

# CNIT R120: CISCO CCNA COMPUTER NETWORKING I

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**Originator**

alynch

**College**

Oxnard College

**Discipline (CB01A)**

CNIT - Computer Networking/IT

**Course Number (CB01B)**

R120

**Course Title (CB02)**

Cisco CCNA Computer Networking I

**Banner/Short Title**

Cisco CCNA Networking I

**Credit Type**

Credit

**Start Term**

Fall 2021

**Formerly**

ENGT R120

**Catalog Course Description**

This course is offered by the Oxnard College Cisco Networking Academy. It covers foundation level computer networking including cabling, network topologies, local area networks (LANs), Ethernet, switching, routing, IPv4 and IPv6 addressing, TCP/IP protocols, and the Open Systems Interconnection (OSI) Model. The fundamentals of wireless networking and network security are also covered in this course. Students will develop networking skills in this course from hands-on labs as well as the ability to troubleshoot common networking problems. This is one of the essential courses to take on the pathway towards preparation for the Cisco CCNA certification and this is an appropriate first course to take in the CNIT program.

**Taxonomy of Programs (TOP) Code (CB03)**

0708.10 - \*Computer Networking

**Course Credit Status (CB04)**

D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**

B (Transferable to CSU only)

**Course Basic Skills Status (CB08)**

N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**

C - Clearly Occupational

**Course Cooperative Work Experience Education Status (CB10)**

N - Is Not Part of a Cooperative Work Experience Education Program

**Course Classification Status (CB11)**

Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**

N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**

Y - Not Applicable

**Course Noncredit Category (CB22)**

Y - Credit Course

**Funding Agency Category (CB23)**

Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**

1 - Program Applicable

**General Education Status (CB25)**

Y - Not Applicable

**Support Course Status (CB26)**

N - Course is not a support course

**Field trips**

May be required

**Grading method**

Letter Graded

**Alternate grading methods**

Credit by exam, license, etc.

**Does this course require an instructional materials fee?**

No

**Repeatable for Credit**

No

**Units and Hours**

**Carnegie Unit Override**

No

**In-Class**

**Lecture**

**Minimum Contact/In-Class Lecture Hours**

52.5

**Maximum Contact/In-Class Lecture Hours**

52.5

**Activity**

**Laboratory**

**Minimum Contact/In-Class Laboratory Hours**

52.5

**Maximum Contact/In-Class Laboratory Hours**

52.5

**Total in-Class**

**Total in-Class**

**Total Minimum Contact/In-Class Hours**

105

**Total Maximum Contact/In-Class Hours**

105

**Outside-of-Class**

**Internship/Cooperative Work Experience**

**Paid**

**Unpaid**

**Total Outside-of-Class**

**Total Outside-of-Class**

**Minimum Outside-of-Class Hours**

105

**Maximum Outside-of-Class Hours**

105

**Total Student Learning**

**Total Student Learning**

**Total Minimum Student Learning Hours**

210

**Total Maximum Student Learning Hours**

210

**Minimum Units (CB07)**

4

**Maximum Units (CB06)**

4

**Student Learning Outcomes (CSLOs)**

**Upon satisfactory completion of the course, students will be able to:**

- |   |  |
|---|--|
| 1 | Demonstrate the ability to construct a straight-through Ethernet cable using a schematic diagram and the appropriate networking hand tools.                                |
| 2 | List the public and private IPv4 ranges and default subnet masks for Class A, Class B, and Class C addresses.  |
| 3 | Configure a Cisco router with a basic configuration using the CLI that includes password settings, IP address and subnet mask, and save the file using the proper command. |
| 4 | Use proper spelling, grammar, and sentence structure on the reflection questions of a lab assignment.  |

**Course Objectives**

**Upon satisfactory completion of the course, students will be able to:**

- |    |   |
|----|---|
| 1  | Configure a host with an IPv4 or IPv6 address that is appropriate for the network   |
| 2  | Describe the difference between a distance vector routing protocol and a link state routing protocol                        |
| 3  | Configure a switch or router IOS using the command line interface   |
| 4  | Differentiate between various network topologies  |
| 5  | Construct, terminate, and test out an Ethernet cable  |
| 6  | Identify the components of an Internet service provider (ISP) and network operations center (NOC)                           |
| 7  | Describe the purpose of an IP address and subnet mask and how they are used on the Internet                                 |
| 8  | List the 7 layers of the open system interconnection (OSI) model and provide a brief description of each layer of the model |
| 9  | Describe the purpose and function of TCP/IP protocols   |
| 10 | Troubleshoot common networking problems using a structured model and TCP/IP utilities                                       |
| 11 | Create an Ethernet LAN and enable permissions to share resources across the network.  |

- 12 Create a secure wireless network using IEEE 802.11 protocols
- 13 Describe the features of a firewall and how it can be used to protect against an attack
- 14 Work effectively in a team to accomplish the objectives of a lab assignment
- 15 Configure routing protocols using the Cisco command line interface (CLI)
- 16 Capture and analyze network traffic using a packet capture program
- 17 Differentiate between a virus, worm, and Trojan horse as it relates to malware.

