Computer Network Engineering & Electronics

Degrees, Certificates & Awards
Associate in Science: Computer Network Engineering
Certificate of Completion: Computer Network Engineering
Skills Competency Award: Cisco Networking Associate
Skills Competency Award: Cisco Networking Professional
Skills Competency Award: Computer Networking Technology

Program Description
The field of computer-related technologies continues to evolve at an astounding pace. Fortunately, the Department of Computer Network Engineering and Electronics 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 A.S. Degree.

The Computer Network Engineering program prepares students to work in the area of network support, a field which currently commands excellent salaries and is expected to grow rapidly in the next few years. Students are given extensive training for many of the major industry certification exams: A+, Lucent, N+ and Cisco. Graduates are currently working as LAN/WAN specialists, network administrators, Internet/intranet administrators and network designers.

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

Graduates from the Computer Network Engineering and Electronics 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.

Department Offices
Division: Technologies
Department Chair: Angel Cardenas (A-183, ext. 3063)
Dean: Erika Endrijonas (A-218, ext. 2721)

Faculty & Offices
Angel Cardenas, Chair (A-183, ext. 3063)
Mohammad El-Soussi (A-179, ext. 2512)
Behzad Masooman, Lab Teaching Assistant (A-182A, ext. 2753)

Advisers/Counselor Liaison
Counselor Liaison: Carmen Rivero (SS-138, ext. 2941)

Requirements for A.S. Degree: Computer Network Engineering

Department Requirements (35-37 units)
CNEE 101 — Introduction to Computer Network Technology ..........................................3
CNEE 102 — PC Repair I: Hardware .............................................................................3
CNEE 105 — Network Wiring & Cabling ......................................................................3
CNEE 106 — Telecommunications & WAN .................................................................2
CNEE 110 — Networking Essentials ...........................................................................4
CNEE 112 — PC Repair II: Software ...........................................................................3
CNEE 120 — Fundamentals of Network Security .........................................................3
CNEE 125* — CCNA I: Introduction to Networking & Routers .................................4
CNEE 126+ — CCNA II: Switching, Routing & WAN .............................................4

*Students who completed CNEE 131 and CNEE 132 are exempt from taking CNEE 125.
+Students who completed CNEE 133 and CNEE 134 are exempt from taking CNEE 126.

Plus choose two elective courses from the following (6-8 units):
CIS 105 — Introduction to Operating Systems .........................................................4
CIS 201 — UNIX System Administration ..................................................................4
CIS 206 — MS Windows System Administration .....................................................4
CNEE 124 — Internetworking with TCP/IP ...............................................................4
CNEE 128 — Fundamentals of Wireless LANs .........................................................3
CNEE 135 — CCNP 1: Advanced Routing .................................................................4
CNEE 136 — CCNP 2: Remote-Access Networks ....................................................4
CNEE 137 — CCNP 3: Multi-layer Switching ............................................................4
### College Requirements
For complete information, see "Graduation Requirements" in the Catalog Index.

### Requirements for Certificate of Completion: Computer Network Engineering

#### Department Requirements (35-37 units)
- CNEE 101 — Introduction to Computer Network Technology ........................................... 3
- CNEE 102 — PC Repair I: Hardware .................................................................................. 3
- CNEE 105 — Network Wiring & Cabling ......................................................................... 3
- CNEE 106 — Telecommunications & WAN ..................................................................... 2
- CNEE 110 — Networking Essentials ................................................................................ 4
- CNEE 112 — PC Repair II: Software ............................................................................... 3
- CNEE 120 — Fundamentals of Network Security .............................................................. 3
- CNEE 125* — CCNA I: Introduction to Networking & Routers ........................................ 4
- CNEE 126+ — CCNA II: Switching, Routing & WAN ....................................................... 4

*Students who completed CNEE 131 and CNEE 132 are exempt from taking CNEE 125.
+Students who completed CNEE 133 and CNEE 134 are exempt from taking CNEE 126.

*Plus choose two elective courses from the following (6-8 Units):
- CIS 105 — Introduction to Operating Systems ................................................................. 4
- CIS 201 — UNIX System Administration ......................................................................... 4
- CIS 206 — MS Windows System Administration ............................................................. 4
- CNEE 124 — Internetworking with TCP/IP ....................................................................... 4
- CNEE 128 — Fundamentals of Wireless LANs ................................................................. 3
- CNEE 135 — CCNP 1: Advanced Routing ..................................................................... 4

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### Skills Competency Award: Cisco Networking Associate

#### Department Requirements (8 units)
- CNEE 125* — CCNA I: Introduction to Networking & Routers ........................................ 4
- CNEE 126+ — CCNA II: Switching, Routing & WAN ....................................................... 4

*Students who completed CNEE 131 and CNEE 132 are exempt from taking CNEE 125.
+Students who completed CNEE 133 and CNEE 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.

