Cisco 12A CCNA Certification

Application for Board Authorization of Courses

District:	Abbotsford School District #34
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Date:	April 1, 2007
School:	Abbotsford Virtual School
Principal:	Don Martyn
Course Name:	Cisco 12A CCNA Certification

Board/Authority Approval Date: _____

Board Authorized Course Application
Cisco 12A CCNA Certification

Board/Authority Signature: _____

Grade Level: Twelve

Credits: Four (112 instructional hours)

Prerequisites: Cisco 11 CCNA Certification

Special Training/Facilities: Computer Room and Cisco Networking Equipment

Course Synopsis: Cisco 12A is a hands-on course in networking routing concepts. The course will focus on routing theory, router components, routing protocols and advanced routing techniques. After completing Cisco 12A the students will move on to Cisco 12B which will cover the rest of the topics required to achieve CCNA certification.

Rationale: This course will provide students with a hands-on head start towards the specialized training required in today's computer technology industry. Many students and employers have stated an interest in this course. Cisco's Networking Academy program delivers Web-based content, online assessment, student performance tracking, hands-on labs, instructor training and support. Combining online education with hands-on laboratory exercises, the curriculum enables students to apply what they learn in class while working on actual computers and networks. Cisco CCNA Certification is an industry-wide credential.

Organizational Structure

Unit/Topic	Title	Time
Unit 1	**Router Basics**	18 hours
Unit 2	**Router Commands**	32 hours
Unit 3	**Troubleshooting Routers and Network Security**	32 hours
Unit 4	**IP Addressing and Routing Protocols**	30 hours

Unit Description

Unit 1: Router Basics Time: 18 hours

Students will become familiar with routers, the basic configuration modes of the router and practice simple configurations.

Curriculum Organizers - **Module 1 & 2: Review CCNA 11 Core Materials and Core Labs**
Students completing this module will be able to:

- Review the role of Routers in a WAN environment
- Review the Router's Operating System

Summative Assessment: Written exam and hands-on router programming assessment.

Curriculum Organizers - **Module 3: Configuring a Router**
Students completing this module will be able to:

- Name a router
- Set passwords
- Examine show commands
- Configure a serial interface
- Configure an Ethernet interface
- Execute changes to a router
- Save changes to a router
- Configure an interface description
- Configure a message-of-the-day banner
- Configure host tables
- Understand the importance of backups and documentation

Summative Assessment: End of module online assessment, router simulation assessment, hands-on router programming assessment.

Curriculum Organizers - **Module 4: Learning about Other Devices**
Students completing this module will be able to:

- Enable and disable CDP
- Use the show cdp neighbors command
- Determine which neighboring devices are connected to which local interfaces
- Gather network address information about neighboring devices using CDP
- Establish a Telnet connection
- Verify a Telnet connection
- Disconnect from a Telnet session
- Suspend a Telnet session
- Perform alternative connectivity tests
- Troubleshoot remote terminal connections

Summative Assessment: Online exam, simulator completion, written exam and router hands-on exam.

Unit 2: Router Commands Time: 32 hours

Students will become familiar with the router boot sequence and file system and distance vector routing protocols.

Curriculum Organizers - **Module 5: Managing Cisco IOS Software**
Students completing this module will be able to:

- Identify the stages of the router boot sequence
- Determine how a Cisco device locates and loads the Cisco IOS
- Use the boot system command
- Identify the configuration register values
- Briefly describe the files used by the Cisco IOS and their functions
- List the locations on the router of the different file types
- Briefly describe the parts of the IOS name
- Save and restore configuration files using TFTP and copy-and-paste
- Load an IOS image using TFTP
- Load an IOS image using XModem
- Verify the file system using show commands

Summative Assessment: Online exam and router simulator.

