CCNA 2: Routing and Switching Essentials (ITCC 1344)

Credit: 3 semester credit hours (2 hours lecture, 4 hours lab)

Prerequisite/Co-requisite: ITCC 1314

Course Description

Describes the architecture, components, and basic operation of routers and explains the basic principles of routing and routing protocols. It also provides an in-depth understanding of how switches operate and are implemented in the LAN environment for small and large networks.

Required Textbook and Materials

1. *Switching, Routing, and Wireless Essentials Companion Guide (CCNAv7)*, by Cisco Networking Academy, Cisco Press, August 2020.

    a. ISBN for print book is 978-0-13-672935-8
    b. ISBN for e-book is 978-0-13-672948-8.

Recommended Textbook and Materials

1. *CCNA 200-301 Portable Command Guide, 5th Edition*, by Cisco Networking Academy, Cisco Press, 2020. *This is the 5th Edition, which aligns with the CCNAv7 certification and curriculum.*

    a. ISBN for print book is 978-0-13-593782-2.
    b. ISBN for e-book is 978-0-13-593770-9.

Course Objectives

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

1. Configure and maintain routers and switches.
2. Resolve common issues with routing protocols, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Course Outline

1. Basic Device Configuration
    a. Configure a Switch with Initial Settings
    b. Configure Switch Ports
    c. Secure Remote Access
    d. Basic Router Configuration
    e. Verify Directly Connected Networks

2. Switching Concepts
    a. Frame Forwarding
    b. Collision and Broadcast Domains
3. VLANs
    a. Overview of VLANs
    b. VLANs in a Multi-Switched Environment
    c. VLAN Configuration
    d. VLAN Trunks
    e. Dynamic Trunking Protocol
4. Inter-VLAN Routing
    a. Inter VLAN Routing Operation
    b. Router-on-a-Stick Inter-VLAN Routing
    c. Inter-VLAN Routing using Layer 3 Switches
    d. Troubleshooting Inter-VLAN Routing
5. STP Concepts
    a. Purpose of STP
    b. STP Operations
    c. Evolution of STP
6. EtherChannel
    a. EtherChannel Operation
    b. Configure EtherChannel
    c. Verify and Troubleshoot EtherChannel
7. DHCPv4
    a. DHCPv4 Concepts
    b. Configure a Cisco IOS DHCPv4 Server
    c. Configure a DHCPv4 Client
8. SLAAC and DHCPv6
    a. IPv6 GUA Assignment
    b. SLAAC
    c. DHCPv6
    d. Configure DHCPv6 Server
9. FHRP Concepts
    a. First Hop Redundancy Protocols
    b. HSRP
10. LAN Security Concepts
    a. Endpoint Security
    b. Access Control
    c. Layer 2 Security Threats
    d. MAC Address Table Attack
    e. LAN Attack

11. Switch Security Configuration
    a. Implement Port Security
    b. Mitigate VLAN Attacks
    c. Mitigate DHCP Attacks
    d. Mitigate ARP Attacks
    e. Mitigate STP Attacks
12. WLAN Concepts
    a. Introduction to Wireless
    b. WLAN Components
    c. WLAN Operation
    d. CAPWAP Operation
    e. Channel Management
    f. WLAN Threats
    g. Secure WLANs
13. WLAN Configuration
    a. Remote Site WLAN Configuration
    b. Configure a Basic WLAN on the WLC
    c. Configure a WPA2 Enterprise WLAN on the WLC
    d. Troubleshoot WLAN Issues
14. Routing Concepts
    a. Path Determination
    b. Packet Forwarding
    c. Basic Router Configuration Review
    d. IP Routing Table
    e. Static and Dynamic Routing
15. IP Static Routing
    a. Static Routes
    b. Configure IP Static Routes
    c. Configure IP Default Static Routes
    d. Configure Floating Static Routes
    e. Configure Static Host Routes
16. Trouble Static and Default Routes
    a. Packet Processing with Static Routes
    b. Troubleshooting IPv4 Static and Default Route Configuration

Grade Scale

90 – 100   A
80 – 89   B
70 – 79   C
60 – 69   D
0 – 59   F

Course Evaluation

Final grades will be calculated according to the following criteria:

Labs and Packet Tracers	30%
Study Guides	10%
Modules Tests	30%
Final Exams	30%

Course Requirements

1. Demonstrate proficiency through hands-on labs as assigned.
2. Build and troubleshoot virtual labs in Packet Tracer as assigned.
3. Complete Chapter Study Guides.
4. Complete the Final Exam. The Final Exam will consist of two parts, hands-on and written. The hands-on portion will use Packet Tracer and the written portion will use the online Cisco curriculum.

Course Policies

1. No food, drinks, use of tobacco products, or vaping products in class.
2. Electronic devices not being used for the class, such as phones and headphones, must be turned off while in class. Any device usage during class may result in a deduction of points on an assignment or test.
3. Do not bring children to class.
4. Certification: If a student passes the certification test that is associated with this class, you will receive an "A" on the final exam and credit for 25% of your labs. If you have missed a previous test, you must still take the final exam to substitute for that grade.
5. Attendance Policy: Three absences are allowed. If a student is tardy to class or departs early three (3) times, it will be equal to one (1) absence. Each absence beyond three absences will result in a 2 point deduction from your final grade.
6. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an 'F' in the course.
7. Tools: Return all tools and/or software to their designated place.
8. A grade of 'C' or better must be earned in this course for credit toward degree requirement.
9. Additional course policies, as defined by the individual course instructor, will be outlined in the course addendum and provided by the instructor.

Technical Requirements (for courses using Blackboard)

The latest technical requirements, including hardware, compatible browsers, operating systems, software, Java, etc. can be found online at:

https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support/Browser_Checker.

A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of the online technology and resources.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737, visit the Student Services office at the Eagles' Nest, or visit the online resource: https://www.lit.edu/student-success/special-populations

Starfish

LIT utilizes an early alert system called Starfish. Throughout the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff, all through the Starfish home page. You can also log in to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT. For more information, visit https://lit.edu/student-success/starfish.

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office. Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document.

Certification Requirement

CNTT and Cyber Security majors are required to earn certification in one of the following areas prior to graduation.

- A+ Certification
- Network+ Certification
- Security+ Certification
- Linux+ Certification
- Cisco Certified Network Associate (CCNA)

This course covers part of the material to prepare for the Cisco Certified Network Associate v1.0 (CCNA 200-301) certification exam. All three Cisco courses must be completed to cover the material for the CCNA exam. Students are responsible for scheduling and paying for the certification through the LIT Testing Center. More information about the certification can be found online at http://www.cisco.com/c/en/us/training-events/training-certifications/certifications.html.