

# Cisco 12B CCNA Certification

---

## Application for Board Authorization of Courses

District: Abbotsford School District#34

Developed by: David Driver

Date: April 1, 2007

School: Abbotsford Virtual School

Principal: Don Martyn

Course Name: Cisco 12B CCNA Certification

Board/Authority Approval Date: \_\_\_\_\_

**Board Authorized Course Application**  
**Cisco 12B CCNA Certification**

Board/Authority Signature: \_\_\_\_\_

Grade Level: Twelve

Credits: Four (112 instructional hours)

Prerequisites: Cisco 12A CCNA Certification

Special Training/Facilities: Computer Room and Cisco Networking Equipment

**Course Synopsis:** Cisco 12B covers switching basics and WAN technologies. Students will focus on switch terminology, switch configuration and WAN terminology. Through hands on activities and labs, you will learn how to configure a switch, configure intermediate routing features and troubleshoot your work. Cisco12B is the final step toward preparing to take the full Cisco's 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.

**Board Authorized Course Application  
Cisco 12B CCNA Certification**

**Organizational Structure**

<b>Unit/Topic</b>	<b>Title</b>	<b>Time</b>
Unit 1	<b>Switch Basics and Configuration</b>	28 hours
Unit 2	<b>Switched Networks and VLANs</b>	28 hours
Unit 3	<b>WAN Technology and Solutions</b>	22 hours
Unit 4	<b>Router WAN Configuration and Network Administration</b>	22 hours
Unit 5	<b>CCNA Certification</b>	12 hours

**Unit Description**

**Unit 1: Switch Basics and Configuration**

Time: 28 hours

Students will become familiar with the evolution of Ethernet/802.3, network segmentation and switch operation, configurations and commands.

**Curriculum Organizers - Module 1,2 &3: Review CCNA 2 modules 1, 2 and 3 (Cisco 11 & 12A)**

Students completing this module will be able to perform the following tasks:

- Review Classless Routing
- Review OSPF
- Review EIRGP

Summative Assessment: Online exam, written exam and router simulation exam.










**Curriculum Organizers - Module 4: Switching Concepts**

Students completing this module will be able to perform the following tasks:

- Describe the history and function of shared, half-duplex Ethernet
- Define collision as it relates to Ethernet networks
- Define microsegmentation
- Define CSMA/CD
- Describe some of the key elements affecting network performance
- Describe the function of repeaters
- Define network latency
- Define transmission time
- Describe the basic function of Fast Ethernet
- Define network segmentation using routers, switches, and bridges
- Describe the basic operations of a switch
- Define Ethernet switch latency
- Explain the differences between Layer 2 and Layer 3 switching
- Define symmetric and asymmetric switching
- Define memory buffering
- Compare and contrast store-and-forward and cut-through switching
- Understand the differences between hubs, bridges, and switches
- Describe the main functions of switches

## Board Authorized Course Application









### Cisco 12B CCNA Certification

-  List the major switch frame transmission modes
-  Describe the process by which switches learn addresses
-  Identify and define forwarding modes
-  Define LAN segmentation
-  Define microsegmentation using switching
-  Describe the frame-filtering process
-  Compare and contrast collision and broadcast domains
-  Identify the cables needed to connect switches to workstations
-  Identify the cables needed to connect switches to switches

Summative Assessment: Online exam and small LAN building mastery hands-on exam.

#### Curriculum Organizers - **Module 5: Switches**















Students completing this module will be able to perform the following tasks:

-  Describe the four major goals of LAN design List the key considerations in LAN design
-  Understand the steps in systematic LAN design
-  Understand the design issues associated with Layers 1, 2, and 3
-  Describe the three-layer design model
-  Identify the functions of each of layer of the three-layer model
-  List Cisco access layer switches and their features
-  List Cisco distribution layer switches and their features
-  List Cisco core layer switches and their features

Summative Assessment: Online exam and LAN design exam.

