Modesto Junior College
Course Outline of Record

CMPSC 263

I. OVERVIEW
The following information will appear in the 2010 - 2011 catalog

CMPSC 263 Networking Essentials 4 Units
Prerequisite: Satisfactory completion of CMPSC 201.

Concepts of networking technologies. Includes networking standards and the OSI model, transmission basics and media, TCP/IP protocols, topologies and Ethernet standards, hardware, WANs and remote connectivity, wireless networking, network operating systems, voice and video over IP, network security, network troubleshooting, integrity and availability of networks, and network management. Designed to assist individuals preparing for various certifications. Hands-on computer assignments required.

Materials Fee Required
Field trips might be required. (A-F or P/NP - Student choice) Lecture /Lab
Transfer: (CSU)

II. LEARNING CONTEXT
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. COURSE CONTENT

1. Required Content:

A. Networks and Networking Concepts
   1. What is networking
   2. A networking lexicon
   3. Network types

B. Network Design Essentials
   1. Network design
   2. Designing a network layout
   3. Standard topologies
   4. Hubs
   5. Variations of the major topologies

C. Networking media
   1. Network cabling
   2. Primary cable types
   3. Wireless networking
D. Network interface cards
   1. Network interface card (NIC) basics
   2. Choosing netowk adapters
   3. Special-purpose NICs
   4. Driver software

E. Making networks work
   1. Reference model
   2. OSI network model
   3. IEEE 802 model

F. Network communications and protocols
   1. Function of packets in network communications
   2. Protocols
   3. Putting data on the cable

G. Network architectures
   1. Ethernet
   2. Token Ring
   3. AppleTalk and ARCnet
   4. FDDI
   5. Other networking alternatives

H. Simple network operations
   1. Network operating systems
   2. Software components of networking
   3. Installing a network operating system
   4. Network services
   5. Network applications

I. Understanding complex networks
   1. Interconnectivity in mult-vendor environments
   2. Implementing multi-vendor solutions
   3. Centralized vs. client/server computing
J. Network administration and support
   1. Managing networked accounts
   2. Managing network performance
   3. Managing network data security
   4. Avoiding data loss

K. Enterprise and distributed networks
   1. Modems in network communications
   2. Carriers
   3. Remote access networking
   4. Creating larger networks

L. Wide Area and large-scale networking
   1. Wide area network transmission technologies
   2. Advanced WAN technologies

M. Troubleshooting network problems
   1. Preventing problems with network management and planning
   2. Network troubleshooting
   3. Network support resources
   4. Common troubleshooting situations

N. Understanding and using Internet resources
   1. What's on the Internet
   2. Locating Internet resources
   3. Making an Internet connection

2. Required Lab Content:

A. Networking
   1. Elements of a network
   2. How networks are used
   3. Jobs and job requirements

B. Network Standards
   1. OSI model
2. Frame specifications and types

C. Network Protocols
   1. Address Resolution Protocol (ARP)
   2. TCP/IP and NWLink IPX/SPX
   3. Binding order on a multiple protocol network

D. Networking Media
   1. Coaxial
   2. Twisted pair (shielded and unshielded)
   3. Fiber optic
   4. Connectors
   5. Crossover cables

E. Network Architectures
   1. LANs
   2. Bus
   3. Star
   4. Ring
   5. Mesh
   6. Switching and Routing

F. Network Hardware
   1. Network interface cards
   2. Hubs, bridges, and routers

G. WANs and Remote Connectivity
   1. Common carriers
   2. Point-to-point tunneling protocol

H. Network Operating Systems
   1. Windows and Unix/Linux
   2. File Systems
   3. Installing a network operating systems

I. TCP/IP and the Internet
1. IP addresses and network classes
2. Subnets
3. Network gateways
4. Network services: DHCP, DNS, FTP, and network ports

J. Troubleshooting Network Problems
   1. Network utilities: ping, nslookup, ipconfig, ifconfig, tracert, traceroute
   2. Troubleshooting a malfunctioning NIC
   3. Troubleshooting network media
   4. Troubleshooting connectivity components: hubs, switches, routers

K. Maintaining and Upgrading a Network
   1. Performing network upgrades
   2. Service packs
   3. Researching network solutions on the web

L. Ensuring Integrity and Availability
   1. Viruses
   2. Universal Power Supplies (UPCs)
   3. RAID
   4. Backups

M. Network Security
   1. Auditing
   2. Security Risks
   3. Security Configuration

B. ENROLLMENT RESTRICTIONS
   1. Prerequisites
      Satisfactory completion of CMPSC 201.
   2. Requisite Skills
      Before entering the course, the student will be able to:
      a. Demonstrate how to use the Windows operating system.
      b. Describe the functional components of a microcomputer system.
c. Discuss how systems software controls the components of a microcomputer system.

d. Discuss how microcomputer applications are used to solve individual and business problems.

