NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
ITN 155 – SWITCHING, WIRELESS, AND WIRELESS ESSENTIALS - CISCO (4 CR.)

Course Description
Provides the skills and knowledge to install, operate, and troubleshoot routers and switches in small networks. Introduces students to wireless local area networks (WLANS) and network security concepts. Lecture 3 hours. Laboratory 2 hours. Total 5 hours per week.

General Course Purpose
This course will provide knowledge and skills to configure a router and a switch. Students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPng, single-area and multi-area OSPF, virtual LANs and inter-VLAN routing in both IPv4 and IPv6 networks.
 Students will learn the basics of routing, switching, and advanced technologies to prepare for the CCENT and CCNA certification exams, networking related degree programs, and entry-level careers.

Course Prerequisites/Corequisites
Prerequisites: ITN 154 and college level reading and writing ability.

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

- Describe basic switching concepts and the operation of Cisco switches
- Describe the operations of a router, routing table and the router lookup process
- Create VLANs and describe how routing occurs in the logically separated networks
- Differentiate dynamic routing protocols, distance vector routing protocols, and link state routing protocols
- Configure and troubleshoot static routing and default routing (RIP and RIPng)
- Configure and troubleshoot access control lists (ACLs) for IPv4 and IPv6 networks
- Configure and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4 and IPv6 networks
- Configure and troubleshoot Network Address Translation (NAT) operations

Major Topics to be Included:
- Introduction to switched networks
- Basic switching concepts and configuration
- Virtual Local Area Network (LAN)
- Routing Concepts
- Inter-VLAN routing
- Static Routing
- Dynamic Routing
- Single-area OSPF
- Access Control Lists
- Dynamic Host Configuration Protocol (DHCP)
- Network Address Translation (NAT) for IPv4

Student Learning Outcomes

1. Introduction to Switch Networks
   1.1. Describe the convergence of data, voice and video and how it affects a switched network

      1.1.1. List and explain the elements of a converged network
      1.1.2. Describe the different hierarchical design models
      1.1.3. List and explain the different types of switches
  1.2. Explain how switches operate in a switched environment
      1.2.1. Describe the types of switch forwarding methods
      1.2.2. Compare collision and broadcast domains

2. Basic Switching Concepts and Configuration
  2.1. Perform basic switch configuration
  2.2. Configure switch ports.
  2.3. Manage and implement switch security
      2.3.1. Describe secure remote access
      2.3.2. Identify common switch attacks

3. Virtual Local Area Network (VLAN)
  3.1 Define a VLAN and its role in a switched network
      3.1.1. Identify the types of VLANs
      3.1.2 Describe how VLAN controls broadcast domains
  3.2 Create, verify and troubleshoot a VLAN:
      3.2.1 VLAN port membership
      3.2.2 VLAN Trunks
      3.2.3 Dynamic Trunk Protocol (DTP)
  3.3 Identify and describe common VLAN attacks

4. Routing Concepts
  4.1. Describe the functions and features of a router
  4.2. Configure basic router settings and verify connectivity
      4.2.1. Configure router interfaces
      4.2.2. Use the *show* commands to verify the operations of an interface
  4.3. Understand and describe the router forwarding function

5. Inter-VLAN Routing
  5.1. Define inter-VLAN routing
  5.2. Identify and describe the different types of inter-VLAN routing:
  5.3. Configure and verify inter-VLAN routing
  5.4. Identify and troubleshoot common inter-VLAN issues:
      5.4.1. Switch port issues
      5.4.2. Interface issues
      5.4.3. IP addressing issues
  5.5. Understand and describe Layer 3 switching
      5.5.1. Define routed ports
      5.5.2. Define switch virtual interfaces (SVI)

6. Static Routing
  6.1 Understand and describe static routing
      6.1.1. Identify the types of static routing
  6.2 Configure and verify static routing using:
      6.2.1. Next-hop static route
      6.2.2. Directly connected static route
      6.2.3. Fully Specified Static route
  6.3 Configure and verify a default static route; IPv4 static route; IPv6 static route
  6.4 Design and implement a hierarchical addressing scheme using:
      6.4.1. Classful addressing