## Course Content

### Lecture/Course Content

1. Computing Devices
  - a. Desktop
  - b. Workstation
  - c. Laptop
  - d. Server
  - e. Tablet
2. Components of a Switch and Router
  - a. Flash memory
  - b. RAM
  - c. NVRAM
  - d. ROM
3. Cisco Internetwork Operating System (IOS)
  - a. Naming structure
  - b. Versions
  - c. Feature sets
  - d. Boot sequence
4. Network Topologies
  - a. Bus Topology
  - b. Star Topology
  - c. Extended Star Topology
  - d. Mesh Topology
  - e. Hybrid Mesh Topology
5. Cabling
  - a. Straight-Thru Cable
  - b. Crossover Cable
  - c. Rollover Cable
  - d. Crimper and Punch Down Tool
  - e. RJ-45 Connectors
  - f. EIA/TIA 568 Cabling Standards
6. Local Area Network (LAN)
  - a. Ethernet and CSMA/CD
  - b. Hubs and Switches
  - c. Collision Domain and Broadcast Domain
7. ISP and NOC
  - a. Tier 1, 2, & 3 ISP
  - b. Demarcation Point
  - c. Local Loop
  - d. NOC Help Desk
  - e. Planning and Provisioning
8. IP Addressing
  - a. IPv4 and IPv6
  - b. Subnet Mask
  - c. Subnetting IPv4
  - d. Network Address Translation (NAT)
  - e. Port Address Translation (PAT)
9. OSI Model
  - a. Purpose of the OSI Model
  - b. Seven Layers of the OSI Model
  - c. Comparing OSI Model to the TCP/IP Model
  - d. Troubleshooting using the OSI model
10. TCP/IP Protocols and Utilities
  - a. IP Address Related: IP, NAT, PAT

- b. Name Related: DNS, NSLookup
  - c. Email Related: SMTP, POP3, IMAP4
  - d. Network Management: SNMP
  - e. Web Related: HTTP, HTTPS, FTP, SFTP
  - f. Terminal Emulation: Telnet, SSH, RDP
  - g. Troubleshooting with TCP/IP Utilities: Ping, tracert, netstat, nslookup, ipconfig
  - h. Wireshark Packet Capture Program
11. Wireless Networking
    - a. 802.11 a, 802.11b, 802.11g, 802.11n, 802.11ac
    - b. Wireless Security: WEP, WPA, WPAII, 802.11i
    - c. Infrastructure vs Ad-Hoc
    - d. Site Survey
  12. Security
    - a. Software Firewall
    - b. Hardware Firewall
    - c. Packet Filtering Firewall
    - d. Stateful Inspection Firewall
    - e. Access-Controlled Lists (ACL)
  13. Cisco Router and Switch Management
    - a. Backing up the configuration file
    - b. Creating a network config using CLI
    - c. Hardening the device with secure encrypted passwords
    - d. Password Recovery and remote management using SSH
  14. Routing Protocols
    - a. Interior vs Exterior
    - b. Distance Vector vs Link State
    - c. RIP and RIP 2
    - e. EIGRP and OSPF
    - f. BGP
  15. Malware
    - a. Virus
    - b. worm
    - c. Trojan horse
    - d. Ransomware

### Laboratory or Activity Content

1. Make an Ethernet Cable
  - a. Utilize a schematic diagram to make an EIA/TIA 568A or 568B straight-through cable
  - b. Utilize hand tools including a cable cutter, wire stripper, and crimper to make an Ethernet cable
  - c. Test out cable with a cable tester and interpret results
2. IP Addressing
  - a. Configure a host with an IPv4 address, subnet mask, and gateway
  - b. Configure a host with an IPv6 address and gateway
  - c. Verify IP address settings using ipconfig
  - d. Ping between host PC and gateway
3. Switch
  - a. Gather switch IOS information using show version command
  - b. Create a switch configuration using the Cisco CLI
  - c. Harden the device with a secure configuration including:
    - i. Encrypted line vty password
    - ii. Encrypted enable password
    - iii. Encrypted enable secret password
    - iv. SSH for secure remote access
  - d. Interpret device status using status indicator lights
  - e. Interpret port status using port indicator lights
4. Router
  - a. Gather router IOS information using show version command
  - b. Create a router configuration using the Cisco CLI
  - c. Harden the device with a secure configuration including:
    - i. Encrypted line vty password
    - ii. Encrypted enable password

