Cerro Coso College
Course Outline of Record Report
10/12/2021

ITC143 : Computer Network Fundamentals

General Information

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Course Code (CB01) :	ITC143
Course Title (CB02) :	Computer Network Fundamentals
Department:	Business Information Technolog
Proposal Start:	Spring 2019
TOP Code (CB03) :	(0702.00) Computer Information Systems
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	CCC000504267
Curriculum Committee Approval Date:	02/09/2018
Board of Trustees Approval Date:	04/12/2018
External Review Approval Date:	Pending
Course Description:	This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP (Internet Protocol) addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for further study of computer networks. It uses the OSI (Open Systems Interconnection) and TCP (Transmission Control Protocol) layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. This course prepares students for the current version of CompTIA's Network+ certification exam. Note: This course was formerly CSCI C143.
Submission Type:	Improvement to Program of Study
	Per program review, changing the designation from CSCI to IT for clarification and SLO data.
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications) • Computer Science
Alternate Master Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications) • Computer Science
Bachelors or Associates Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications)
Additional Bachelors or Associates Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications)

- Computer Science

Course Development Options

Basic Skills Status (CB08)

Course is not a basic skills course.

Course Special Class Status (CB13)

Course is not a special class.

Grade Options

- Letter Grade Methods
- Pass/No Pass

☐ Allow Students to Gain Credit by Exam/Challenge

Allowed Number of Retakes

0

Course Prior To College Level (CB21)

Not applicable.

Rationale For Credit By Exam/Challenge

No value

Retake Policy Description

Type:|Non-Repeatable Credit

☑ Allow Students To Audit Course

Course Support Course Status (CB26)

No value

Associated Programs

☑ Course is part of a program (CB24)

Associated Program	Award Type	Active
Cyber Security Technology	A.S. Degree Major	Spring 2018
Cyber Security Technician	Certificate of Achievement	Spring 2018
Information Technology Plus	Certificate of Achievement	Spring 2018 to Summer 2019
CC Computer Information Systems-	Certificate of Achievement	Spring 2018 to Summer 2019
CC Computer Information Systems	A.S. Degree Major	Spring 2018 to Summer 2019
CC Information Technology	Certificate of Achievement	Summer 2019
CC Information Technology	A.S. Degree Major	Summer 2019
Linux Operating System	Certificate of Achievement	Fall 2020
Cloud Computing	Certificate of Achievement	Fall 2020 to Spring 2021

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Transferable to CSU only

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	72
Total Student Learning Hours	162
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

☐ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	2	4
Laboratory Hours	3	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	36
Laboratory	54
Activity	0
Total	90
Course Out-of-Class Hours	
Lecture	72

Laboratory		0
Activity		0
Total		72

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0   **Faculty Load:** 0

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Advisory

ITC142 - Information & Communication Technology Essentials

Students need to know the essential skills for individual computer repair to assist them as they complete the skills for an Information Technology Technician. These skills include computer hardware identification and basics of building a computer to include installation of components (power supplies, motherboards, processor, memory, and expansion card). In addition, students need to have experience and knowledge of installing and configuring operating systems, application software and
updates. This material is covered in the IT C142/CSCI C142 course.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Outside reading
Rationale	Textbook and Electronic Readings Other Methods: A. Textbook and Electronic Readings B. Pre-recorded Training Videos C. Real-time Lectures D. Discussions E. Lab Scenarios

Methods of Instruction	Audiovisual
Rationale	Pre-recorded Training Videos

Methods of Instruction	Laboratory
Rationale	No value

Methods of Instruction	Lecture
Rationale	No value

Methods of Instruction	Skills Development and Performance
Rationale	No value

Methods of Instruction	Discussion
Rationale	No value

Methods of Instruction	Demonstration
Rationale	No value

Assignments

A. Chapter reading (Example: Reading the assigned chapters from the textbook based on the topics for the week).
B. Weekly step-by-step assignments (Example - Explain basic concepts related to network management.).

C. Weekly application simulations assignments (Example: Identify components of a Transmission Control Protocol/Internet Protocol (TCP/IP) packet using Wireshark and command line tools.)

Methods of Evaluation	Rationale
Final Exam	Comprehensive Exam: A comprehensive exam in a proctored environment will evaluate a student's preparedness for the Net+ exam. Example: Multiple choice and essay question exam covering all concepts of the course.
Participation	Discussions: Students will participate in discussions to critically explore concepts and compare elements of the text. Example: Discuss how a network technician may design a network using various topologies.
Participation	Hands-on labs: Activities will reinforce the practical application of theories presented in the text. Labs will also provide insight and training into real-world tasks for Network Technicians. Example: Use Windows networking utilities (IP Config and Netstat) to demonstrate Transmission Control Protocol/Internet Protocol TCP/IP setup).
Tests	Objective Exams: Objective exams will evaluate the student's comprehension of text material and prepare them for the Net+ certification exam environment. Example: Multiple choice and essay question exam covering computer network configuration and settings.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
West, Jill; Dean, Tamara; and Andrews, Jean	Network Guide to Networks, 7th Edition	Cengage	2016	978130590941

Other Instructional Materials

Description	Cengage. LabSim Network Pro, English 4.2.1 ed., Network+ lab simulation software
Author	No value
Citation	No value

Materials Fee

No

Learning Outcomes and Objectives

Course Objectives

Describe and differentiate the devices and services used to support communications in data networks and the Internet.