6.4.2. Classless Inter-Domain Routing (CIDR)

6.4.3. Variable-Length Subnet Masking (VLSM)

6.5 Configure and test summary static route and floating static route

6.6 Troubleshoot connectivity problems on static and default routes

7. Routing Dynamically

7.1. Understand and describe dynamic routing

7.1.1. Compare dynamic with static routing

7.1.2. Identify and describe the types of dynamic routing protocols

7.2. Describe distance vector routing protocol operation

7.2.1. Identify the types of distance vector protocols

7.3. Describe the legacy routing protocol RIP and the IPv6 RIPng

7.3.1. Configure RIP and RIPng

7.4. Describe the link-state routing process

7.4.1. Identify link-state routing protocols

7.4.2. Compare link-state protocols with distance vector protocols

7.5. Understand and describe the role of the routing table in packet forwarding

7.5.1. Understand how a routing table is built

7.5.2. Use *show* command to display a routing table

7.5.3. Describe the router lookup process

8. Single-Area OSPF

8.1 Identify the features and components of OSPF

8.1.1. Compare single-area and multiarea OSPF

8.1.2. List the different types of OSPF packets

8.1.3. Describe how OSPF establishes neighbor adjacencies

8.1.4. Understand and explain the Designated Router (DR) and Backup Designated Router (BDR) election process

8.2 Configure Single-Area OSPFv2

8.2.1. Verify OSPF using the *show* command

8.3 Compare OSPFv2 and OSPFv3

8.3.1. Configure OSPFv3 in an IPv6 network

8.3.2. Verify OSPFv3 using the *show* command

9. Access Control Lists (ACL)

9.1 Define an ACL and its role in a TCP communication

9.1.1. Differentiate a standard from an extended ACL

9.1.2. Examine and explain the role of a wildcard mask in IPv4 ACL

9.1.3. Describe existing guidelines and best practices in creating ACLs.

9.2 Configure standard IPv4 ACLs

9.2.1. Modify standard ACLs

9.2.2. Verify standard ACLs

9.3 Configure extended IPv4 ACLs

9.3.1. Modify extended ACLs

9.3.2 Verify extended ACLs

9.4 Troubleshoot common ACL errors

9.5 Compare IPv4 and IPv6 ACLs

9.5.1. Configure IPv6 ACLs

9.5.2. Verify IPv6 ACLs

10. Dynamic Host Configuration Protocol (DHCP)

10.1 Define DHCP and its role in an IPv4 network

10.1.1. List and explain the different DCHPv4 address allocation

10.1.2. Describe the DHCP operation
10.1.2. Configure and verify DHCPv4
10.1.3. Troubleshoot DCHPv4
10.2 Define DCHPv6
    10.2.1. Identify the methods to assign global unicast address dynamically:
        10.2.1.1. Stateless Address Autoconfiguration (SLAAC)
        10.2.1.2. DHCP for IPv6 (Stateful DHCPv6)
    10.2.2. Configure and verify stateless DHCPv6
    10.2.3. Configure and verify stateful DHCPv6
    10.2.4. Troubleshoot DCHPv6

11. Network Address Translation (NAT) for IPv4
    1.1   Define NAT and its role in an IPv4 network
        11.1.1.   Identify the different NAT translation
        11.1.2.   List the advantages and disadvantages of NAT
        11.1.3.   Compare NAT and PAT (Port Address Translation)
        11.1.4.   Explain how NAT can be implemented in IPv6
    1.2   Configure and verify NAT
    1.3   Configure and verify PAT
    1.4   Troubleshoot NAT using the *show* and *debug* commands

Required Time Allocation per Topic

In order to standardize the core topics of ITN 155 so that a course taught at one campus is equivalent to the same course taught at another campus, the following student contact hours per topic are required. Each syllabus should be created to adhere as closely as possible to these allocations. Of course, the topics cannot be followed sequentially. Many topics are taught best as an integrated whole, often revisiting the topic several times, each time at a higher level. There are normally 60 student-contact-hours per semester for a four credit course. (This includes 15 weeks of instruction and does not include the final exam week so 15* 4 = 60 hours. Sections of the course that are given in alternative formats from the standard 16 week section still meet for the same number of contact hours.) The final exam time is not included in the time table. The category, Other Optional Content, leaves ample time for an instructor to tailor the course to special needs or resources.

Topic:	Time in Hours:	Percentages:
Introduction to Switch Networks	2	3
Basic Switching Concepts and Configuration	8	12.5
VLANs	6	10
Routing Concepts	8	12.5
Inter-VLAN Routing	6	10
Static Routing	4	7
Routing Dynamically	4	7
Single-Area OSPF	4	7
Access Control Lists (ACLs)	6	10
Dynamic Host Configuration Protocol (DHCP)	4	7
Network Address Translation (NAT)	4	7
Exam & quizzes	4	7
Total:	60	100%