- iii. Encrypted enable secret password
  - iv. SSH for secure remote access
  - d. Interpret device status using status indicator lights
  - e. Interpret port status using port indicator lights
5. Create a LAN
- a. Utilize appropriate cable to connect host PC to switch and switch to router
  - b. Configure host, switch, and router with the proper IPv4 address settings to place network devices on same network
  - c. Ping between devices to verify network connectivity
  - d. Configure host, switch, and router with the proper IPv6 address settings to place network devices on same network
6. TCP/IP Troubleshooting Utilities
- a. Gather IP addressing information using ipconfig, ipconfig /all
  - b. Gather DNS information using nslookup as well as mail exchanger records with the set type=mx command
  - c. Tracer the network path and hop count using the tracert command
  - d. Test network connectivity using the ping command and utilize switch options to alter ping performance
  - e. Trace the network path and hop count using the tracert command
7. Routing Protocols
- a. Configure the RIPv2 routing protocol on a router using the CLI
  - b. Demonstrate convergence on a network with multiple routers that are using the RIPv2 routing protocol
  - c. Configure the OSPF routing protocol on a router using the CLI
  - d. Optimize the OSPF routing protocol metrics
  - e. View the routing table on the OSPF enabled router using the appropriate CLI command
  - f. Demonstrate convergence on a network with multiple routers that are using the OSPF routing protocol
8. Troubleshooting
- a. Perform a bottom-up approach using the OSI Model to troubleshoot common networking problems
  - b. Utilize TCP/IP utilities to diagnose and troubleshoot common networking problems
  - c. Document steps taken while performing troubleshooting

## Methods of Evaluation

**Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):**

Problem solving exercises  
Skills demonstrations  
Written expression

**Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):**

Computational homework  
Essays  
Group projects  
Individual projects  
Laboratory activities  
Laboratory reports  
Objective exams  
Oral presentations  
Projects  
Problem-Solving Assignments  
Problem-solving exams  
Quizzes  
Reports/papers  
Skills demonstrations  
Skill tests

## Instructional Methodology

**Specify the methods of instruction that may be employed in this course**

Audio-visual presentations  
Computer-aided presentations  
Collaborative group work  
Class activities  
Class discussions  
Distance Education  
Demonstrations

Group discussions  
 Guest speakers  
 Instructor-guided use of technology  
 Internet research  
 Laboratory activities  
 Lecture  
 Small group activities

**Describe specific examples of the methods the instructor will use:**

1. Instructor will use publisher-provided PowerPoints to lecture on chapter Cisco CCNA course topics.
2. The instructor will introduce labs and demonstrate lab solutions where appropriate.
3. The instructor may summarize current IT events or trends in the IT industry and ask students questions regarding the information that was shared.
4. Small group research and presentation of current cybersecurity threats and best practices to defend against specific threats.
5. The instructor will illustrate some of the more challenging multiple-choice questions and performance-based questions that students may experience on the CCNA certification.

## Representative Course Assignments

### Writing Assignments

1. Students are required to answer reflection questions at the end of their lab activities to demonstrate that they grasp the material in the lab and to see if they can relate the knowledge to a new networking scenario.
2. Students are required to respond to questions posed at the current Oxnard College distance education portal. An example would be for a student to respond to a question explaining why OSPF is a better routing protocol than RIP.

### Critical Thinking Assignments

1. Evaluation of a cybersecurity vulnerability and specific written recommendations to mitigate the risk.
2. Students will evaluate the technology needs of a fictitious company and determine a solution that best meets the needs of the customer. For example, a company is using new cloud based applications that are bandwidth intensive but they have not upgraded their network infrastructure to accommodate the requirements of these new real-time applications. Students will research the app requirements as it relates to bandwidth, latency, jitter, and security. Next, the students will make specific network infrastructure upgrade recommendations and justify the recommendations in a written report and security and the student needs to determine the appropriate IEEE 802.11 standard to implement and WLAN security needs. The student will need to justify their selection when multiple approaches may satisfy the customer needs.

### Reading Assignments

1. Students are required to read and study the information in the assigned chapter of the curriculum in-between classes in order to be prepared for the lecture and classroom activities. A typical reading activity would be for the students to read the chapter on IP addressing so that they are prepared to configure devices with the proper IP address settings for network connectivity.
2. Students are required to perform reading from assigned support websites such as [www.cisco.com](http://www.cisco.com) (<http://www.cisco.com>), [www.arin.net](http://www.arin.net) (<http://www.arin.net>), and [www.ietf.org](http://www.ietf.org) (<http://www.ietf.org>).