Describe the role of protocol layers in data networks.

Evaluate the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments.

Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.

Explain fundamental Ethernet concepts such as media, services, and operations.

Build a simple Ethernet network using routers and switches.

Compose Cisco command-line interface (CLI) commands to perform basic router and switch configurations.

Experiment with common network utilities to verify small network operations and analyze data traffic.

CSLOs

Demonstrate knowledge of networking concepts such as Internet Protocol (IP) addressing, sub-netting, and the logical and physical network topologies.

Expected SLO Performance: 70.0

Identify target information or configuration requirements and perform actions in a skill demonstration scenario that would be encountered in a network environment.

Expected SLO Performance: 70.0

Business Information Technolog Computer Information Systems A.A. Degree for Transfer	3. Demonstrate competency in networking and convergence including the ability to design, analyze, and support computer networks.

Analyze and design a simple Ethernet network using routers and switches.

Expected SLO Performance: 70.0

Business Information Technolog Program Outcomes	Design, analyze, and support computer networks.

Differentiate among challenging technical concepts among a group of peers to analyze potential common networking issues.

Expected SLO Performance: 70.0

Describe how to provide appropriate customer support as a network technician.

Expected SLO Performance: 70.0

Business Information Technolog Program Outcomes	Design, analyze, and support computer networks.
ISLOs Core ISLOs	Students who are completing a program will be prepared to engage in responsible citizenship at various levels.
Business Information Technolog Information Technology Plus Certificate of Achievement	4. Evaluate and apply network security solutions related to servers, storage, and virtualization.

Outline

Course Outline

1. An Introduction to Networking
   a. Advantages of networked computing relative to stand-alone computing
   b. Client/server and peer-to-peer networks differences
   c. Elements common to all client/server networks
   d. Several specific uses for a network
   e. Certifications available to networking professionals
   f. Skills and specializations that helps networking professional to excel
2. Networking Standards and the Open System Interconnection (OSI) Model
   a. Organizations that set standards for networking
   b. Purpose of the OSI model and each of its layers
   c. Specific functions for each OSI model layer
   d. How two network nodes communicate through the OSI model
   e. Structure and purpose of data packets and frames
   f. Two types of addressing covered by the OSI model
3. Transmission Basics and Networking Media
   a. Basic data transmission concepts, including full duplexing, attenuation, latency, and noise
   b. Physical characteristics of coaxial cable, Shielded Twisted Pair (STP), Unshielded Twisted Pair (UTP), and fiber-optic media
   c. Benefits and limitations of different networking media
   d. Principles behind and uses for serial cables
   e. Wiring standards and the best practices for cabling buildings and work areas
4. Introduction to Transmission Control Protocol/Internet Protocol (TCP/IP) Protocols
   a. Purpose and implementation of Domain Name System (DNS)
   b. Well-known ports for key TCP/IP services
   c. Common Application layer TCP/IP protocols are used
5. Topologies and Ethernet Standards
   a. Basic and hybrid Local Area Network (LAN) topologies, and their uses, advantages, and disadvantages
   b. Backbone structures that form the foundation for most networks
   c. Different types of switching used in data transmission
   d. Nodes on Ethernet networks share a communications channel
   e. Characteristics of several Ethernet standards
6. Network Hardware, Switching, and Routing
   a. Functions of LAN connectivity hardware
   b. Install, configure, and differentiate between network devices such as Network Interface Controller (NICs), hubs, bridges, switches, routers, and gateways
   c. Advanced features of a switch and understand popular switching techniques, including Virtual Local Area Network (VLAN) management
   d. Purposes and properties of routing
   e. Common Internet Protocol version 4 (IPv4) and Internet Protocol version 6 (IPv6) routing protocols
7. Wide Area Networks (WAN)
   a. Uses for WANs
   b. Different WAN topologies, including their advantages and disadvantages
   c. Characteristics of WAN technologies, including their switching type, throughput, media, security, and reliability
   d. WAN transmission and connection methods, including Public Switched Telephone Network (PSTN), Integrated Services Digital Network (ISDN), T-carriers, Digital subscriber line (DSL), broadband cable, broadband over powerline, Automated Teller Machine (ATM), and Synchronous Optical Network (SONET)
8. Wireless Networking
   a. How nodes exchange wireless signals
   b. Potential obstacles to successful wireless transmission and their repercussions, such as interference and reflection
   c. Wireless LAN (WLAN) architecture
   d. Characteristics of popular WLAN transmission methods, including 802.11 a/b/g/n
   e. Install and configure wireless access points and their clients
   f. Wireless WAN technologies, including 802.16 (WiMAX), High Speed Packet Access (HSPA+), Long-Term Evolution (LTE), and satellite communications
9. In-Depth TCP/IP Networking
   a. Methods of network design unique to TCP/IP networks, including subnetting, Classless Inter-Domain Routing (CIDR), and address translation
   b. Differences between public and private TCP/IP networks
   c. Protocols used between mail clients and mail servers, including Simple Mail Transfer Protocol (SMTP), Post Office Protocol