Curriculum Organizers - **Module 6: Routing and Routing Protocols**
Students completing this module will be able to:

- Explain the significance of static routing
- Configure static and default routes
- Verify and troubleshoot static and default routes
- Identify the classes of routing protocols
- Identify distance vector routing protocols
- Identify link-state routing protocols
- Describe the basic characteristics of common routing protocols
- Identify interior gateway protocols
- Identify exterior gateway protocols
- Enable Routing Information Protocol (RIP) on a router

Summative Assessment: Online exam and written exam.

Curriculum Organizers - **Module 7: Distance Vector Routing Protocols**
Students completing this module will be able to:

- Describe how routing loops can occur in distance vector routing
- Describe several methods used by distance vector routing protocols to ensure that routing information is accurate
- Configure RIP
- Use the **ip classless** command

- Troubleshoot RIP
- Configure RIP for load balancing
- Configure static routes for RIP
- Verify RIP
- Configure IGRP
- Verify IGRP operation
- Troubleshoot IGRP

Summative assessment: Online exam, 4 router lab scenario hands-on exam.

Unit 3: Troubleshooting Routers and Network Security Time: 32 hours

Students will become familiar with various ICMP error messages and some of the ways they are used, the structured approach to network troubleshooting and how ACLs are used as part of a security solution.

Curriculum Organizers - **Module 8: TCP/IP Suite Error and control Messages**
Students completing this module will be able to:

- Describe ICMP
- Describe the ICMP message format
- Identify ICMP error message types
- Identify potential causes of specific ICMP error messages
- Describe ICMP control messages
- Identify a variety of ICMP control messages used in networks today
- Determine the causes for ICMP control messages

Summative Assessment: Online exam.

Curriculum Organizers - **Module 9: Basic Router Troubleshooting**
Students completing this module will be able to:

- Use the **show ip route** command to gather detailed information about the routes installed on the router
- Configure a default route or default network
- Understand how a router uses both Layer 2 and Layer 3 addressing to move data through the network
- Use the **ping** command to perform basic network connectivity tests
- Use the **telnet** command to verify the application layer software between source and destination stations
- Troubleshoot by sequential testing of OSI layers
- Use the **show interfaces** command to confirm Layer 1 and Layer 2 problems
- Use the **show ip route** and **show ip protocol** commands to identify routing issues
- Use the **show cdp** command to verify Layer 2 connectivity
- Use the **traceroute** command to identify the path packets take between networks
- Use the **show controllers serial** command to ensure the proper cable is attached

- Use basic **debug** commands to monitor router activity

Summative Assessment: Online exam, hand-on skills exam on traceroute, ping, telnet and show router commands.

Curriculum Organizers - **Module 10: Intermediate TCP/IP**
Students completing this module will be able to:

- Describe TCP and its function
- Describe TCP synchronization and flow control
- Describe UDP operation and processes
- Identify common port numbers
- Describe multiple conversations between hosts
- Identify ports used for services and clients
- Describe port numbering and well known ports
- Understand the differences and the relationship between MAC addresses, IP addresses, and port numbers

Summative Assessment: Online exam and written exam on common port numbers

Curriculum Organizers - **Module 11: Access Control List Fundamentals**
Students completing this module will be able to:

- Describe the differences between standard and extended ACLs
- Explain the rules for placement of ACLs
- Create and apply named ACLs
- Describe the function of firewalls
- Use ACLs to restrict virtual terminal access

Summative Assessment: Online exam and written exam on creating ACL's

Unit 4: IP Addressing and Routing Protocols Time: 30 hours

Students will become familiar with IP version 6, RIP version 2, link-state routing protocols, EIGRP and troubleshooting routing protocols.

