

## BAA Board Presentation

May 28, 2007

School: AVS

Teacher: Dave Driver

Courses:

1. Cisco 11
2. Cisco 12a
3. Cisco 12B

### **Background:**

This past fall the Ministry Audited two courses;

A+ Certification 11, and A+ Certification 12

These courses had been developed at Mouat by Dave Driver. The courses **did not meet the standards by the Ministry for a BAA course.**

**Option #1:** “Make recommended changes and re-submit to the Ministry for further review. If passed, the courses would continue next year.

**Option #2:** Do not make the recommended changes. Students presently enrolled in the courses would still receive credit. The Ministry would take the courses “Off the Books” for 2007 and 2008.

**Option #3:** Follow option two, but then create new courses that already exist in another District (Sardis Sec./Chilliwack--- and have been approved by the Ministry)

Don Martyn, Brad Hutchinson worked with Dave Driver to develop these new courses based on the same courses at Sardis Secondary.

Cisco 11,12A, 12B are certification courses. This certification is accepted industry wide.

# Cisco 11 CCNA Certification

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## Application for Board Authorization of Courses

District: Abbotsford #34

Developed by: David Driver

Date: April 1, 2007

School: Abbotsford Virtual School

Principal: Don Martyn

Course Name: Cisco 11 CCNA Certification

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

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

## Board Authorized Course Application Cisco 11 CCNA Certification

Grade Level: Eleven

Credits: Four (112 instructional hours)

Prerequisites: None

Special Training/Facilities: Computer Room and Cisco Networking Equipment

**Course Synopsis:** Cisco 11 is a hands-on course in networking fundamentals. The course will focus on networking devices, IP addressing, Ethernet cabling, and an introduction in routing theory. Students will learn to make patch cables, and do installation of structured cabling. There will be an emphasis on the Cisco CCNA Certification Exams. Cisco 11 CCNA Certification is the first step toward preparing to take Cisco's CCNA certification. Cisco 12a and 12b CCNA Certification will complete their training for 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. Students can also receive university transfer credits for this course.

# Board Authorized Course Application Cisco 11 CCNA Certification

## Organizational Structure

Unit/Topic	Title	Time
Unit 1	Networking Basics	30 hours
Unit 2	Network Cabling and Devices	28 hours
Unit 3	Network Protocols	30 hours
Unit 4	Introduction to Routers	24 hours

## Unit Description











### Unit 1: Networking Basics

Time: 30 hours

Students will become familiar with Internet connectivity and network math. They will discuss the importance of bandwidth, how the Open System Interconnection (OSI) model and the Transmission Control Protocol/Internet Protocol (TCP/IP) model works, define and compare network terminology, and examine copper media, optical media, wireless media and test LAN/WAN cables.

#### Curriculum Organizers - **Module 1: Introduction to Networking**








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

-  Understand the physical connection that has to take place for a computer to connect to the Internet
-  Recognize the components that comprise the computer
-  Install and troubleshoot network interface cards and modems
-  Use basic testing procedures to test the Internet connection
-  Demonstrate a basic understanding of the use of Web browsers and plug-ins
-  Recognize the Base 10, Base 2, and Base 16 number systems
-  Perform 8-bit binary to decimal and decimal to 8-bit binary conversions
-  Perform simple conversions between decimal, binary, and hexadecimal numbers
-  Recognize the binary representation of IP addresses and network masks
-  Recognize the decimal representation of IP addresses and network masks

Summative Assessment: End of Module online assessment, in-class Base number and IP addressing exam.

#### Curriculum Organizers - **Module 2: Networking Fundamentals**

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

-  Briefly outline the history of networking
-  Identify devices used in networking
-  Understand the role of protocols in networking
-  Define LAN, WAN, MAN, and SAN
-  Explain VPNs and their advantages
-  Describe the differences between intranets and extranets
-  Explain the importance of bandwidth in networking

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- Use an analogy from experience to explain bandwidth
- Identify bps, kbps, Mbps, and Gbps as units of bandwidth
- Explain the difference between bandwidth and throughput
- Calculate data transfer rates
- Explain why layered models are used to describe data communication
- Explain the development of the OSI model
- List the advantages of a layered approach
- Identify each of the seven layers of the OSI model
- Identify the four layers of the TCP/IP model
- Describe the similarities and differences between the two models

Summative Assessment: End of Module online assessment, in-class exam on the OSI model.

