



## Internetworking Technologies I

PEIMS Code: N1302803

Abbreviation: INTNET1

Grade Level(s): 9-12

Award of Credit: 1.0

### Approved Innovative Course

- Districts must have local board approval to implement innovative courses.
- In accordance with Texas Administrative Code (TAC) §74.27, school districts must provide instruction in all essential knowledge and skills identified in this innovative course.
- Innovative courses may only satisfy elective credit toward graduation requirements.
- Please refer to TAC §74.13 for guidance on endorsements.

### Course Description:

The purpose of this course is to begin to prepare students for a networking career by introducing how networks operate. This first course introduces architectures, models, protocols, and networking elements – understanding needed to support the operations and priorities of Fortune 500 companies to small innovative retail businesses. In this course, students will build simple local area networks (LANs), perform basic configurations for routers and switches, and develop a working knowledge of IP addressing schemes and foundational network security.

### Essential Knowledge and Skills:

- (a) General requirements. This course is recommended for students in Grades 9-12. Students shall receive one credit for successful completion of this course.
- (b) Introduction.
  - (1) Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.
  - (2) This course is suitable for the Information Technology (IT) career cluster, which focuses on building linkages in IT occupations for entry level, technical, and professional careers related to the design, development, support, and management of hardware, software, multimedia, and systems integration services.
  - (3) In Internetworking Technologies I, students obtain necessary skills to compete in the global economy. Students learn hands-on technical skills to help them prepare for IT careers as well as postsecondary IT-related degrees. This course provides students with practical skills in networking.
  - (4) Students are encouraged to participate in extended learning

- experiences such as career and technical student organizations and other leadership or extracurricular organizations.
- (5) Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.
- (c) Knowledge and skills.
- (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:
- (A) identify and demonstrate positive work behaviors that enhance employability and job advancement such as regular attendance, promptness, attention to proper attire, maintenance of a clean and safe work environment, appropriate voice, and pride in work;
  - (B) identify and demonstrate positive personal qualities such as flexibility, open-mindedness, initiative, listening attentively to speakers, and willingness to learn new knowledge and skills;
  - (C) use effective reading and writing skills;
  - (D) solve problems and think critically;
  - (E) demonstrate leadership skills and function effectively as a team member;
  - (F) identify and implement proper safety procedures for the workplace; and
  - (G) identify and demonstrate planning and time-management skills.
- (2) The student identifies various employment opportunities in the information technology field. The student is expected to:
- (A) develop a personal career plan that includes education, job skills, and experience necessary to achieve career goals; and
  - (B) develop a resume and portfolio appropriate to chosen career plan; describe and practice interview skills for successful job placement.
- (3) The student understands the operation of data networks. The student is expected to:
- (A) describe the purpose and functions of various network devices;
  - (B) describe the components required for network and Internet communications;
  - (C) select the correct components required to meet a given network specification;
  - (D) describe the purpose and basic operation of the protocols in the Open Systems Interconnection (OSI) and Transmission Control Protocol (TCP) models and their associated protocols;
  - (E) describe the impact of multiple personal wireless devices on a wireless network;

- (F) interpret network diagrams;
  - (G) predict the path between two hosts across a network; and
  - (H) differentiate between local area networks (LAN) and wide area networks (WAN) operation and features.
- (4) The student configures, verifies, and troubleshoots switches in the network. The student is expected to:
- (A) select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts;
  - (B) explain the technology and media access control method for Ethernet technologies;
  - (C) explain network segmentation and basic traffic management concepts;
  - (D) explain the operation and concepts of basic switching;
  - (E) perform, save, and verify initial switch configuration, including switched virtual interfaces (SVI) and default gateway;
  - (F) verify network status and switch operation using basic utilities;
  - (G) implement and verify basic security for a switch; and
  - (H) identify, prescribe, and resolve common switched network media issues, configuration issues, auto negotiation, and switch hardware failures.
- (5) The student implements Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6), addressing services to meet network requirements.  
The student is expected to:
- (A) describe the need and role of IP addressing in a network;
  - (B) compare Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6);
  - (C) create and apply appropriate IP addressing schemes to a network;
  - (D) assign and verify valid IP addresses to hosts, servers, and networking devices in a LAN environment;
  - (E) describe the operation and benefits of using private and public IPv4 addressing;
  - (F) implement static services for hosts in a LAN environment; and
  - (G) identify and correct IP addressing issues.
- (6) The student configures, verifies, and troubleshoots routing. The student is expected to:
- (A) identify and describe basic routing concepts;
  - (B) describe the operation of routers;

- (C) compare methods of routing and routing protocols;
- (D) configure, verify, and troubleshoot static routing;
- (E) connect, configure, and verify operation status of a device interface;
- (F) verify device configuration and network connectivity using ping, traceroute, telnet, Secure Shell (SSH), or other utilities;
- (G) perform and verify routing configuration tasks for a static or default route given specific routing requirements;
- (H) manage internetwork operating system (IOS) and configuration files, including saving and editing;
- (I) implement password protection and physical network security; and
- (J) troubleshoot and correct network and configuration issues.