### Skills Demonstrations

1. Students will properly cable and configure a LAN according to settings specified in a lab and harden the configuration of the network switch and router.
2. Students will demonstrate the ability to make an Ethernet straight-through or crossover cable using the appropriate cabling tools in a lab activity.

### Other assignments (if applicable)

1. Students are required to complete hands-on activities using a network simulation program called Packet Tracer outside of class hours. An example of an activity using Packet Tracer would be to configure a LAN with a hub and then configure a LAN with a switch and run the simulation comparing performance of the LAN with each device.
2. In order to prepare for the Cisco certification exam, students will be required to answer certification preparation questions using their [cisco.netacad.net](http://cisco.netacad.net) account.

## Outside Assignments

### Representative Outside Assignments

1. Read the assigned cloud based Cisco CCNA curriculum.
2. Complete assigned labs using a network based simulation program.

3. Visit network security related websites such as [www.sans.org](http://www.sans.org) to learn about the latest cybersecurity threats and how to mitigate against these threats.

## Articulation

### C-ID Descriptor Number

ITIS 150

### Status

Submitted to C-ID

### Comparable Courses within the VCCCD

CNSE M18 - Cisco System Computer Networking A

### Equivalent Courses at other CCCs

College	Course ID	Course Title	Units
Santa Barbara City College	CNEE 125	CCNAI-Introduction to Switching and Routing	5



**District General Education****A. Natural Sciences****B. Social and Behavioral Sciences****C. Humanities****D. Language and Rationality****E. Health and Physical Education/Kinesiology****F. Ethnic Studies/Gender Studies****CSU GE-Breadth****Area A: English Language Communication and Critical Thinking****Area B: Scientific Inquiry and Quantitative Reasoning****Area C: Arts and Humanities****Area D: Social Sciences****Area E: Lifelong Learning and Self-Development****CSU Graduation Requirement in U.S. History, Constitution and American Ideals:****IGETC****Area 1: English Communication****Area 2A: Mathematical Concepts & Quantitative Reasoning****Area 3: Arts and Humanities****Area 4: Social and Behavioral Sciences****Area 5: Physical and Biological Sciences****Area 6: Languages Other than English (LOTE)****Textbooks and Lab Manuals****Resource Type**

Textbook

**Classic Textbook**

Yes

**Description**Cisco Press (2020), *Introduction to Networks Companion Guide (CCNAv7)* or same curriculum offered via the cloud using the Cisco Networking Academy.**Distance Education Addendum****Definitions****Distance Education Modalities**

Hybrid (51%–99% online)

Hybrid (1%–50% online)  
100% online

## Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

## Regular Effective/Substantive Contact

### Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.
Face to Face (by student request; cannot be required)	Face to face with students will take place at student request to discuss specific questions, issues, or concerns.
Video Conferencing	Zoom or comparable video conferencing software to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.
Other DE (e.g., recorded lectures)	Any real-time instruction will be recorded and available to students through the LMS.

### Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.
Face to Face (by student request; cannot be required)	Face to face with students will take place at student request to discuss specific questions, issues, or concerns.
Video Conferencing	Zoom or comparable video conferencing software to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.
Other DE (e.g., recorded lectures)	Any real-time instruction will be recorded and available to students through the LMS.

### 100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Topics will be presented for discussion with the opportunity to provide commentary and feedback on fellow student responses.
E-mail	Email will be used for individual interaction between professor and student, to send group email reminders of deadlines, to inform of upcoming course content.

**Video Conferencing**

Zoom or comparable video conferencing software will be utilized to lecture on course content, demonstrate lab assignments, answer student questions in real time, and provide student assistance on anything that is course related.

**Other DE (e.g., recorded lectures)**

Any real-time instruction will be recorded and available to students through the LMS.

**Examinations****Hybrid (1%–50% online) Modality**

Online  
On campus

**Hybrid (51%–99% online) Modality**

Online  
On campus

**Primary Minimum Qualification**

COMPUTER INFORMATION SYS

**Additional local certifications required**

Cisco CCNA certification. This course is preparing students for the Cisco CCNA industry certification so the instructor needs to hold this certification to be qualified to teach the course.

**Review and Approval Dates****Department Chair**

8/21/2020

**Dean**

8/21/2020

**Technical Review**

8/26/2020

**Curriculum Committee**

8/26/2020

**Curriculum Committee**

11/25/2020

**CCCCO**

MM/DD/YYYY

**Control Number**

CCC000543431

**DOE/accreditation approval date**

MM/DD/YYYY