(POP3), and Internet Message Access Protocol (IMAP4)
d.   Multiple TCP/IP utilities for network discovery and troubleshooting
e.   Dynamic Host Configuration Protocol (DHCP) uses for dynamic network addressing
10.   Virtual Networks and Remote Access
a.   Virtualization and identify characteristics of virtual network components
b.   Virtual servers, adapters, and switches as part of a network
c.   Techniques for incorporating virtual components in VLANs
d.   Methods for remotely connecting to a network, including dial-up networking, virtual desktops, and thin clients
e.   Virtual Private Networks (VPNs) and the protocols
f.   Features and benefits of cloud computing and Network as a Service (NaaS)
11.   Network Security
a.   Security threats and vulnerabilities in LANs and WANs and design security policies that minimize risks
b.   Security measures for network hardware and design, including firewalls, intrusion detection systems, and scanning tools
c.   Methods of encryption, such as Secure Sockets Layer (SSL) and Internet Protocol Security (IPSec), that can secure data in storage and in transit
d.   How user authentication protocols, such as Public Key Infrastructure (PKI), Remote Authentication Dial In User Service (RADIUS), Terminal Access Controller Access Control System (TACACS+), Kerberos, Challenge-Handshake Authentication Protocol (CHAP), Microsoft version of the Challenge-Handshake Authentication Protocol (MS-CHAP), and Extensible Authentication Protocol (EAP) function
e.   Network operating system techniques to provide basic security
f.   Wireless security protocols, such as Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA), and 802.11i
12.   Voice and Video Over IP
a.   Terminology specific to converged networks
b.   Voice over IP (VoIP) services, Private Branch Exchange (PBXs), and their user interfaces
c.   Video-over-IP services and their user interfaces
d.   VoIP and video-over-IP signaling and transport protocols, including Session Initiation Protocol (SIP), H.323, and Real-time Transport Protocol (RTP)
e.   Quality of Service (QoS) assurance methods critical to converged networks, including Resource Reservation Protocol (RSVP) and Differentiated services (DiffServ)
13. Troubleshooting Network Problems
a.   Steps involved in an effective troubleshooting methodology
b.   Systematic troubleshooting process to identify and resolve networking problems
c.   Symptoms, solutions, and results when troubleshooting network problems and documentation procedures
d.   Variety of software and hardware tools to diagnose problems
14. Ensuring Integrity and Availability
a.   Characteristics of a network that keep data safe from loss or damage
b.   Enterprise-wide network from malware protection
c.   Fault-tolerance techniques for storage, network design, connectivity devices, naming and addressing services, and servers
d.   Best practices for network backup and recovery
e.   Components of a useful disaster recovery plan and the options for disaster contingencies
15. Network Management
a.   Basic concepts related to network management
b.   Importance of documentation, baseline measurements, policies, and regulations in assessing and maintaining a network's health
c.   Performance of Simple Network Management Protocol (SNMP)-based network management software, system and event logs, and traffic-shaping techniques
d.   Reasons for and elements of an asset management system
e.   Regular hardware and software maintenance routines

Lab Outline

1. Transmission Basics and Networking Media
a.   Packet flow with Wireshark.
b.   Media Access Control (MAC) addresses.
2. Introduction to Transmission Control Protocol/Internet Protocol (TCP/IP)
a.   Component identification of a TCP/IP packet using Wireshark and command line tools.
b.   Domain Name System (DNS) server name determination.
c.   Querying a DNS server manually.
3. Network Hardware, Switching and Routing

a. Diagram a network using software and demonstrate where security devices could be implemented to isolate network traffic.

b. Simulator usage to setup networks and isolate traffic isolation.

4. In-Depth TCP/IP Networking

a. Windows networking utilities (IPConfig and Netstat) for TCP/IP setup.

5. Network Management

a. Design a corporate network using software (Visio) and implement it using a simulator.

Delivery Methods and Distance Education

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings ("Hybrid") -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

Face 2 Face
Online
Hybrid

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how will these requirements be met with the same rigor in the Distance Education section?

All assignments in distance education courses (online, hybrid and iTV) of IT C143 are of the same rigor as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually. The use of industry-standard software and a simulation manual instructs students to complete a series of tasks and provides detailed documentation of their results to the instructor. The instructor reviews the student's results and provides feedback to the students on skill development and selection of the correct methods. The instructor can view students' step-by-step actions to provide feedback and guide their learning. The instructor does provide detailed feedback to students to guide their learning. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online is presented virtually. Instead of on-site lectures, hybrid and online courses use a variety of methods including, but not limited to videos, interactive simulations and written lecture notes.

Effective Student-Instructor Contact: Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Moodle Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other (specify)

contact_chat
contact_email

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

No Value

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

itv
publisher

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

No Value