El Camino College
COURSE OUTLINE OF RECORD – Approved

I. GENERAL COURSE INFORMATION

Subject and Number: Computer Information Systems 137
Descriptive Title: Computer Networking Fundamentals
Course Disciplines: Computer Information Systems
Division: Business

Catalog 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. The OSI (Open Systems Interconnection) and TCP (Transmission Control Protocol) layered models are used to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. Students will learn to configure, troubleshoot and resolve problems within a network.

Conditions of Enrollment:
Recommended Preparation Computer Information Systems 13 or equivalent experience

Course Length: X Full Term   Other (Specify number of weeks):
Hours Lecture: 2.00 hours per week   TBA
Hours Laboratory: 3.00 hours per week   TBA
Course Units: 3.00

Grading Method: Letter
Credit Status: Associate Degree Credit

Transfer CSU: X Effective Date: 1/16/2018
Transfer UC: No

General Education:
El Camino College:

CSU GE:

IGETC:

II. **OUTCOMES AND OBJECTIVES**
   A. **COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)**

   1. Students will be able to describe, differentiate, and analyze network technologies to propose solutions to solve communication and data needs of an organization.

   2. Students will be able to plan, document, configure and secure a simple network using routers, switches, and other appropriate hardware and software.

   3. Students will be able to troubleshoot all aspects of network problems including hardware, software, storage and security issues by using troubleshooting methodology and utilities.

   4. Students will be able to differentiate between static and dynamic IP addresses and assign a static IP address, subnet mask, and default gateway to devices on a network.

   The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at http://www.elcamino.edu/academics/slo/.

   B. **Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)**

   1. Describe and differentiate the devices and services used to support communications in data networks and the Internet.
      - Objective Exams

   2. Describe the role of protocol layers in data networks.
      - Objective Exams

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

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

   5. Explain fundamental Ethernet concepts such as media, services, and operations.
      - Objective Exams

   6. Configure a simple Ethernet network using routers, switches and software.
      - Other (specify)
      - lab assignments

   7. Understand how to use common network utilities to verify small network operations and analyze data traffic.
      - Other (specify)
      - lab assignments

III. **OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)**

Lecture or Lab	Approximate Hours	Topic Number	Major Topic

Lecture	3	I	**I. Introduction to Networking Concepts (3 hours, lecture)**
			    A. Kinds of Networks
			    B. Network construction
			    C. Hardware and Software

Lecture	6	II	**II. Functions of Common Networking Protocols (6 hours, lecture)**
			    A. Encryption protocols
			    B. Email protocols
			    C. File Type protocols
			    D. Security protocols
			    E. Other Internet protocols
			    F. Remote access protocols
			    G. Device specific protocols

Lecture	3	III	**III. Network Topologies (3 hours, lecture)**
			    A. Bus
			    B. Ring
			    C. Star
			    D. Mixed

Lecture	6	IV	**IV. Network Scope (6 hours, lecture)**
			    A. Local Area Networking (LAN)
			    B. Metropolitan Area Network (MAN)
			    C. Backbone Network (BN)
			    D. Wide Area Network (WAN)

Lecture	3	V	**V. Network Design (3 hours, lecture)**
			    A. Router Interfaces
			    B. Switching Table
			    C. Access Control List

Lecture	3	VI	**VI. IP Addressing (IPv4 and IPv6) (3 hours, lecture)**
			    A. Subnets
			    B. IP address configuration
			    C. IP address types

Lecture	3	VII	**VII. OSI (Open Systems Interconnection) Model (3 hours, lecture)**
			    A. Application layer
			    B. Presentation layer
			    C. Session layer
			    D. Transport layer
			    E. Network layer
			    F. Data-link layer
			    G. Physical layer

Lecture	3	VIII	**VIII. Network Troubleshooting Methodology (3 hours, lecture)**
			    A. Change Management
			    B. Documentation
			    C. Problem scope and definition

Lecture	6	IX	**IX. Network Security (6 hours, lecture)**
			    A. Network Security Policy
			    B. Physical versus Logical Security
			    C. Network Resource Discovery

Lab	6	X	**X. Wired Network Installation and Configuration (6 hours, lab)**
			    A. Router configuration
			    B. Broadcast domain
			    C. Routing tables

Lab	6	XI	**XI. Internet Protocol (6 hours, lab)**
			    A. Ping and Traceroute
			    B. Routing tables
			    C. Path Checks

Lab	6	XII	**XII. Subnet Network Topologies (6 hours, lab)**
			    A. Subnet topology
			    B. Subnet information

