I. INTRODUCTION

A. Networks are complex environments involving multiple media, multiple protocols, and interconnections to networks outside an organization’s central office. Well-designed and carefully installed networks can reduce the problems associated with growth as a networking environment evolves.

B. Designing, building, and maintaining a network can be a challenging task. Even a small network that consists of only fifty nodes can pose complex problems that lead to unpredictable results. Large networks that feature thousands of nodes can pose even more complex problems. Despite improvements in equipment performance and media capabilities, designing and building a network is difficult.

C. This chapter provides a review of the Open System Interconnection (OSI) reference model and an overview of network planning and design considerations related to routing. Using the OSI reference model as a guide for network design can facilitate changes. Using the OSI reference model as a hierarchical structure for network design allows you to design networks in layers. The OSI reference model is at the heart of building and designing networks, with every layer performing a specific task to promote data communications. In this semester, the focus is on Layer 1 through Layer 4.

D. Prerequisite: ITCC 1401, ITCC 1404 Departmental approval is required.

II. LEARNING OUTCOMES

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

A. The type and speed of LAN and WAN media to be implemented

B. How data is sent across the media

C. The type of addressing schemes used
D. How data will be reliably sent across the network and how flow control will be accomplished

E. The type of routing protocol implemented.

III. INSTRUCTIONAL MATERIALS

Required Text:

A. The instructional materials identified for this course are viewable through www.ctcd.edu/books

B. Required Equipment Provided by Department:

   Computer System

IV. COURSE REQUIREMENTS

This course has been designed with an on-line component to the curriculum. The student will be required to attend classes and labs. Tests are taken on-line as well. It is suggested that the student read the text and then take notes on the lecture. A complete journal will be due as requested. Late assignments will result in 10% less than full credit.

V. EXAMINATIONS

A. There are exams for each completed chapter and a final exam. All exams will be taken on-line on the CISCO server and DURING CLASS TIME ONLY. Student must SCORE a 90 or higher on chapter exams or a GRADE of 0 will be recorded in the grade book for that chapter.

B. In order to RE-TEST to make up for a bad test grade a student must complete the remedial work as outlined in that section. Before a second attempt is allowed, the student must do a detailed outline of the entire chapter(s).

C. All tests over a chapter are averaged to give a grade for that chapter, not just the grade shown in the grade book.

VI. SEMESTER GRADE COMPUTATION

The course grade will be calculated according to the following weights:

   Lab Exercise          200 points          1000 - 900 = A
On-line tests 400 points 899 - 800 = B
Case Study 200 points 799 - 700 = C
Final Exam 200 points 699 - 600 = D
TOTAL 1000 points 599 - 0 = F

Students, who do not complete all projects successfully with approval by the instructor, will receive an Incomplete for the course grade and will have three weeks into the next semester to finish the projects or their grade will become an F.

VII. ATTENDANCE

Students are required to attend all classes in which they have enrolled. Students are required to be in the classrooms on time and remain for the duration of the class.

Any time a student has 10 hours absence and administrative withdrawal will be submitted.

A. Four Classes of 2 1/2 hours = 10 Hours
B. Late for Class = 1 Hour Absence: 10 Times = 10 Hours

VIII. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Course Withdrawal: It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application of Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

A student who officially withdraws will be awarded the grade of W provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of F.

B. Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements.

C. Incomplete Grade: The College catalog states, an incomplete grade may be given in those cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course. Prior approval from the instructor is required before the grade of IP for Incomplete is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an F for the course.

D. Cellular Phones and Beepers: Cellular phones and beepers will be turned off while the
E. **Americans with Disabilities Act (ADA):** Disability Support Services provides services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

F. **Instructor Discretion:** The instructor reserves the right of final decision in course requirements.

G. **Civility:** Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

IX. **COURSE OUTLINE**

A. **Unit One: Review: LAN Design**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   a. Identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach
   b. Interpret network diagrams
   c. Select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts
   d. Explain the technology and media access control method for Ethernet networks

2. **Learning Activities:**
   a. Read and discuss Unit One of course text. (F1, F5, F6)
   b. Complete the on-line exam for this unit. (F12)
   c. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)

B. **Unit Two: Basic Switch Concepts and Configurations**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   a. Explain basic switching concepts and the operation of Cisco switches
   b. Perform and verify initial switch configuration tasks including remote
access management
c. Manage Cisco IOS® Software
d. Manage Cisco IOS configuration files (save, edit, upgrade, and restore)

2. **Learning Activities**

a. Read and discuss Unit Two of course text. (F1, F5, F6)
b. Complete the on-line exam for this unit. (F12)
c. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)
d. Complete all TCS requirements for Chapter 2. (F7, F8, F10)

C. **Unit Three: VLANs**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:

   a. Describe how VLANs create logically separate networks and how routing occurs between them

2. **Learning Activities**

b. Read and discuss Unit Three of course text. (F1, F5, F6)
c. Complete the on-line exam for this unit. (F12)
d. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)
e. Complete all TCS requirements for Chapter 3. (F7, F8, F10)
D. **Unit Four: VTP**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   
a. Describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), and 802.1q

2. **Learning Activities**
   
a. Read and discuss Unit Three of course text. (F1, F5, F6)
b. Complete the on-line exam for this unit. (F12)
c. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)
d. Complete all TCS requirements for Chapter 4. (F7, F8, F10)

E. **Unit Five: STP**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   
a. Describe enhanced switching technologies such as Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q

2. **Learning Activities**
   
a. Read and discuss Unit Five of course text. (F1, F5, F6)
b. Complete the on-line exam for this unit. (F12)
c. Complete all Lab exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20)(F9)
d. Complete all TCS requirements for Chapter 5. (F7, F8, F10)

F. **Unit Six: Inter-VLAN Routing**

1. **Unit Objectives:** Upon successful completion of this unit the student will be able to:
   
a. Configure, verify, and troubleshoot VLANs, trunking on Cisco switches, inter-VLAN routing, STP, and VTP

b. Interpret the output of various **show** and **debug** commands to verify the operational status of a Cisco switched network

c. Verify network status and switch operation using basic utilities such as ping, traceroute, Telnet, Secure Shell (SSH), Address Resolution Protocol (ARP), and ipconfig, as well as the **show** and **debug** commands
d. Identify, prescribe, and resolve common switched network media issues, configuration issues, autonegotiation, and switch hardware failures

2. Learning Activities

a. Read and discuss Unit Six of course text. (F1, F5, F6)

b. Complete the on-line exam for this unit. (F12)

c. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)

G. Unit Seven: Basic Wireless Concepts and Configurations

1. Unit Objectives: Upon successful completion of this unit the student will be able to:

a. Describe standards associated with wireless media, such as IEEE WI-FI Alliance and ITU/FCC

b. Identify and describe the purpose of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS)

c. Identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points

d. Compare and contrast Wi-Fi Protected Access (WPA) security features and capabilities of open, Wired Equivalent Privacy (WEP), and WPA-1/2 networks

e. Describe common wireless-network implementation issues such as interference and misconfiguration

2. Learning Activities

a. Read and discuss Unit Seven of course text. (F1, F5, F6)

b. Complete the on-line exam for this unit. (F12)

c. Complete all Lab Exercises given out by the Instructor. (C5, C6, C7, C8, C9, C14, C19, C20) (F9)

d. Complete all TCS requirements for Chapter 7. (F7, F8, F10)