

# Computer Network Engineering

## Degrees, Certificates and Awards

Associate in Science: Computer Network Engineering

Certificate of Achievement:

Computer Network Engineering

Skills Competency Award: Cisco Networking Associate

## Program Description

The field of computer-related technologies continues to evolve at an astounding pace. Fortunately, the Department of Computer Network Engineering provides direct access to the wide variety of exciting careers in this field. The department not only offers programs which meet the general needs of the industry, but also provides several unique specialty programs. Most programs may be completed for a highly specific technical Certificate, or taken along with General Education courses for the broader AS Degree.

The Computer Network Engineering Program prepares students to work in the area of network support, a field which currently commands excellent salaries. Students are given extensive training for many of the major industry certification exams: A+, Microsoft and Cisco. Graduates are currently working as LAN/WAN specialists, network administrators, Internet/intranet administrators and network designers, and network engineers.

In addition to the Degree program, the department offers Skills Competency Awards for the CCNA and CCNP certifications.

Graduates from the Computer Network Engineering Department benefit greatly from the excellent reputation Santa Barbara City College has earned. In contrast to those with only highly specific training, the broad education received by our students makes them preferred job candidates with many local employers.

## Program Student Learning Outcomes

1. Apply basic computer hardware and software concepts to install, trouble-shoot and manage home and small business computer network systems.
2. Using appropriate IP addressing scheme and appropriate networking hardware and software, design, trouble-shoot and maintain a computer network infrastructure for small to medium size organizations.
3. Identify computer network security threats and vulnerabilities for a given network, choose

appropriate network security hardware and software for a given security requirement, and apply necessary security measures to prevent a possible computer network compromise.

4. Given a computer network engineering problem, apply critical thinking, problem-solving techniques and effective communications skills to find solutions to the problem.

## Department Offices

*Division:* Technologies

Angel Cardenas, *Chair* (A-183, ext. 3063)

Alan Price, *Dean* (A-218 ext. 3044)

## Faculty and Offices

Angel Cardenas, *Chair* (A-183, ext. 3063)

Mohammad El-Soussi (A-179, ext. 2512)

Behzad Masooman, *Lab Teaching Assistant* (A-182A, ext. 2753)

## Requirements for AS Degree:

### Computer Network Engineering

#### Department Requirements (41-42 units)

CIS 201 — UNIX/Linux System Administration <i>or</i> .....	4
CIS 206 — MS Windows Server System Admin <i>or</i> .....	4
CIS 213 — MS Exchange Server Administration <i>or</i> .....	3
CIS 219 — VMWare vSphere System Administration .....	3
CNEE 101 — Introduction to Computer Network Technology .....	3
CNEE 102 — Fundamentals of PC Support.....	3
CNEE 106 — Telecommunications and WAN .....	3
CNEE 110 — Networking Essentials.....	3
CNEE 112 — Advanced Computer Support: A+ Practical Applications .....	3
CNEE 120 — Fundamentals of Network Security .....	3
CNEE 124 — Internetworking with Tcp/Ip .....	3
CNEE 125* — CCNA I: Introduction to Networking and Routers.....	5
CNEE 126+ — CCNA II: Switching and WAN .....	5
CNEE 146 — Firewalls and VPNs.....	4
CNEE 206 — MS Windows Network Infrastructure.....	3

*\*Students who completed CNEE 131 and 132 are exempt from taking CNEE 125.*

*+Students who completed CNEE 133 and 134 are exempt from taking CNEE 126.*

**Recommended Course Sequence**

*First Semester*

CNEE 101 — Introduction to Computer Network Technology .....3  
 CNEE 102 — Fundamentals of PC Support.....3  
 CNEE 106 — Telecommunications and WAN .....3

*Second Semester*

CNEE 110 — Networking Essentials.....3  
 CNEE 112 — Advanced Computer Support: A+ Practical Applications .....3  
 CNEE 124 — Internetworking with Tcp/Ip .....3  
 CNEE 125 — CCNA I: Introduction to Networking and Routers .....5

*Third Semester*

CNEE 120 — Fundamentals of Network Security .....3  
 CNEE 126 — CCNA II: Switching and WAN .....5

*Fourth Semester*

CNEE 146 — Firewalls and VPNs.....4  
 CNEE 206 — MS Windows Network Infrastructure.....3  
 CIS 206 — MS Windows Server System Admin .....4

**College Requirements**

For complete information, see “Graduation Requirements” in the *Catalog* Index.

