Internetworking Technologies II

PEIMS Code: N1302804

Abbreviation: INTNET2

Grade Level(s): 10-12

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:

This course focuses on switching technologies and router operations that support small-to-medium business networks, including wireless local area networks (WLAN) and security concepts. In Internetworking Technologies II, students perform basic network configuration and troubleshooting, identify and mitigate local area network (LAN) security threats, and configure and secure a basic WLAN. Students will demonstrate a deeper understanding of industry expectations by applying more advanced concepts in a practical lab situation that simulates the environment students might encounter in the workplace. Recommended preparation: Cisco Networking Study Guide: Introduction to Networks or equivalent knowledge.

Essential Knowledge and Skills:

(a) General requirements. Students shall receive one credit for the successful completion of this course. This course is recommended for students in Grades 10-12. Prerequisite: Internetworking Technologies I.

(b) Introduction.

(1) Career and technical education 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 II, students obtain necessary skills to compete in the global economy. As in the first Internetworking Technologies

course, students learn hands-on technical skills to help them prepare for IT careers as well as postsecondary IT-related degrees. This course delves much deeper into networking and troubleshooting skills, such as switch security, wireless configurations, and routing technologies.

(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 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)   demonstrate planning and time-management skills.

(2)   The student identifies various employment opportunities in the information technology field. The student is expected to:

(A)   add to the personal career plan developed in the first course, research further the education and job skills appropriate for this level, and expand on the experience necessary to achieve further certifications;

(B)   edit the resume or portfolio created in the first course to reflect the new skills learned, and

(C)   expand interview skills for successful job placement.

(3)   The student configures, verifies, and troubleshoots advanced switching. The student is expected to:

(A)   describe enhanced switching technologies;

(B)   configure a switch port to be assigned to a Virtual Local Area Network (VLAN) based on requirements;

(C)   configure a trunk port on a Local Area Network (LAN) switch;

(D)   configure Dynamic Trunking Protocol (DTP);

(E)   configure, verify, and troubleshoot spanning tree versions;

(F)   configure, verify, and troubleshoot EtherChannel technologies;

(G)   interpret the output of various show commands to verify the operational status of a Cisco switched network;

(H)   implement switch security to mitigate LAN attacks; and

(I)   implement port security to mitigate media access control (MAC) address table attacks.

(4)   The student configures, verifies, and troubleshoots advanced routing. The student is expected to:

(A)   configure basic settings on a router using command line interface (CLI) to route between two directly connected networks;

(B)   verify connectivity between two networks that are directly connected to a router;

(C)   implement dynamic host configuration protocol version 4 (DHCPv4) to operate across multiple LANs;

(D)   configure a router as a DHCPv4 server and client;

(E)   configure dynamic address allocation in Internet Protocol version 6 (IPv6) networks;

(F)   configure a stateful and stateless dynamic host configuration protocol version 6 (DHCPv6) server;

(G)   configure inter-VLAN routing;

(H)   configure IPv4 and IPv6 static, floating static, and default routing;

(I)   compare static and dynamic routing concepts;

(J)   troubleshoot routing implementation issues; and

(K)   verify router hardware and software operation using show commands;

(5)   The student implements and verifies Wireless LANs (WLANs). The student is expected to:

(A)   explain how WLANs enable network connectivity and configure and verify a basic WAN serial connection;

(B)   describe WLAN technology and standards;

(C)   describe the components of a WLAN infrastructure;

(D)   configure a WLAN to support a remote site;

(E)   configure a wireless lan controller (WLC) wireless local area network (WLAN) to use the management interface and Wi-Fi Protected Access 2 – Pre-Shared-Key (WPA2 PSK) authentication;

(F)   configure a WLC WLAN to use a VLAN interface, a DHCP server, and WPA2 Enterprise authentication; and

(G)   troubleshoot common wireless configuration issues.

(6)   The student troubleshoots switching and routing networks. The student is expected to:

   (A)   analyze and implement proper troubleshooting methods;

   (B)   identify and correct switching and routing network problems; and

   (C)   identify and select software troubleshooting tools.

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 II is allowed with one of the following certificates.

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