#### Curriculum Organizers - **Module 3: Networking Media**

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

- Discuss the electrical properties of matter
- Define voltage, resistance, impedance, current, and circuits
- Describe the specifications and performances of different types of cable
- Describe coaxial cable and its advantages and disadvantages over other types of cable
- Describe shielded twisted-pair (STP) cable and its uses
- Describe unshielded twisted-pair cable (UTP) and its uses
- Discuss the characteristics of straight-through, crossover, and rollover cables and where each is used
- Explain the basics of fiber-optic cable
- Describe how fibers can guide light for long distances
- Describe multimode and single-mode fiber
- Describe how fiber is installed
- Describe the type of connectors and equipment used with fiber-optic cable
- Explain how fiber is tested to ensure that it will function properly
- Discuss safety issues dealing with fiber optics

Summative Assessment: End of Module online assessment.

#### Curriculum Organizers - **Module 4: Cable Testing**

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

- Differentiate between sine waves and square waves
- Describe exponents and logarithms
- Describe decibels
- Define basic terminology related to time, frequency, and noise
- Differentiate between digital bandwidth and analog bandwidth
- Compare and contrast noise levels on various types of cabling
- Define and describe the affects of attenuation and impedance mismatch
- Define crosstalk, near-end crosstalk, far-end crosstalk, and power sum near-end crosstalk

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- ☐ Describe how crosstalk and twisted pairs help reduce noise
- ☐ Describe the ten copper cable tests defined in TIA/EIA-568-B
- ☐ Describe the difference between Category 5 and Category 6 cable

Summative Assessment: End of Module online assessment

#### Curriculum Organizers - **Module 5: Cabling LANs and WANs**

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

- ☐ Identify characteristics of Ethernet networks
- ☐ Identify straight-through, crossover, and rollover cables
- ☐ Describe the function, advantages, and disadvantages of repeaters, hubs, bridges, switches, and wireless network components
- ☐ Describe the function of peer-to-peer networks
- ☐ Describe the function, advantages, and disadvantages of client-server networks
- ☐ Describe and differentiate between serial, Integrated Services Digital Network (ISDN), digital subscriber line (DSL), and cable modem WAN connections
- ☐ Identify router serial ports, cables, and connectors
- ☐ Identify and describe the placement of equipment used in various WAN configurations

Summative Assessment: End of Module online assessment, in-class cable building exam.

#### **Unit 2: Network Cabling, Devices and Protocols**

Time: 28 hours

Students will become familiar with the specifics of the most important varieties of Ethernet. They will also become familiar with the effects of collisions and broadcasts on network traffic and how bridges and routers are used to segment networks for improved performance.

#### Curriculum Organizers - **Module 6: Ethernet fundamentals**

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

- ☐ Describe the basics of Ethernet technology
- ☐ Explain naming rules of Ethernet technology
- ☐ Define how Ethernet and the OSI model interact
- ☐ Describe the Ethernet framing process and frame structure
- ☐ List Ethernet frame field names and purposes
- ☐ Identify the characteristics of CSMA/CD
- ☐ Describe the key aspects of Ethernet timing, interframe spacing and backoff time after a collision
- ☐ Define Ethernet errors and collisions
- ☐ Explain the concept of auto-negotiation in relation to speed and duplex

Summative Assessment: End of Module online assessment

#### Curriculum Organizers - **Module 7: Ethernet Technology**

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

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- ☐ Compare and contrast 10BASE5, 10BASE2, and 10BASE-T Ethernet technology
- ☐ Define Manchester encoding
- ☐ List the factors affecting Ethernet timing limits
- ☐ List 10BASE-T wiring parameters
- ☐ Describe the key characteristics and varieties of 100-Mbps Ethernet
- ☐ Describe the evolution of Ethernet
- ☐ Explain the MAC methods, frame formats, and transmission process of Gigabit Ethernet
- ☐ Describe the uses of specific media and encoding with Gigabit Ethernet
- ☐ Identify the pinouts and wiring typical to the various implementations of Gigabit Ethernet
- ☐ Compare and contrast Gigabit and 10-Gigabit Ethernet
- ☐ Describe the basic architectural considerations of Gigabit and 10-Gigabit Ethernet