**Requirements for Certificate of Achievement: Computer Network Engineering**

**Department Requirements (41-42 units)**

CIS 201 — UNIX/Linux System Administration **or**.....4  
 CIS 206 — MS Windows Server System Admin **or**.....4  
 CIS 213 — MS Exchange Server Administration **or**.....3  
 CIS 219 — VMWare vSphere System Administration .....3  
 CNEE 101 — Intro to Computer Network Technology.....3  
 CNEE 102 — Fundamentals of PC Support.....3  
 CNEE 106 — Telecommunications and WAN .....3  
 CNEE 110 — Networking Essentials.....3  
 CNEE 112 — Advanced Computer Support: A+ Practical Applications .....3  
 CNEE 120 — Fundamentals of Network Security .....3  
 CNEE 124 - Internetworking with Tcp/Ip.....3  
 CNEE 125\* — CCNA I: Introduction to Networking and Routers .....5  
 CNEE 126+ — CCNA II: Switching and WAN .....5

CNEE 146 — Firewalls and VPNs.....4  
 CNEE 206 — MS Windows Network Infrastructure.....3

*\*Students who completed CNEE 131 and 132 are exempt from taking CNEE 125.*

*+Students who completed CNEE 133 and 134 are exempt from taking CNEE 126.*

*Recommended Sequence:* First semester: CNEE 101, 102, 106; second semester: CNEE 110,112, 124, 125; third semester: CNEE 120,126; fourth semester: CNEE 146, 206, CIS 206.

*Certificate of Achievement Requirements:* Complete all department requirements for the certificate with a cumulative GPA of 2.0 or better. Candidates for a Certificate of Achievement are required to complete at least 20% of the department requirements through SBCC.

**Skills Competency Award: Cisco Networking Associate**

**Department Requirements (10 units)**

CNEE 125\* — CCNA I: Introduction to Networking and Routers .....5  
 CNEE 126+ — CCNA II: Switching and WAN .....5

*\*Students who completed CNEE 131 and 132 are exempt from taking CNEE 125.*

*+Students who completed CNEE 133 and 134 are exempt from taking CNEE 126.*

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Program Cost and Outcome**

For planning purposes, the webpage below provides information on the cost of attendance, program length (assuming a student attends full time), financing options and historical student completion rates:

[www.sbcc.edu/financialaid/gainfulemployment/Computer%20Network%20Engineering.htm](http://www.sbcc.edu/financialaid/gainfulemployment/Computer%20Network%20Engineering.htm)

**Computer Network Engineering Courses**

**CNEE 101 — Introduction to Computer Network Technology (3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Hours: 54 lecture*

Technical introduction to data communications and networks. It provides a thorough understanding of basic network components, and how they're implemented in a system. Topics include data communications hardware and software, transmission methodologies and rates, standards, protocols, terminology and concepts.

**CNEE 102 — Fundamentals of PC Support  
(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Hours: 72 (45 lecture, 27 lab)*

Technical introduction of computer technology, networking and security. Installation, configuration and maintenance of devices, PCs, and software for end-users. Includes hands-on lab activities.

**CNEE 106 — Telecommunications and WAN  
(3) — CSU**

*Skills Advisories: Eligibility for ENG 103  
Hours: 54 lecture*

Introduction to voice, data and video communications. Overview of the telecommunications industry, customer premises equipment, switched and private networks, transmission media, fiber optics, T-1 technology, channel banks, switching and signaling; advanced telecommunications services, local area networks, wide area networks, Internet, ISDN, personal computing systems and telecommunications protocols.

**CNEE 110 — Networking Essentials  
(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 102  
Hours: 72 (45 lecture, 27 lab)*

Introduction to networking components and systems. Networking standards, protocols, operating systems, security, media and hardware.

**CNEE 112 — Advanced Computer Support: A+ Practical Applications  
(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 102  
Hours: 72 (45 lecture, 27 lab)*

Advanced course on installation, configuration and maintenance of devices, PCs, and software for

end-users. Course focuses on trouble-shooting and tools used for IT professionals. Includes hands-on lab activities.