#### Curriculum Organizers - **Module 6: Switch Configuration**

Students completing this module will be able to perform the following tasks:

-  Identify the major components of a Catalyst switch
-  Monitor switch activity and status using LED indicators
-  Examine the switch bootup output using HyperTerminal
-  Use the help features of the command line interface
-  List the major switch command modes
-  Verify the default settings of a Catalyst switch
-  Set an IP address and default gateway for the switch to allow connection and management over a network
-  View the switch settings with a Web browser
-  Set interfaces for speed and duplex operation
-  Examine and manage the switch MAC address table
-  Configure port security
-  Manage configuration files and IOS images
-  Perform password recovery on a switch
-  Upgrade the IOS of a switch

Summative Assessment: Online exam.

# Board Authorized Course Application

## Cisco 12B CCNA Certification

### Unit 2: Switched Networks and VLANs

Time: 28 hours

Students will become familiar with redundancy in a network, VLANs, VTP implementation in a VLAN switched LAN environment and troubleshooting.

#### Curriculum Organizers - **Module 7: Spanning-Tree Protocol**

Students completing this module will be able to perform the following tasks:

- Define redundancy and its importance in networking
- Describe the key elements of a redundant networking topology
- Define broadcast storms and describe their impact on switched networks
- Define multiple frame transmissions and describe their impact on switched networks
- Identify causes and results of MAC address database instability
- Identify the benefits and risks of a redundant topology
- Describe the role of spanning tree in a redundant-path switched network
- Identify the key elements of spanning tree operation
- Describe the process for root bridge election
- List the spanning tree states in order
- Compare Spanning Tree Protocol and Rapid Spanning Tree Protocol

Summative Assessment: Online exam.

#### Curriculum Organizers - **Module 8: Virtual LANs**

Students completing this module will be able to perform the following tasks:

- Define VLANs
- List the benefits of VLANs
- Explain how VLANs are used to create broadcast domains
- Explain how routers are used for communication between VLANs
- List the common VLAN types
- Define ISL and 802.1Q
- Explain the concept of geographic VLANs
- Configure static VLANs on 29xx series Catalyst switches
- Verify and save VLAN configurations
- Delete VLANs from a switch

Summative Assessment: Online exam and VLAN configuration exam.

#### Curriculum Organizers - **Module 9: VLAN Trunking Protocol**

Students completing this module will be able to perform the following tasks:

- Explain the origins and functions of VLAN trunking
- Describe how trunking enables the implementation of VLANs in a large network
- Define IEEE 802.1Q

## Board Authorized Course Application

### Cisco 12B CCNA Certification

- Define Cisco ISL
- Configure and verify a VLAN trunk
- Define VTP
- Explain why VTP was developed
- Describe the contents of VTP messages
- List and define the three VTP modes
- Configure and verify VTP on an IOS-based switch
- Explain why routing is necessary for inter-VLAN communication
- Explain the difference between physical and logical interfaces
- Define subinterfaces
- Configure inter-VLAN routing using subinterfaces on a router port

Summative Assessment: Online exam and hands-on VTP router simulator.

### Unit 3: WAN Technology and Solutions

Time: 22 hours

Students will become familiar with methods of scaling IP addresses, WAN technologies and designs, and PPP configuration and troubleshooting.

#### Curriculum Organizers - **Module 1: Scaling IP Addresses**

Students completing this module will be able to:

- Understand NAT and PAT features
- Understand how to configure, verify, and troubleshoot NAT and PAT
- Describe the features of DHCP
- Understand how to configure, verify, and troubleshoot DHCP

Summative Assessment: Online exam and NAT and PAT programming simulator.

#### Curriculum Organizers - **Module 2: WAN Technologies**

Students completing this module will be able to:

- Describe WAN technology, standards, and devices
- Understand WAN technologies such as Dialup, ISDN, X.25, Frame Relay, ATM, DSL, and cable modems
- Describe WAN communication
- Understand WAN design

Summative Assessment: Online exam.

