IT 0125 - ROUTING AND SWITCHING ESSENTIALS

Catalog Description

Formerly known as CIS 66
Prerequisite: Completion of IT 105 with grade of "C" or better
Hours: 72 (54 lecture, 18 laboratory)
Description: Focuses on switching technologies and router operations that support small-to-medium business networks and includes Wireless Local Area Networks (WLANs) and security concepts. Students learn key switching and routing concepts. Students will perform basic network configuration and troubleshooting, identify and mitigate Local Area Network (LAN) security threats, and configure and secure a basic WLAN. (CSU)

Course Student Learning Outcomes

- CSLO #1: Research, analyze and evaluate information to solve business problems using appropriate computer technology.
- CSLO #2: Design and produce computer technology solutions incorporating current trends, security, and best practices.
- CSLO #3: Employ computer technology concepts and terminology in professional communication.
- CSLO #4: Demonstrate marketable computer technology career skills.

Effective Term

Fall 2023

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

90

Total Student Learning Hours

162

Course Objectives

Lecture Objectives:
1. Explain how to support available and reliable networks using dynamic addressing and first-hop redundancy protocols.
2. Describe basic switching concepts
3. Discuss how VLANs create logically separate networks and how routing occurs between them
4. Describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q.
5. Describe the purpose, nature, and operations of a router, routing tables, and the route lookup process,
6. Discuss dynamic routing protocols, distance vector routing protocols, and link-state routing protocols, the
7. Describe the purpose and types of access control lists (ACLs),
8. Discuss the operation and benefits of Dynamic Host Configuration Protocol (DHCP), Domain Name System (DNS) for IPv4 and IPv6, and Network Address Translation (NAT).

Laboratory Objectives:
1. Configure VLANs and Inter-VLAN routing applying security best practices.
2. Troubleshoot inter-VLAN routing on Layer 3 devices.
3. Configure redundancy on a switched network using STP and EtherChannel.
4. Troubleshoot EtherChannel on switched networks.
5. Configure dynamic address allocation in Internet Protocol version 6 (IPv6) networks.
6. Configure WLANs using a Wireless Controller (WLC) and Layer 2 (L2) security best practices.
7. Configure switch security to mitigate LAN attacks.
8. Configure IPv4 and IPv6 static routing on routers.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Objective Examinations
  - Example: Objective Quizzes/Exams will be given at the end of each chapter consisting of multiple choice questions demonstrating knowledge of the chapter concepts. The instructor will be checking for accuracy. Example (1) quiz question: ___ is a distance-vector routing protocol that broadcasts entire routing tables to neighbors every 30 seconds, out of every interface. a. RIP c. BGP b. OSPF d. EIGRP Example (2) To determine how many digits are used for the network identifier, you must look at the ___, which is a required component for all IP hosts. a. subnet mask c. network mask b. MAC mask d. TCP/IP mask
- Problem Solving Examinations
  - Example: You are the network administrator for a small network. You have been given the 192.168.54.0 network. Identify the appropriate subnet mask, that will give you the necessary number of subnets needed to create this network.
- Projects
  - Example: In this lab you will use PacketTracer to set up a multi-router network, create static routes between those networks and ping between routers. In addition, you will enable and configure RIP to automatically learn routes, and test those routes using ping.
- Skill Demonstrations
  - Example: You will be part of two teams (two students each on each team) that will create five networks connected by two routers. You will connect the routers together using a V.35 back-to-back serial cable. The computers will be connected to the routers using Cat 5 Ethernet cable. You will also enable and configure RIP routing protocol on both routers. Once connected and configured, you will ping from the computer on one network to the computers on the other networks through the two routers.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Using in-class lab assignments, students will be shown and practice how to configure and verify static routes, and use routing protocols to create a small routed network. Students will first learn these techniques using router simulation software, and then will learn how to perform these tasks on real routers. Students will be required to demonstrate proficiency/accuracy in these skills. (Laboratory Objective 3)

Lecture:

1. Instructors will use the lecture/discussion method to present basic switching and routing concepts, including: router operations, routing tables, dynamic routing protocols, etc. During lecture/discussion, the instructor will be engaging students actively through question/response, giving real-life examples of key concepts, and checking for understanding. (Lecture Objective 1)

Distance Learning

1. Using a online virtual lab system, students will be provided with a written scenario, asking them to configure the parameters on a Cisco switch to create a number of VLANs and configure the switch ports according to how they will be used. Students will provide screenshots at key points in the lab to demonstrate proficiency/accuracy in these skills. (Laboratory Objective 1)

Typical Out of Class Assignments
Reading Assignments

1. Students will be assigned chapter reading assignments from the course textbook which will need to be completed before each class session. Example: Read the chapter about Advanced Routing Protocols and be prepared to discuss in class. 2. Internet research and reading assignments will be required that build on concepts presented in class, and provide insight into current technology industry trends and innovations. Example: research to find additional information about utilizing VLANs in a business environment and be prepared to discuss in class.

Writing, Problem Solving or Performance

1. Lab assignments will require students to perform technical tasks and provide written responses that demonstrate logical analysis and problem solving. Example: Students asked to complete a lab to set up a two router network and configure the router interfaces to allow them to communicate. 2. Chapter review questions will be assigned to students and must be completed before the start of each class. Review questions will require written answers that demonstrate problem solving and an understanding of chapter concepts. Example: Answer questions at end of the chapter about Router Startup and Configuration.

Other (Term projects, research papers, portfolios, etc.)
Required Materials

- Switching, Routing, and Wireless Essentials Companion Guide
  - Author: Cisco Networking Academy
  - Publisher: Cisco Press
  - Publication Date: 2020
  - Text Edition: 1st
  - Classic Textbook?: No
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.