Montgomery County Community College
CIS 172
Enterprise Networking, Security and Automation
3-3-2

CATALOG DESCRIPTION:
This course discusses the WAN technologies and network services required by converged applications in a complex network. The course enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students learn how to configure and troubleshoot network devices and resolve common issues with data link protocols. Students will also develop the knowledge and skills needed to implement IPSec, OSPF and virtual private network (VPN) operations in a complex network.

PREQUISITES:
Previous Course Requirements
- CIS 171 Switching, Routing and Wireless Essentials (Cisco Semester 2 v7.0) completed within the past 3 years.

Concurrent Course Requirements
None

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
1. Describe different WAN technologies and their benefits.	Lecture/Discussion Hands on Lab Exercises Homework Assignments Projects	Chapter Tests Written and Skills-Based Evaluations Final Exam
2. Identify the operations and benefits of virtual private networks (VPNs) and tunneling protocols.	Lecture/Discussion Hands on Lab Exercises Homework Assignments Projects	Chapter Tests Written and Skills-Based Evaluations Final Exam
3. Configure serial and broadband network connections.	Lecture/Discussion Hands on Lab Exercises Homework Assignments Projects	Chapter Tests Written and Skills-Based Evaluations Final Exam

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
4. Troubleshoot network configuration and operation problems.	Lecture/Discussion Hands on Lab Exercises Homework Assignments Projects	Chapter Tests Written and Skills-Based Evaluations Final Exam
5. Design network architectures which implement IPSec, OSPF, wireless and virtual private network (VPN) operations in a complex network	Lecture/Discussion Hands on Lab Exercises Homework Assignments Projects	Skills Based Assessment Final (performance) Final Exam
6. Build small-to-medium sized converged, complex networks.	Lecture Discussion Extensive Hands-On Lab Exercises Homework Assignments Quizzes/Tests	Skills Based Assessment Final (performance) Final Exam

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Director of Educational Effectiveness. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria*.

SEQUENCE OF TOPICS:

1. Single-Area OSPFv2 Concepts

- OSPF Features and Characteristics
- OSPF Packets
- OSPF Operation

2. Single-Area OSPFv2 Configuration

- OSPF Router ID
- Point-to-Point OSPF Networks
- Multiaccess OSPF Networks
- Modify Single-Area OSPFv2
- Default Route Propagation
- Verify Single-Area OSPFv2

3. Network Security Concepts

- Current State of Cybersecurity
- Threat Actors

- Threat Actor Tools
- Malware
- Common Network Attacks
- IP Vulnerabilities and Threats
- TCP and UDP Vulnerabilities
- IP Services
- Network Security Best Practices
- Cryptography

4. ACL Concepts

- Purpose of ACLs
- Wildcard Masks in ACLs
- Guidelines for ACL Creation
- Types of IPv4 ACLs

5. ACL Concepts for iPv4 Configuration

- Configure Standard IPv4 ACLs
- Modify IPv4 ACLs
- Secure VTY Ports with a
- Standard IPv4 ACL
- Structure of an Extended IPv4
- ACL
- Configure Extended IPv4 ACLs

6. NAT for iPv4

- NAT Characteristics
- Types of NAT
- NAT Advantages
- Configure Static NAT
- Configure Dynamic NAT
- Configure PAT
- NAT and IPv6

7. WAN Concepts

- Purpose of WANs
- WAN Operations
- Private WAN Infrastructures
- Public WAN Infrastructure
- Selecting WAN Services
- Serial Communications

- Broadband Connections

8. VPN and IPsec Concepts

- VPN Technology
- Types of VPNs
- IPsec

9. QoS Concepts

- Network Transmission Quality
- Traffic Characteristics
- Queuing Algorithms
- QoS Models
- QoS Implementation Techniques

10. Network Management

- Device Discovery with CDP
- Device Discovery with LLDP
- NTP
- SNMP Operation
- Syslog Operation
- Router and Switch File
- Maintenance
- IOS Image Management

11. Network Design

- Converged Networks
- Switched Networks
- Cisco Validated Designs
- Scalable Networks
- Switch Hardware
- Router Hardware

12. Network Troubleshooting

- Network Documentation
- Troubleshooting Process
- Isolate the Issue Using Layered
- Models
- Troubleshooting Tools
- Symptoms and Causes of
- Network Problems
- Troubleshooting IP Connectivity

13. Network Virtualization

- Cloud Computing
- Virtualization
- Virtual Network Infrastructure
- Software-Defined Networking
- Controllers

14. Network Automation

- Automation Overview
- Data Formats
- APIs
- REST
- Configuration Management
- IBN and Cisco DNA Center

LEARNING MATERIALS:
Online curriculum and assessments from Cisco Academy web portal. Provided to students with no additional charge.

Optional Student Resources:

CCNA 200-301 Official Cert Guide Library (CISCO Press), Odem Wendall, 2019,

- ISBN-13: 978-1-58714-714-2

Other materials may be required and may be made available directly to the student or via the College's library reserve or computer network.

COURSE APPROVAL:

Prepared by:	Alan Evans	Date: 3/2002
Revised by:	Alan Evans	Date: 2/2005
Revised by:	Jason Wertz	Date: 3/2008
Revised by:	Marie Hartlein	Date: 11/2012
VPAA/Provost or designee Compliance Verification:		
	Victoria L. Bastecki-Perez, Ed.D.	Date: 6/18/2013
Revised by:	Patricia Rahmlow	Date: 11/15/2017
VPAA/Provost or designee Compliance Verification:		
	Victoria L. Bastecki-Perez, Ed.D.	Date: 1/30/2018
Revised by: Marie Hartlein		Date: 1/3/2020
VPAA or designee Compliance Verification:		Date: 4/27/2021

This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.