
- F. demonstrate basic computer and networking literacy.
- G. demonstrate a basic understanding of physical science.

The certificate of accomplishment in Microsoft Windows systems administration prepares students for a career in information technology through an in-depth study of networking with Microsoft products.

To earn a certificate of accomplishment, students must complete each course used to meet a certificate requirements with a "C" grade or higher.

<i>required courses:</i>		<i>units</i>
CNT-114	Microsoft Windows Operating System Essentials/Administration .....	3
CNT-116	Implementing Windows Server Enterprise .....	3
CNT-117	Implementing Microsoft Windows Directory Services.....	3
CNT-118	Implementing a Microsoft Windows Network Infrastructure .....	3

<i>plus at least 3 units from:</i>		
CNT-138	Implementing and Managing Microsoft Exchange Server.....	3
CNT-148	Introduction to Cybersecurity: Ethical Hacking .....	3
<b>total minimum required units</b>		<b>15</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

## Computer network technologies

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### 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

### 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.

Students will learn to install, configure, and administer Microsoft Windows Active Directory directory services. The course also focuses on implementing Group Policy and understanding the Group Policy tasks required to centrally manage users and computers. 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 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 will enable students to install, configure, manage and support a network infrastructure that uses the Microsoft Windows Server products. The course focuses heavily 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 course also enables the student to configure Windows as a network router, configure Internet access for a network, configure a Web server, and manage 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 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.

The course provides students with the knowledge and skills necessary to install and configure both Microsoft and VMWare Virtualization Technologies. Students will be introduced to storage systems, business continuity, storage security and management, virtualization technology and concepts. This course will cover deployment and administration of various operating systems, Hyper-V, Virtual machine networks. CSU

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**CNT-138 Implementing and Managing Microsoft Exchange Server**

3 units LR

- 45 hours lecture/27 hours laboratory per term
- Recommended: CNT-114 or equivalent
- Note: Refer to course schedule for specific Exchange Server version. 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 students with in-depth product information on the following topics: planning deployment and installing Exchange Server, architecture of Exchange Server, supporting Exchange Server in a single site or multi-site enterprise environment, establishing messaging connectivity over the Internet, and supporting Web access to Exchange Server computers through Microsoft Outlook Web Access. 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

**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