#### Recommended Resources and Materials:

Cisco Networking Academy. "CCNA 7: Introduction to Networks Course Resources." Cisco, January 2021. <https://www.netacad.com/portal/resources/browse/3a2f6928-8efb-4db8-ba3e-7ef5439f7f7b>. (available post-login)

Cisco Network Academy. "Instructor Packet Tracer Source Files." Cisco, 2019.

<https://www.netacad.com/portal/resources/file/30068>.

Cisco Network Academy. "Instructor PowerPoints." Cisco, 2020.

<https://www.netacad.com/portal/resources/file/30064>.

Cisco Network Academy. "Scope and Sequence." Cisco, 2019.

<https://www.netacad.com/portal/resources/file/30128>.

Cisco Network Academy. "Skills Assessment Design." Cisco, 2019.

<https://www.netacad.com/portal/resources/file/30056>.

Cisco Network Academy. "Student Lab Source Files." Cisco, 2020.

<https://www.netacad.com/portal/resources/file/30054>.

Cisco Network Academy. "Student Packet Tracer Source Files." Cisco, 2019.

<https://www.netacad.com/portal/resources/file/30050>.

#### Available textbooks:

Cisco Press. "Cisco Networking Academy Resource Center." Cisco Networking Academy - Cisco Press | Cisco Press, 2023. <https://www.ciscopress.com/promotions/cisco-networking-academy-136536>.

Cisco Academy Support Centers (ASC) provide expertise and advisement in lab setup, timeline for course, ongoing professional development, etc., for both the school district and the instructor(s) for the class.

Berryman, Gay. "Academy Support and Instructor Training Center / Welcome." Academy Support and Instructor Training Center / Welcome, April 2023.

<https://www.esc11.net/ascitc>.

Lab equipment:

Cisco Press. "Cisco Networking Academy Resource Center." Cisco Networking Academy - Cisco Press | Cisco Press, 2023. <https://www.ciscopress.com/promotions/cisco-networking-academy-136536>.

#### Recommended Course Activities:

Cisco Networking Academy. "Cisco Networking Academy Builds IT Skills & Education for Future Careers." Networking Academy, March 13, 2023. <https://www.netacad.com/> and would include:

- Interactive activities
- Animations
- Videos
- In-line quizzes embedded in the curriculum pages
- Check for Understanding embedded in the curriculum
- In-line Syntax checkers
- Module exams
- Simulator labs

#### Suggested methods for evaluating student outcomes:

- Formative assessments:
  - Interactive quizzes with immediate feedback
  - Interactive activities with syntax checker
  - Completing hands-on labs to reinforce concepts
  - Group projects applying skills learned
- Summative assessments:
  - Module exams
  - Final online exam
  - Final skills-based assessment

#### Teacher qualifications:

An assignment for Internetworking Technologies I is allowed with one of the following certificates.

- Computer Science: Grades 8-12.
- Secondary Computer Information Systems (Grades 6-12)

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- Secondary Industrial Arts (Grades 6-12).
- Secondary Industrial Technology (Grades 6-12).
- Technology Education: Grades 6-12.
- Technology Applications: Early Childhood-Grade 12.
- Technology Applications: Grades 8-12.
- Trade and Industrial Education: Grades 6-12. This assignment requires appropriate work approval.
- Trade and Industrial Education: Grades 8-12. This assignment requires appropriate work approval.
- Trade and Industrial Workforce Training: Grades 6-12. This assignment requires a bachelor's degree and appropriate work approval.
- Vocational Trades and Industry. This assignment requires appropriate work approval.

### Additional information:

- Requires Instructor Training from a Cisco Academy Instructor Training Center (ITC) to be accredited in the Cisco Network Academy System. There are many training centers in the United States that could provide the training. There are also many options as to the format of the training – remote, in-person, blended. The ITC for Texas is located at ESC Region 11. (<https://www.esc11.net/ascitc>) ([About Us](#))
- Training costs would vary from \$300 – 550 per course.