

# Inver Hills Community College

## ITC 2536: Enterprise Networking, Security, Automation, and Core Technologies

### A. COURSE DESCRIPTION

Credits: 6

Lecture Hours/Week: 4

Lab Hours/Week: 4

OJT Hours/Week: \*.\*

Prerequisites:

CNT 2510 - Network Fundamentals (CCNA 1) (Minimum grade: 2.0 GPA equivalent) AND ITC 2510 - Introduction to Networks (CCNA1) (Minimum grade: 2.0 GPA equivalent) AND ITC 2520 - Switching, Routing, and Wireless Essentials (CCNA 2) (Minimum grade: 2.0 GPA equivalent) AND ITC 2515 - Introduction to Networks and Routing and Switching Essentials (CCNA 1/2) AND ITC 2516 - Intro to Networks and Switching, Routing, and Wireless Essentials (CCNA1/2)

Corequisites: None

MnTC Goals: None

Explores the design, management, configuration, and troubleshooting of enterprise computer networks in depth. This includes the ability to configure OSPF and eBGP routing protocols, access control lists, and NAT, as well as an understanding of wide area networking, VPNs, SD-WAN, quality of service, network security, virtualization, and automation technologies. This course completes the coursework preparation for the CCNA certification exam as well as the CCNP Enterprise Core certification exam.

### B. COURSE EFFECTIVE DATES: 07/31/2020 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. OSPFv2 Concepts & Configuration 7%  
Network Security and ACL Concepts, ACL and NAT Implementation 15%  
WAN, VPN, and QoS Concepts 10%  
Network Design, Management, and Troubleshooting 11%  
Network Virtualization and Automation 7%  
Enterprise Network Architecture 8%  
Enterprise Network Virtualization and Assurance 10%  
Enterprise Network Infrastructure (Layer 2, Layer 3, Wireless, IP Services) 15%  
Enterprise Network Security 10%  
Enterprise Network Automation 7%

**D. LEARNING OUTCOMES (General)**

1. Students will be able to:
  - Explain how single-area OSPF operates in both point-to-point and broadcast multiaccess networks.
  - Implement single-area OSPFv2 in both point-to-point and broadcast multiaccess networks.
  - Explain how vulnerabilities, threats, and exploits can be mitigated to enhance network security.
  - Explain how ACLs are used as part of a network security policy.
  - Implement IPv4 ACLs to filter traffic and secure administrative access.
  - Implement NAT services on the edge router to provide IPv4 address scalability.
2.
  - Explain how WAN access technologies can be used to satisfy business requirements.
  - Explain how VPNs and IPsec are used to secure site-to-site and remote access connectivity.
  - Explain how networking devices implement QoS.
  - Implement network management protocols to monitor the network.
  - Explain the characteristics of scalable network architectures.
  - Troubleshoot enterprise networks using the layered model, a systematic process, and appropriate tools.
  - Explain the purpose and characteristics of network virtualization.
3.
  - Explain how network automation is enabled through RESTful APIs and configuration management tools.
  - Explain the different design principles used in an enterprise network
  - Analyze design principles of a WLAN deployment
  - Differentiate between on-premises and cloud infrastructure deployments
  - Explain the working principles of the Cisco SD-WAN solution
  - Explain the working principles of the Cisco SD-Access solution
  - Describe concepts of wired and wireless QoS
  - Differentiate hardware and software switching mechanisms
  - Describe device virtualization technologies
4.
  - Configure and verify data path virtualization technologies
  - Describe network virtualization concepts
  - Troubleshoot static and dynamic 802.1q trunking protocols
  - Troubleshoot static and dynamic EtherChannels
  - Configure and verify common Spanning Tree Protocols (RSTP and MST)
  - Compare routing concepts of EIGRP and OSPF (advanced distance vector vs. linked state, load balancing, path selection, path operations, metrics)
5.
  - Configure and verify simple OSPF environments, including multiple normal areas, summarization, and filtering (neighbor adjacency, point-to-point and broadcast network types, and passive interface)
  - Configure and verify eBGP between directly connected neighbors (best path selection algorithm and neighbor relationships)
  - Describe Layer 1 wireless concepts, such as RF power, RSSI, SNR, interference noise, band and channels, and wireless client devices capabilities
  - Describe AP modes and antenna types
  - Describe access point discovery and join process (discovery algorithms, WLC selection process)
6.
  - Describe the main principles and use cases for Layer 2 and Layer 3 roaming
  - Troubleshoot WLAN configuration and wireless client connectivity issues
  - Describe Network Time Protocol (NTP)
  - Configure and verify NAT/PAT
  - Configure first hop redundancy protocols, such as HSRP and VRRP
  - Describe multicast protocols, such as PIM and IGMP v2/v3
  - Diagnose network problems using tools such as debugs, conditional debugs, trace route, ping, SNMP, and syslog
  - Configure and verify device monitoring using syslog for remote logging

7.
  - Configure and verify NetFlow and Flexible NetFlow
  - Configure and verify SPAN/RSPAN/ERSPAN
  - Configure and verify IPSLA
  - Describe Cisco DNA Center workflows to apply network configuration, monitoring, and management
  - Configure and verify NETCONF and RESTCONF
  - Configure and verify device access control
  - Configure and verify infrastructure security features
  - Describe REST API security
  - Configure and verify wireless security features
  - Describe the components of network security design
  - Interpret basic Python components and scripts
  - Construct valid JSON encoded file
8.
  - Describe the high-level principles and benefits of a data modeling language, such as YANG
  - Describe APIs for Cisco DNA Center and vManage
  - Interpret REST API response codes and results in payload using Cisco DNA Center and RESTCONF
  - Construct EEM applet to automate configuration, troubleshooting, or data collection
  - Compare agent vs. agentless orchestration tools, such as Chef, Puppet, Ansible, and SaltStack

#### **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

None

#### **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

#### **G. SPECIAL INFORMATION**

None noted