### Skills Competency Award: Cisco Networking Professional

#### Department Requirements (16 units)
- CNEE 135 — CCNP 1: Advanced Routing .................................................................... 4
- CNEE 136 — CCNP 2: Remote-Access Networks ............................................................ 4
- CNEE 137 — CCNP 3: Multi-Layer Switching ................................................................. 4
- CNEE 138 — CCNP 4: Network Trouble-shooting .......................................................... 4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.
Skills Competency Award: Computer Networking Technology

Department Requirements (10 units)

CNEE 106 — Telecommunications & WAN ....................... 2
CNEE 110 — Networking Essentials .......................... 4
CNEE 124 — Internetworking with TCP/IP ...................... 4

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

Course Descriptions

CNEE 101 — Introduction to Computer Network Technology
(3) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H

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 — PC Repair I: Hardware
(3) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H

Fundamentals of supporting and trouble-shooting computer hardware: motherboards, hard drives, I/O devices, memory, printers and multimedia devices. Includes hands-on lab activities.

CNEE 105 — Network Wiring and Cabling
(3) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H

Introduction to networking: the physical layer; termination, testing, trouble-shooting and installation of network wiring and cabling. Participants receive a Certificate of Completion in Network Wiring and Cabling.

CNEE 106 — Telecommunications and WAN
(2) F, S — CSU
Skills Advisories: Eligibility for ENG 100 and ENG 103

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
(4) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H
Course Advisories: CNEE 102

Introduction to networking components and systems. Networking standards, protocols, operating systems, media and hardware. Includes hands-on lab activities.

CNEE 112 — PC Repair II: Software
(3) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H
Course Advisories: CNEE 102

Fundamentals of supporting and trouble-shooting computer operating systems. Installation, configuration and maintenance of different Windows OS. Includes hands-on lab activities.

CNEE 120 — Fundamentals of Network Security
(3) F, S — CSU
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H
Course Advisories: CNEE 110

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  
(4) F, S — CSU  
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H  
Course Advisories: CNEE 110  
Introduction to developing or migrating to TCP/IP protocol. Hands-on approach to configuring a host, employing TCP/IP tools, and using application services to access TCP/IP-based internetworks.

CNEE 125 — CCNA I: Introduction to Networking and Routers  
(4) F, S — CSU  
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H  
Course Advisories: CNEE 110  
First half of CCNA certification preparation. Networking concepts, TCP/IP, routing, Cisco IOS, and Cisco router configuration.

CNEE 126 — CCNA II: Switching, Routing and WAN  
(4) F, S — CSU  
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H  
Course Advisories: CNEE 125  
Second half of CCNA certification preparation. Switching, VLANs, ACL, IGRP, WAN services, IPX, ISDN, PPP, frame relay and network design.

CNEE 128 — Fundamentals of Wireless LANs  
(3) F, S — CSU  
Skills Advisories: MATH 4 and Eligibility for English 110 or ENG 110H  
Course Advisories: CNEE 125  
Introduction to wireless LANs. A comprehensive overview of technologies, security, and best design practices, with emphasis on hands-on skills.

CNEE 135 — CCNP 1: Advanced Routing  
(4) F, S — CSU  
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H  
Course Advisories: CCNA certification  
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  
Course Advisories: CNEE 135  
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 ENG 110H  
Course Advisories: CNEE 136  
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 ENG 110H  
Course Advisories: CNEE 137  
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 144 — Fundamentals of Voice over IP  
(3) — CSU  
Skills Advisories: MATH 4 and Eligibility for English 110 or ENG 110H  
Course Advisories: CNEE 126  
Introduction to converged data and voice networks as well as the challenges faced by its various technologies. Course covers technologies common to many IP telephony implementations.

CNEE 145 — Cisco IOS Network Security  
(3) — CSU  
Skills Advisories: MATH 4 and Eligibility for ENG 110 or ENG 110H  
Course Advisories: CNEE 125  
Installation, configuration and operation of IP network security on perimeter routers: AAA security, access control, intrusion detection, network address translation, and virtual private networks.
CNEE 146 — Cisco PIX Firewalls  
(3) F, S — CSU  
**Skills Advisories:** MATH 4 and Eligibility for ENG 110 or ENG 110H  
**Course Advisories:** CNEE 125  
Installation, configuration and operation of network security on PIX firewalls: AAA security, access control, intrusion detection, network address translation, virtual private networks, and content filtering.