C. HOURS AND UNITS

<table>
<thead>
<tr>
<th>INST METHOD</th>
<th>TERM HOURS</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lect</td>
<td>54</td>
<td>3.00</td>
</tr>
<tr>
<td>Lab</td>
<td>54</td>
<td>1.00</td>
</tr>
<tr>
<td>Disc</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

D. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Lecture and Discussion Methods
2. Classroom Demonstrations
3. Technology Presentations
4. Question and Answer Sessions
5. Lab Demonstrations
6. Practical Hands-On Exercises
7. Independent Study through readings

E. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS

   Time spent on coursework in addition to hours of instruction (lecture hours)

   a. (Weekly) Write one-page summaries of network articles published in leading telecommunications journals and by standards organizations.

   b. (Weekly) Carefully analyze and follow detailed instructions for completion of projects.

   c. (Weekly) Quizzing on networking concepts and terminology.

   d. (Weekly) Lab activities focused on hands-on implementation of networking concepts and solutions.

   e. (Per term) Compare and contrast different network systems, computer hardware, and software components as well as networking computer codes.

   f. (Per term) Design solution algorithms for network problems and implement those solutions using systems analysis techniques and telecommunications programs.

   g. (Per term) Several exams at strategic points during the term.

2. EVIDENCE OF CRITICAL THINKING

   Assignments require the appropriate level of critical thinking

   a. Essay Prompt: You are a networking professional who works in a college computer lab. The computers run only the TCP/IP protocol on an Ethernet network, and all computers use 3Com NICs. Many beginning computer science students use this lab for homework; you help them access the network and troubleshoot problems with their connections on a daily basis. One day,
a student begins tampering with his computer; when he restarts the computer, it alerts him that it can’t find the network.
He calls you over to help. You ensure all the physical connections are sound. Then, you check the workstation’s network properties and find that he has changed the frame type that his NIC uses to transmit data from Ethernet to token ring. Explain why this has prevented the workstation from connecting to the network.

b. Lab Project: To better understand the impact IEEE has on networking standards, it is helpful to read the actual standards and consider how they are used. This project will guide you through the process of searching for IEEE specifications on the Web. You will also take a look at the IEEE 802.3 standard for the most popular form of LAN technology, Ethernet. To complete this project, you need a computer with access to the Internet (through a high-speed connection), a Web browser, and version 6.0 or higher of the Adobe Acrobat reader (available free at Adobe’s Web site, www.adobe.com). This exercise further assumes that your Web browser is configured to recognize and open Adobe Acrobat documents automatically when one is selected (fourteen detailed steps follow).

c. Example Quiz/Exam Questions:

i. The use of 1s and 0s to represent information is characteristic of a(n) __________________ system.

ii. The combination of additional bits used for subnet information plus the existing network ID is known as the ______________________________.

iii. A(n) ____________________ is a software application on a network host that acts as an intermediary between the external and internal networks, screening all incoming and outgoing traffic.

iv. A help desk is typically staffed with ____________________ - people proficient in workstation and network troubleshooting.

v. Describe the OSI model Session layer’s functions.

F. TEXTS AND OTHER READINGS (TYPICAL)


III. DESIRED LEARNING

A. COURSE GOAL

As a result of satisfactory completion of this course, the student should be prepared to:

- articulate fundamental network characteristics and terminology, analyze standard network topologies,
- articulate standard network protocols and basic security measures, and troubleshoot network problems.

B. STUDENT LEARNING GOALS

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. Required Learning Goals

   Upon satisfactory completion of this course, the student will be able to:

   a. Describe the fundamental characteristics of local and wide area networks.
   b. Explain networking lexicons.
   c. Recognize various types of computer networks.
   d. Design a network layout.
e. Compare and contrast standard topologies and hubs.

f. Construct a network.

g. Compare and contrast networking media.

h. Evaluate and select network adapters for best performance and application.

i. Differentiate the seven layers of the OSI Model.

j. Describe the function of packets in network communications.

k. Explain the function of network protocols.

l. Compare and contrast network architectures.

m. Describe and demonstrate simple network operations.


o. Demonstrate network administration and support features.

p. Design a distributed network.

q. Describe the technological requirements of large-scale networks.

r. Diagnose and solve network problems.

s. Effectively use Internet resources.

2. Lab Learning Goals

   Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Describe elements of a network.

   b. Discuss network standards organizations.

   c. Apply the seven layers of the OSI model to various protocol stacks.

   d. Identify frame specifications and frame types.

   e. Install, configure and set binding order for multiple network protocols including TCP/IP.

   f. Evaluate network media and create various types of media solutions with appropriate connectors.

   g. Design and implement multiple network architectures.

   h. Install and configure network hardware components.

   i. Describe the requirements for WAN and remote connectivity.

   j. Install and troubleshoot multiple network operating systems.

   k. Configure Internet gateway systems.

   l. Diagnose network problems using hardware and software network tools.

   m. Implement network integrity measures.

   n. Design and manage a network security plan.
IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT

1. Assignments
2. Quizzes
3. Lab Activities
4. Exams

B. SUMMATIVE ASSESSMENT

1. Assignments
2. Quizzes
3. Lab Activities
4. Exams