

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: Networking Essentials

CODE NO. : CSN120 **SEMESTER:** 12W

PROGRAM: Computer Network Technician
Computer Programmer

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DATE: Jan-2012 **PREVIOUS OUTLINE DATED:** Jan-2011

APPROVED: "Brian Punch" Jan/12

TOTAL CREDITS: 5 **CHAIR** **DATE**

PREREQUISITE(S): NONE

HOURS/WEEK: 4

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I. COURSE DESCRIPTION:

This course introduces students to network terminology, technologies and protocols, such as the TCP/IP suite of protocols used on the Internet. The course also includes the study of network media, Ethernet technologies, routing and bridging techniques and network devices. Practical exercises in network cable installation planning, terminating and testing is also an important component of this course. In general, it provides an introduction to the fundamentals of networks including LANs and WANs.

Rationale:

This course is also the beginning of the Cisco Certified Networking Associate CCNA curriculum. The CCNA curriculum is extensive and beyond the domain of a single course. Should the student choose the Computer Network Technology program, three additional CCNA Exploration courses will further the students' progress towards full certification. The four courses are referred to by Cisco as "Network Fundamentals", "Routing Protocols and Concepts", "LAN Switching and Wireless", and "Accessing the WAN". These four courses themselves do not result in CCNA certification; one formal exam must be taken at a [Pearson VUE](http://www.vue.com/cisco) (<http://www.vue.com/cisco>) Testing Centre at the student's own expense, upon completion of the four courses.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Explain the importance of data networks and the Internet in supporting business communications and every day activities.**Potential Elements of the Performance:**

- Describe how networks impact our daily lives.
- Describe the role of data networking in the human network.
- Identify the key components of any data network.
- Identify the opportunities and challenges posed by converged networks.
- Describe the characteristics of network architectures: fault tolerance, scalability, quality of service and security.
- Install and use IRC clients and a Wikiserver.

Reference: Network Fundamentals CCNA Exploration, Chapter-1

2. **Explain how communication works in data networks and the Internet**

Potential Elements of the Performance:

- Describe the structure of a network, including the devices and media that are necessary for successful communications.
- Explain the function of protocols in network communications.
- Explain the advantages of using a layered model to describe network functionality.
- Describe the role of each layer in two recognized network models: The TCP/IP model and the OSI model.
- Describe the importance of addressing and naming schemes in network communications.

Reference: Network Fundamentals CCNA Exploration, Chapter-2

3. **Describe & utilize the Application Layer & its protocols.**

Potential Elements of the Performance:

- Describe how the functions of the three upper OSI model layers provide network services to end user applications.
- Describe how the TCP/IP Application Layer protocols provide the services specified by the upper layers of the OSI model.
- Define how people use the Application Layer to communicate across the information network.
- Describe the function of well-known TCP/IP applications, such as the World Wide Web and email, and their related services (HTTP, DNS, SMB, DHCP, STMP/POP, and Telnet).
- Describe file-sharing processes that use peer-to-peer applications and the Gnutella protocol.
- Explain how protocols ensure services running on one kind of device can send to and receive data from many different network devices.
- Use network analysis tools to examine and explain how common user applications work.

Reference: Network Fundamentals CCNA Exploration, Chapter-3

4. **Analyze the operations and features of the Transport layer protocols and services**

Potential Elements of the Performance:

- Explain the need for the Transport layer.
- Identify the role of the Transport layer as it provides the end-to-end transfer of data between applications.
- Describe the role of two TCP/IP Transport layer protocols: TCP and UDP.
- Explain the key functions of the Transport layer, including reliability, port addressing, and segmentation.
- Explain how TCP and UDP each handle key functions.
- Identify when it is appropriate to use TCP or UDP and provide examples of applications that use each protocol.