#### Curriculum Organizers - **Module 3: PPP**

Students completing this module will be able to:

- Explain serial communication
- Describe and give an example of TDM
- Identify the demarcation point in a WAN
- Describe the functions of the DTE and DCE

## Board Authorized Course Application

### Cisco 12B CCNA Certification

- Discuss the development of HDLC encapsulation
- Use the **encapsulation hdlc** command to configure HDLC
- Troubleshoot a serial interface using the **show interface** and **show controllers** commands
- Identify the advantages of using PPP
- Explain the functions of the Link Control Protocol (LCP) and the Network Control Protocol (NCP) components of PPP
- Describe the parts of a PPP frame
- Identify the three phases of a PPP session
- Explain the difference between PAP and CHAP
- List the steps in the PPP authentication process
- Identify the various PPP configuration options
- Configure PPP encapsulation
- Configure CHAP and PAP authentication
- Use **show interface** to verify the serial encapsulation
- Troubleshoot any problems in the PPP configuration with the **debug PPP** command

Summative Assessment: Online exam and PAP and CHAP programming simulator.

#### Unit 4: Router WAN Configuration and Network Administration      Time: 22 hours

Students will become familiar with ISDN, DDR and Frame relay configuration, and Network operating systems and administration.

#### Curriculum Organizers - **Module 4: ISDN and DDR**

Students completing this module will be able to:

- Define the ISDN standards used for addressing, concepts, and signaling
- Describe how ISDN uses the physical and data link layers
- List the interfaces and reference points for ISDN
- Configure the router ISDN interface
- Determine which traffic is allowed when configuring DDR
- Configure static routes for DDR
- Choose the correct encapsulation type for DDR
- Determine and apply an access list that affects DDR traffic
- Configure dialer interfaces

Summative Assessment: Online exam.

#### Curriculum Organizers - **Module 5: Frame Relay**

Students completing this module will be able to:

- Identify the components of a Frame Relay network
- Explain the scope and purpose of Frame Relay

## Board Authorized Course Application

### Cisco 12B CCNA Certification

- ☞ Discuss the technology of Frame Relay
- ☞ Compare point-to-point and point-to-multipoint topologies
- ☞ Examine the topology of a Frame Relay network
- ☞ Configure a Frame Relay Permanent Virtual Circuit (PVC)
- ☞ Create a Frame Relay Map on a remote network
- ☞ Explain the issues of a nonbroadcast multiaccess (NBMA) network
- ☞ Describe the need for subinterfaces and how to configure them
- ☞ Verify and troubleshoot a Frame Relay connection

Summative Assessment: Online exam and simulator

### Curriculum Organizers - **Module 6: Introduction to Network Administration**

Students completing this module will be able to:

- ☞ Identify several potential functions of a workstation
- ☞ Identify several potential functions of a server
- ☞ Describe the roles of equipment in a client/server environment
- ☞ Describe the differences between a network operating system (NOS) and a traditional operating system
- ☞ List several Windows operating systems and their features
- ☞ List several alternatives to the Windows operating systems and their features
- ☞ Describe several functions of a server
- ☞ Identify network management tools
- ☞ Identify the driving forces behind network management
- ☞ Describe the OSI and network management model
- ☞ Describe SNMP and CMIP
- ☞ Describe how management software gathers information and records problems

Summative Assessment: Online exam.

### **Unit 5: CCNA Certification**

Time: 12 hours

### Curriculum Organizers - **Module 7: CCNA Certification**

- ☞ This module directs, informs and finalizes student preparation for writing the CCNA certification industrial exam.

Summative Assessment: Online exams (8 exams), 5 router simulations and 1 hands-on router programming assessment.

### **Instruction**

Cisco 12B CCNA Certification uses Web-based content, lectures, online assessment (exams), student performance tracking and hands-on labs. Combining online education



## **Board Authorized Course Application Cisco 12B CCNA Certification**

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/Client - 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.