Summative Assessment: End of Module online assessment

#### Curriculum Organizers - **Module 8: Ethernet Technologies**

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

- ☐ Define bridging and switching
- ☐ Describe content-addressable memory (CAM) table
- ☐ Define latency
- ☐ Describe store-and-forward and cut-through switching modes
- ☐ Explain Spanning-Tree Protocol (STP)
- ☐ Define collisions, broadcasts, collision domains, and broadcast domains
- ☐ Identify the Layer 1, 2, and 3 devices used to create collision domains and broadcast domains
- ☐ Discuss data flow and problems with broadcasts
- ☐ Explain network segmentation and list the devices used to create segments

Summative Assessment: End of Module online assessment

#### **Unit 3: Network Protocols**

Time: 30 hours

Students will become familiar with the specifics of TCP/IP and Internet addresses, routed and routing protocols, and functions and services of the critical layer of the TCP/IP network model.








#### Curriculum Organizers - **Module 9: Ethernet Switching**

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

- ☐ Explain why the Internet was developed and how TCP/IP fits the design of the Internet
- ☐ List the four layers of the TCP/IP model
- ☐ Describe the functions of each layer of the TCP/IP model
- ☐ Compare the OSI model and the TCP/IP model
- ☐ Describe the function and structure of IP addresses

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-  Understand why subnetting is necessary
-  Explain the difference between public and private addressing
-  Understand the function of reserved IP addresses
-  Explain the use of static and dynamic addressing for a device
-  Understand how dynamic addressing can be done using RARP, BootP, and DHCP
-  Use ARP to obtain the MAC address to send a packet to another device
-  Understand the issues related to addressing between networks

Summative Assessment: End of Module online assessment, in-class exam on subnetting

#### Curriculum Organizers - **Module 10: TCP/IP Protocol Suite and IP Addressing**











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

-  Describe routed protocols
-  List the steps of data encapsulation in an internetwork as data is routed to one or more Layer 3 devices
-  Describe connectionless and connection-oriented delivery
-  Name the IP packet fields
-  Describe the process of routing
-  Compare and contrast different types of routing protocols
-  List and describe several metrics used by routing protocols
-  List several uses for subnetting
-  Determine the subnet mask for a given situation
-  Use a subnet mask to determine the subnet ID

Summative Assessment: End of Module online assessment, in-class exam on subnetting

#### Curriculum Organizers - **Module 11: TCP/IP Transport and Application Layer**

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

-  Describe the functions of the TCP/IP transport layer
-  Describe flow control
-  Describe the processes of establishing a connection between peer systems
-  Describe windowing
-  Describe acknowledgment
-  Identify and describe transport layer protocols
-  Describe TCP and UDP header formats
-  Describe TCP and UDP port numbers
-  List the major protocols of the TCP/IP application layer
-  Provide a brief description of the features and operation of well-known TCP/IP applications

Summative Assessment: End of Module online assessment



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### Unit 4: Introduction to Routers

Time: 24 hours

Students will become familiar with internal and external physical components of the router and the fundamentals of the Cisco Internetwork Operating system (IOS).

#### Curriculum Organizers - **Module 1: WANs and Routers**

Students completing this module will be able to:

- Identify organizations responsible for WAN standards
- Explain the difference between a WAN and LAN and the type of addresses each uses
- Describe the role of a router in a WAN
- Identify internal components of the router and describe their functions
- Describe the physical characteristics of the router
- Identify common ports on a router
- Properly connect Ethernet, serial WAN, and console ports

Summative Assessment: End of Module online assessment, in-class lab exam on setting up routers

#### Curriculum Organizers - **Module 2: Introduction to Routers**

Students completing this module will be able to:

- Describe the purpose of the IOS
- Describe the basic operation of the IOS
- Identify various IOS features
- Identify the methods to establish a command-line interface (CLI) session with the router
- Move between the user command executive (EXEC) and privileged EXEC modes
- Establish a HyperTerminal session on a router
- Log into a router
- Use the help feature in the command line interface
- Troubleshoot command errors

Summative Assessment: End of Module online assessment, in-class lab exam on connecting to the CLI of the router through the console port

### **Instruction**

Cisco 11 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:

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

All of the units include a summative online assessment exam. These exams are extremely thorough including in some cases: multiple choice, pick lists and fully programmable simulations.

**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.

**Tools required:** Students will be supplied with the following tools and supplies: UTP Cable, RJ45 modular plugs, modular Jack, wire stripper and wire crimper.

**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 from home or school.

### **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 as 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.