Lab	6	XIII	**XIII. Wireless Network Installation and Configuration (6 hours, lab)**
			    A. Wireless Access Point
			    B. Wireless Network Interface Card
			    C. Wireless settings
			    D. Wireless components

Lab	6	XIV	**XIV. Access Authorization (6 hours, lab)**
			    A. Password and Lockout Policies
			    B. Access Control List
			    C. Network Resource Access
			    D. Network Data Access

Lab	6	XV	**XV. IP Addressing (6 hours, lab)**
			    A. MAC address
			    B. IP address class
			    C. Valid and invalid IP address

Lab	6	XVI	**XVI. OSI Model (6 hours, lab)**
			    A. Layer identification
			    B. Data Transfer
			    C. Source port
			    D. Destination port

Lab	6	XVII	**XVII. Troubleshooting techniques and tools (6 hours, lab)**
			    A. Problem Solving Process
			    B. Information gathering
			    C. Solution Implementation
			    D. Trial and Error
			    E. Network tool utilization

Lab	6	XVIII	XVIII. Network Security (6 hours, lab)
			A. Firewall and Antivirus
			B. Viruses, worms, rootkits and other malware
			C. Levels of security
			D. Data Encryption

Total Lecture Hours	36
Total Laboratory Hours	54
Total Hours	90

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:
Problem solving demonstrations (computational or non-computational)

B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

Troubleshooting with the OSI Model

Required Tools/Equipment: Your classroom computer running Windows 10 or higher.

Description: You have been called to troubleshoot a problem with the connection to a Web server. The user states that when she starts a Web browser and tries to access a page at www.tomsho.net, the Web browser displays an error message after a short time. You try using the step-by-step OSI model approach to solving this problem. In a 1-2 page document, describe the reply you received, which layers of the OSI model you tested, and which layers of the OSI model are most likely the problem.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. EBiz.com has 250 networked computers and five servers and uses a star topology wired network to reach employees' offices, with a bus interconnecting three floors in its office building. Because of a staggering influx of Internet business, the network administrator's task is to boost network performance and availability as much as possible. The company also wants a network design that's easy to reconfigure and change because workgroups form and disband frequently, and their membership changes regularly. All computers must share sensitive data and control access to customer files and databases.

   Aside from the customer information and billing databases, which run on all servers, employees' desktop computers must run standard word-processing and spreadsheet programs. In a 1-2 page paper, evaluate the requirements for this network, determine the best network topology, and provide a sketch of the network design you think best suits Ebiz.com's needs.

2. Diagnose Network Connectivity: The office you are supporting has one main networked printer. The staff have been printing to this printer daily with no problems for the past 3 months. One of your users says he can no longer print to the main printer. Troubleshoot and diagnose the printing problem.

   In a one to two page written report, document the network configuration page, including the steps for how you would proceed to correct the problem.

D. **OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**
      Objective Exams
      Quizzes
      Laboratory reports
      Class Performance

V. **INSTRUCTIONAL METHODS**
   Demonstration
   Discussion
   Lecture
   Multimedia presentations
   Other (please specify)
         Hands-on interactive activities

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. **WORK OUTSIDE OF CLASS**
   Study
   Answer questions
   Skill practice
   Required reading
   Problem solving activities
   Written work

   Estimated Independent Study Hours per Week: 4

VII. **TEXTS AND MATERIALS**
   A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**
      Greg Tomsho. Guide to Networking Essentials. 8th edition. Course Technology, 2020.

   B. **ALTERNATIVE TEXTBOOKS**

   C. **REQUIRED SUPPLEMENTARY READINGS**

   D. **OTHER REQUIRED MATERIALS**
      One flash memory stick

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification

B. Requisite Skills

Requisite Skills

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
Course Recommended Preparation or Computer Information Systems-13	
Non-Course Recommended Preparation equivalent experience	Successful completion of this course requires that the student have a basic knowledge of computer literacy and a user-level knowledge of computer systems including the operating system, device components and various business software.

D. Recommended Skills

Recommended Skills
Computer literacy CIS 13 - Solve common business problems using appropriate information technology applications and systems.
User-level working knowledge of computer technology including its hardware and operating system CIS 13 - Solve common business problems using appropriate information technology applications and systems.

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Junaid Siddiqui on 10/27/2017.

BOARD APPROVAL DATE: 01/16/2018

LAST BOARD APPROVAL DATE: 03/23/2020

Last Reviewed and/or Revised by: Jay Siddiqui   **Date:** 10/21/2019
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