Reference: Network Fundamentals CCNA Exploration, Chapter-4

5. **Analyze the operations and feature of the Network layer protocols and services and explain the fundamental concepts of routing**

Potential Elements of the Performance:

- Identify the role of the Network layer as it describes communication from one end device to another end device.
- Examine the most common Network layer protocol, Internet Protocol (IP), and its features for providing connectionless and best-effort service.
- Understand the principles used to guide the division, or grouping, of devices into networks.
- Understand the hierarchical addressing of devices and how this allows communication between networks.
- Understand the fundamentals of routes, next-hop addresses, and packet forwarding to a destination network.

Reference: Network Fundamentals CCNA Exploration, Chapter-5

6. **Design, calculate, and apply subnet masks and IP addresses to fulfill given requirements**

Potential Elements of the Performance:

- Explain the structure IP addressing and demonstrate the ability to convert between 8-bit binary and decimal numbers.
- Given an IPv4 address, classify by type and describe how it is

used in the network.

- Explain how addresses are assigned to networks by ISPs and within networks by administrators.
- Determine the network portion of the host address and explain the role of the subnet mask in dividing networks.
- Given IPv4 addressing information and design criteria, calculate the appropriate addressing components.
- Use common testing utilities to verify and test network connectivity and operational status of the IP protocol stack on a host.

Reference: Network Fundamentals CCNA Exploration, Chapter-6

7. **Describe the operation of protocols at the OSI Data link layer and explain how they support communications**

Potential Elements of the Performance:

- Explain the role of Data Link layer protocols in data transmission.
- Describe how the Data Link layer prepares data for transmission on network media.
- Describe the different types of media access control methods.
- Identify several common logical network topologies and describe how the logical topology determines the media access control method for that network.
- Explain the purpose of encapsulating packets into frames to facilitate media access.
- Describe the Layer 2 frame structure and identify generic fields.
- Explain the role of key frame header and trailer fields, including addressing, QoS, type of protocol, and Frame Check Sequence.

Reference: Network Fundamentals CCNA Exploration, Chapter-7

8. **Explain the role of Physical layer protocols and services in supporting communications across data Networks**

Potential Elements of the Performance:

- Explain the role of Physical layer protocols and services in supporting communication across data networks.
- Describe the purpose of Physical layer signaling and encoding as they are used in networks.
- Describe the role of signals used to represent bits as a frame is

transported across the local media.

- Identify the basic characteristics of copper, fiber, and wireless network media and describe common uses of copper, fiber, and wireless network media.

Reference: Network Fundamentals CCNA Exploration, Chapter-8

9. **Explain fundamental Ethernet concepts such as media, services, and operation**

Potential Elements of the Performance:

- Describe the evolution of Ethernet
- Explain the fields of the Ethernet Frame
- Describe the function and characteristics of the media access control method used by Ethernet protocol
- Describe the Physical and Data Link layer features of Ethernet
- Compare and contrast Ethernet hubs and switches
- Explain the Address Resolution Protocol (ARP)

Reference: Network Fundamentals CCNA Exploration, Chapter-9

10. **Employ basic cabling and network designs to connect devices in accordance with stated objectives**

Potential Elements of the Performance:

- Identify the basic network media required to make a LAN connection.
- Identify the types of connections for intermediate and end device connections in a LAN.
- Identify the pinout configurations for straight-through and crossover cables.
- Identify the different cabling types, standards, and ports used for WAN connections.
- Define the role of device management connections when using Cisco equipment.
- Design an addressing scheme for an internetwork and assign ranges for hosts, network devices, and the router interface.
- Compare and contrast the importance of network designs.

Reference: Network Fundamentals CCNA Exploration, Chapter-10

11. **Build a simple Ethernet network using routers and switches and use Cisco CLI IOS commands to perform basic router and switch configuration and verification**

Potential Elements of the Performance:

- Define the role of the Internetwork Operating System (IOS).
- Define the purpose of a configuration file.
- Identify several classes of devices that have the IOS embedded.
- Identify the factors contributing to the set of IOS commands available to a device.
- Identify the IOS modes of operation.
- Identify the basic IOS commands.
- Compare and contrast the basic show commands.