Curriculum Organizers - **Module 1: Introduction to Classless Routing**
Students completing this module will be able to perform tasks related to the following:

- Define VLSM and briefly describe the reasons for its use
- Divide a major network into subnets of different sizes using VLSM
- Define route aggregation and summarization as they relate to VLSM
- Configure a router using VLSM
- Identify the key features of RIPv1 and RIPv2
- Identify the important differences between RIPv1 and RIPv2
- Configure RIPv2
- Verify and troubleshoot RIPv2 operation
- Configure default routes using the ip route and ip default-network commands

Summative Assessment: Online exam and written VLSM calculation exam

Curriculum Organizers - **Module 2: Single Area OSPF**
Students completing this module will be able to perform the following tasks:

- Identify the key features of link-state routing
- Explain how link-state routing information is maintained
- Discuss the link-state routing algorithms
- Examine the advantages and disadvantages of link-state routing
- Compare and contrast link-state routing with distance-vector routing
- Enable OSPF on a router
- Configure a loopback address to set router priority
- Change OSPF route preference by modifying the cost metric
- Configure OSPF authentication
- Change OSPF timers
- Describe the steps to create and propagate a default route
- Use show commands to verify OSPF operation
- Configuring the OSPF routing process
- Configuring OSPF loopback address and router priority
- Modifying OSPF cost metric
- Configuring OSPF authentication
- Configuring OSPF timers
- Propagating a default route
- Common OSPF configuration issues
- Verifying the OSPF configuration
- Define key OSPF terms
- Describe the key differences between distance vector and link-state routing protocols
- Describe the OSPF network types
- Explain the operation of the shortest path first (SPF) algorithm
- Describe the OSPF Hello protocol
- Identify the basics steps in the operation of OSPF

Summative Assessment: Online exam and router OSPF hands-on programming mastery exam.

Curriculum Organizers - **Module 3: EIGRP**
Students completing this module will be able to perform the following tasks:

- Describe the differences between EIGRP and IGRP
- Describe the key concepts, technologies, and data structures of EIGRP
- Understand EIGRP convergence and the basic operation of the Diffusing Update
- Algorithm, or DUAL
- Perform a basic EIGRP configuration
- Configure EIGRP route summarization
- Describe the processes used by EIGRP to build and maintain routing tables
- Verify EIGRP operations

- Mistyped commands
- Incorrectly constructed or incorrectly placed access lists
- Misconfigured routers, switches, or other network devices
- Bad physical connections
- Describe the eight-step process for general troubleshooting
- Apply a logical process to routing troubleshooting
- Troubleshoot a RIP routing process using show and debug commands
- Troubleshoot an IGRP routing process using show and debug commands
- Troubleshoot an EIGRP routing process using show and debug commands
- Troubleshoot an OSPF routing process using show and debug commands

Summative Assessment: Online exam and router simulation mastery exam.

Instruction

Cisco 12A CCNA Certification uses Web-based content, lectures, online assessment (exams), student performance tracking and hands-on labs. Combining online education with hands-on laboratory exercises, the curriculum enables students to apply what they learn in class while working on actual computers and networks

Assessment Tools

The following tools are used for assessment:

- ✓ Personalized Feedback
- ✓ Assignments and Labs
- ✓ Module Practice Exams
- ✓ Module Exams
- ✓ Midterm and Final Exam
- ✓ Skills-Based Exams
- ✓ Simulators

Assessment Component: Formative components are assessed but not used for towards the final grade in the course. Final marks in the course are based entirely on the Summative Assessments presented above although attempted completion of the formative assignments is required.

Learning Resources

The on-line curriculum is developed by Cisco Systems. Software for the course can be downloaded for free by a certified instructor.

Software requirements: All software will be supplied by the instructor.

Hardware requirements: This course requires a computer (Apple or Windows) with Flash 6 Player installed and a minimum of 28.8k internet access. This is needed to access the on-line curriculum and lectures.

Instructional Resources:
Cisco network equipment - routers and switches
VNC Server/Viewer - provides remote access to Cisco equipment
Computer with Internet access – provides connection to on-line curriculum

Additional Information

Students completing this program and meeting UCFV's articulation agreement standards will automatically receive credit for this program from UCFV. These credits are then recognized and transferable to other institutions such OUC, BCIT and CDI. In addition to this, students that complete Cisco 12b CCNA Certification have the skill and knowledge to receive Cisco's Industrial level CCNA certification that is recognized world wide.