**CNEE 120 — Fundamentals of Network Security  
(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 110  
Hours: 90 (36 lecture, 54 lab)*

Fundamentals of network security principles and implementation. Covers authentication, attacks and malicious code, threats and countermeasures, security topologies, intrusion detection, cryptography, firewalls and physical security concepts.

**CNEE 124 — Internetworking with TCP/IP  
(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 110  
Hours: 54 lecture*

Introduction to TCP/IP Protocol Suite, including IPv4 and IPv6 addressing, name resolution, and other concepts and information relevant to setting up and using TCP/IP-based networks.

**CNEE 125 — CCNA I: Introduction to Networking and Routers  
(5) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 110  
Hours: 126 (72 lecture, 54 lab)*

First half of CCNA certification preparation. Networking concepts, TCP/IP, routing, Cisco IOS and Cisco router configuration.

**CNEE 126 — CCNA II: Switching and WAN  
(5) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB  
Course Advisories: CNEE 125  
Hours: 126 (72 lecture, 54 lab)*

Second half of CCNA certification preparation. Switching, VLANs, ACL, WAN services, PPP, frame relay and wireless LANs.

**CNEE 135 — CCNP 1: Advanced Routing**

**(4) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CCNA certification*

*Hours: 108 (54 lecture, 54 lab)*

Advanced Cisco routing configurations: OSPF, EIGRP, IS-IS, BGP and extended IP addressing. Designed to provide classroom and laboratory experience in current and emerging technologies leading to CCNP certification exam.

**CNEE 136 — CCNP 2: Remote-Access Networks**

**(4) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110GB or 110H or 110GB*

*Course Advisories: CNEE 126*

*Hours: 108 (54 lecture, 54 lab)*

WAN protocols, remote-access, network management and security, NAT and VPN. Second semester for Cisco Certified Network Professional.

**CNEE 137 — CCNP 3: Multi-Layer Switching**

**(4) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CNEE 126*

*Hours: 108 (54 lecture, 54 lab)*

Layers 2 and 3 switching. VLANs and routing. Third semester for Cisco Certified Network Professional. Provides classroom and laboratory experience in current and emerging technologies leading to Cisco certification.

**CNEE 138 — CCNP 4: Network Trouble-shooting**

**(4) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CNEE 137*

*Hours: 108 (54 lecture, 54 lab)*

Cisco routers and switches trouble-shooting. Fourth semester for Cisco Certified Network Professional. Provides classroom and laboratory experience in trouble-shooting leading to CCNP.

**CNEE 146 — Firewalls and VPNs**

**(4) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CNEE 125*

*Hours: 108 (54 lecture, 54 lab)*

Cisco advanced course on installation, configuration and operation of network security on Cisco routers and firewalls: AAA, access control, intrusion detection, NAT and VPNg.

**CNEE 175 — Cisco Network Associate Review**

**(1.5) — CSU**

*Skills Advisories: MATH 0 and Eligibility for ENG 110 or 110GB or 110H*

*Course Advisories: CNEE 126*

*Hours: 45 (18 lecture, 27 lab)*

Intensive course designed as a review of Cisco Network Associate principles.

**CNEE 206 — MS Windows Network Infrastructure**

**(3) — CSU**

*Skills Advisories: MATH 4 and Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CNEE 110 and CIS 206*

*Hours: 72 (45 lecture, 27 lab)*

Introduction to MS Windows network infrastructure. Installation, configuration, management and support of DHCP, DNS, WEB, security and Internet services. Includes hands-on lab activities.

**CNEE 219 — Advanced Automotive Electronics**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 100 and 103*

*Hours: 72 lecture*

Provides basic theory and practice of automotive electronic system operation and trouble-shooting. Covers the basic building blocks of circuits and digital systems. Focuses on batteries, starters, voltage regulators, lighting systems, ignition systems, alternators and computer systems.

**CNEE 295 — Internship in Computer Network Engineering and Electronics**

**(2-4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110 GB*

*Limitation on Enrollment: Completion of two courses in CNEE prior to enrollment in an internship course.*

*Hours: 273 lab*

Structured internship program in which students gain experience with community organizations related to the discipline.