Reference: Network Fundamentals CCNA Exploration, Chapter-11

III. TOPICS:

1. Chapters 1-2 Introduction to Networking and Communications
2. Chapter 3 Application Layer Functions & Protocols
3. Chapter 4 OSI Transport Layer
4. Chapter 5 OSI Network Layer
5. Chapter 6 Addressing the Network – Ipv4
6. Chapter 7 Data Link Layer
7. Chapter 8 OSI Physical Layer
8. Chapter 9 Ethernet
9. Chapter 10 Planning & Cabling Networks
10. Chapter 11 Configuring & Testing Networks

IV. REQUIRED RESOURCES / TEXTS / MATERIALS:

The curriculum is provided on-line but the following text is recommended and the lab manual is mandatory:

Textbook:

“Network Fundamentals CCNA Exploration Companion Guide”, Cisco Press, 2008, ISBN-13:978-1-58713-208-7, ISBN-10:1-58713-208-7

Mandatory Lab manual:

“Network Fundamentals CCNA Exploration Labs and Study Guide”, Cisco Press, 2008, ISBN-13:978-1-58713-203-2, ISBN-10:1-58713-203-6

Both bundled:

NETWORK FUNDAMENTALS CCNA EXPLRTN VALUE PK (includes text book and the lab manual) © 2008 | ISBN-13: 9780131357709

V. EVALUATION PROCESS/GRADING SYSTEM:

Final grade will be awarded based on the composite score of assignments, quizzes, and tests as follows:

Theory:

Online Cisco Chapter exams (10x3)	30%
Cisco Final Exam	25%
Attendance	5%
Assignments	5%

Lab:

Lab Activities	25%
Skills-based Assessment	10%

(The percentages shown above may have to be adjusted to accurately evaluate student skills. Students will be notified of any changes made.)

Note: It is necessary to attain a grade of 60% on the final Cisco Exam in order to proceed to the next Cisco CCNA Course level.

Online Cisco exams must be written in class during class time. Special procedures for on-line testing will be a requirement of this course.

The professor reserves the right to adjust the mark up or down based on attendance, participation, leadership, creativity and whether there is an improving trend.

- Students must complete and pass both the test and lab portion of the course in order to pass the entire course.
- All Assignments must be completed satisfactorily to complete the course.
- Makeup Tests are at the discretion of the instructor and will be assigned a maximum grade of 50%.
- The professor reserves the right to adjust the number of tests, practical tests and quizzes based on unforeseen circumstances. The students will be given sufficient notice to any changes and the reasons thereof.
- A student who is absent for 3 or more times without any valid reason or effort to resolve the problem will result in action taken.
NOTE: If action is to be taken, it will range from marks being deducted to a maximum of removal from the course.

Attendance:

Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances should be discussed with the professor. Students are required to be in class on time and attendance will be taken within the first five minutes of class. A missed class will result in a penalty in your marks unless you have discussed your absence with the professor as described above. The penalty depends on course hours and will be applied as follows:

Course Hours	Deduction
5 hrs/week (75 hrs)	1% per hour
4 hrs/week (60 hrs)	1.5% per hour
3 hrs/week (45 hrs)	2% per hour
2 hrs/week (30 hrs)	3% per hour

Absentee reports will be discussed with each student during regular meetings with Faculty Mentors. Final penalties will be reviewed by the professor and will be at the discretion of the professor.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.	
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.	
NR	Grade not reported to Registrar's office.	
W	Student has withdrawn from the course without academic penalty.	

VI. SPECIAL NOTES:Upgrading of Incompletes:

When a student's course work is incomplete or final grade is below 50%, there is the possibility of upgrading to a pass when a student meets all of the following criteria:

1. The student's attendance has been good.
2. An overall average of at least 45% has been achieved by semester's end.
3. The student has made reasonable efforts to participate in class and maintain the recommended schedule for assigned activities.

The nature of the upgrading requirements will be determined by the instructor and may involve re-testing and/or additional lab assignments

VII. COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.