CNEE 147 — Ethical Hacking – Penetration Testing  
(3) F, S — CSU  
**Skills Advisories:** MATH 4 and Eligibility for ENG 110 or ENG 110H  
**Course Advisories:** CNEE 120 and CNEE 126  
Introduction to hacking techniques and tools used for defensive purposes only. Network scanning, operating system and web vulnerabilities, router, firewall and wireless networks testing. Includes hands-on lab activities.

CNEE 150 — Concepts of Electronics  
(4) F, S — CSU  
**Skills Advisories:** MATH 4 and Eligibility for ENG 100 and ENG 103  
Introduction to basic electrical principles for non-majors or those with no previous experience in electronics. Study of electricity, simple series and parallel circuits, magnetism, inductance, capacitance and active devices. Laboratory experience with basic electronic equipment.

CNEE 175 — Cisco Network Associate Review  
(1.5) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or ENG 110H  
**Course Advisories:** CNEE 101 or CNEE 110 and CNEE 124  
Intensive course designed as a review of Cisco Network Associate principles.

CNEE 181 — Introduction to IP Addressing and VLSM  
(2) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or ENG 110H  
Advanced IP topics: Class-full IP addressing and subnetting; variable-length subnet mask; Classless Inter-Domain Routing; route summarization; Private IP Addressing; and NAT.

CNEE 182— Introduction to OSPF Routing  
(2) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or ENG 110H  
Introduction to OSPF Routing in LANs and WANs. Implementation in single and multiple area networks. Designed to provide classroom and laboratory experience in OSPF Routing.

CNEE 183— Introduction to BGP  
(2) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or 110H  
BGP routing configuration and implementation for single-homed and multi-homed connection to an ISP. Configuration of BGP policies.

CNEE 184— Introduction to ISDN and Frame Relay  
(2) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or ENG 110H  
**Course Advisories:** CNEE 126 or CCNA certification  
Introduction to PPP, ISDN and frame relay architectures. ISDN BRI and PRI configuration. Dial-on-Demand routing and Back-Link configuration. Frame relay configuration and traffic shaping.

CNEE 191 — Internetworking Design I  
(3) F, S — CSU  
**Skills Advisories:** MATH 100 and Eligibility for ENG 110 or ENG 110H  
**Course Advisories:** CNEE 126  
Fundamentals of network design for routed and switched networks, involving LAN, WAN and dial access services for businesses and organizations. Leads to Cisco Network Design certification.
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<th>Skills Advisories</th>
<th>Course Advisories</th>
<th>Description</th>
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<tr>
<td>CNEE 192</td>
<td>Internetworking Design II</td>
<td>(3)</td>
<td>F, S</td>
<td>CSU</td>
<td>MATH 100 and Eligibility for ENG 110 or ENG 110H</td>
<td>CNEE 137</td>
<td>Top-down design process and systematic methods for designing internetworks. Design of LAN and WAN networks. Leads to Cisco Network Design certification.</td>
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<td>CNEE 206</td>
<td>MS Windows Network Infrastructure</td>
<td>(4)</td>
<td>F, S</td>
<td>CSU</td>
<td>MATH 4 and Eligibility for ENG 110 or ENG 110H</td>
<td>CNEE 110 and CIS 206</td>
<td>Introduction to MS Windows network infrastructure. Installation, configuration, management and support of DHCP, DNS, WINS, WEB, security and Internet services. Includes hands-on lab activities.</td>
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<tr>
<td>CNEE 207</td>
<td>MS Windows Security</td>
<td>(4)</td>
<td>F, S</td>
<td>CSU</td>
<td>MATH 4 and Eligibility for ENG 110 or ENG 110H</td>
<td>CNEE 110 and CIS 206</td>
<td>Provides knowledge to design and implement an effective security strategy in a network environment, using the Windows operating system. Prepares student for certification exam on Windows Security.</td>
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<tr>
<td>CNEE 219/AUTO 219</td>
<td>Advanced Automotive Electronics</td>
<td>(4)</td>
<td>F, S</td>
<td>CSU</td>
<td>Eligibility for ENG 100 and ENG 103</td>
<td></td>
<td>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.</td>
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<tr>
<td>CNEE 295</td>
<td>Internship in Computer Network Engineering and Electronics</td>
<td>(2-4)</td>
<td>F, S</td>
<td>CSU</td>
<td>Eligibility for ENG 110 or ENG 110H</td>
<td></td>
<td>Structured internship program in which students gain experience with community organizations related to the discipline.</td>
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