



Approved Innovative Course

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Course: Internetworking Technologies I

PEIMS Code: N1302803

Abbreviation: INTNET1

Grade Level(s): 10-12

Number of Credits: 1.0

Course description:

The Internetworking Technologies I course is normally comprised of the courses called Cisco CCNA R&S: Introduction to Networks (CCNA 1) and Cisco CCNA R&S: Routing and Switching Essentials (CCNA 2). The Introduction to Networks course introduces the concept of networking, using various analogies to help the student understand the movement of packets throughout the Internet, and the protocol standards used. The Routing and Switching course moves the student into the theory of “moving packets.” The concepts of routing and switching “packets” to the correct destination is covered, and how a network administrator can direct and/or streamline this process through device configuration and deployment. The course(s):

- Develop a working knowledge of routing, switching, network applications, protocols, and services.
- Use an instructor in the classroom and access expert content online anytime.
- Allow practice of learning on both real equipment and Cisco Packet Tracer, a network configuration simulation tool.
- Give immediate feedback on all work through built-in quizzes and tests.
- Prepare for the workplace with collaborative projects and presentations.
- Connect with the global Cisco Networking Academy community.

Essential knowledge and skills:

- (a) General requirements: This course is recommended for students in Grades 10-12.
- (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.



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- (2) The Information Technology (IT) Career Cluster 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 will obtain the necessary skills to compete in the global economy. Students will learn hands-on technical skills to help them prepare for IT careers as well as post-secondary 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 the necessary skills for career development, maintenance of employability, and successful completion of course outcomes. 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) employ 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;
 - (G) demonstrate an understanding of legal and ethical responsibilities in relation to the field of information technology; and
 - (H) demonstrate planning and time-management skills.



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- (2) The student identifies various employment opportunities in the information technology field. The student is expected to:
 - (A) improve on a personal career plan along with education, job skills, and experience necessary to achieve career goals;
 - (B) develop a resume and portfolio appropriate to chosen career plan, including letters of recommendation; and
 - (C) illustrate interview skills for successful job placement.
- (3) The student applies communication, mathematics, English language arts, and science knowledge and skills to research and develop projects. The student is expected to:
 - (A) demonstrate proper use of written, verbal, and visual communication techniques consistent with networking industry standards;
 - (B) demonstrate proper use of mathematics concepts in the development of networking technologies; and
 - (C) demonstrate proper use of science principles in the development of networking technologies.
- (4) 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 common networking applications Voice Over Internet Protocol (VOIP) and Video Over IP (VIP) on a network;
 - (F) interpret network diagrams;
 - (G) predict the path between two hosts across a network; and
 - (H) differentiate between Local Area Networks/Wide-Area Networks (LAN/WAN) operation and features.
- (5) The student configures, verifies and troubleshoots switching. The student is expected to:



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- (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;
 - (H) identify, prescribe, and resolve common switched network media issues, configuration issues, auto negotiation, and switch hardware failures;
 - (I) describe the function and operation of Virtual Local Area Networks (VLANs); and
 - (J) configure, verify, and troubleshoot VLANs and trunking.
- (6) The student implements Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6) addressing schemes and services to meet network requirements. The student is expected to:
- (A) describe the need and role of addressing in a network;
 - (B) compare and contrast IPv4 and 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) explain the basic uses and operation of Network Address Translation (NAT) in IPv4;
 - (F) describe and verify Domain Name Service (DNS) operation;
 - (G) describe the operation and benefits of using private and public IPv4 addressing;
 - (H) implement static and dynamic addressing services for hosts in a LAN environment; and
 - (I) identify and correct IP addressing issues.
- (7) The student configures, verifies, and troubleshoots routing. The student is expected to:
- (A) describe basic routing concepts;



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- (B) describe the operation of routers;
- (C) compare and contrast methods of routing and routing protocols;
- (D) configure, verify, and troubleshoot routing protocols;
- (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 save, edit, upgrade, backup, and restore;
- (I) implement password and physical security;
- (J) configure and verify interVLAN routing;
- (K) configure and verify Access Control Lists (ACLs);
- (L) configure and verify Domain Host Configuration Protocol (DHCP) and Network Address Translation (NAT); and
- (M) troubleshoot and correct network and configuration issues.

Description of specific student needs this course is designed to meet:

The Internetworking Technologies I course is normally comprised of the courses called Cisco CCNA R&S: Introduction to Networks (CCNA 1) and Cisco CCNA R&S: Routing and Switching Essentials (CCNA 2), which maps to the industry certification Cisco Certified Entry Network Technician (CCENT), which is the ICND1 Cisco test.

If students desire to enter the job market in the field of networking or other IT fields, they need a working knowledge of how to set up, design, and build networks. These courses emphasize hands-on learning and troubleshooting.

Major resources and materials:

Cisco Networking Academy
<https://netacad.com>
The Cisco Learning Network
<https://learningnetwork.cisco.com>



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Recommended course activities:

All resources and materials are available from Cisco and Cisco Learning through the Cisco Networking Academy at <http://netacad.com>. All activities including: curriculum, hands-on labs, tests, Packet Tracer labs, study guides, and reviews are available to all instructors and students.

Suggested methods for evaluating student outcomes:

Chapter tests, quizzes, worksheets, hands-on labs, and Packet Tracer labs are available for every chapter throughout the curriculum. At the completion of this course, students may be prepared to take the Cisco CCENT (ICND1) certification exam.

Teacher qualifications:

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

- (1) Any business or office education certificate.
- (2) Business and Finance: Grades 6-12.
- (3) Business Education: Grades 6-12.
- (4) Secondary Industrial Arts (Grades 6-12).
- (5) Secondary Industrial Technology (Grades 6-12).
- (6) Technology Education: Grades 6-12.
- (7) Technology Applications: Early Childhood-Grade 12.
- (8) Technology Applications: Grades 8-12.
- (9) Trade and Industrial Education: Grades 6-12. This assignment requires appropriate work approval.
- (10) Trade and Industrial Education: Grades 8-12. This assignment requires appropriate work approval.
- (11) Vocational Trades and Industry. This assignment requires appropriate work approval.
- (12) Computer Science: Grades 8-12.
- (13) Secondary Computer Information Systems (Grades 6-12)



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Additional information: