

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Networking Essentials

CODE NO. : CSN120 **SEMESTER:** 2

PROGRAM: Computer Network Technician
Computer Engineering Technician
Computer Engineering Technician – Application
Specialist
Computer Programmer

AUTHOR: Tycho Black

DATE: Jan. 2006 **PREVIOUS OUTLINE DATED:** Jan. 2005

APPROVED:

DEAN

DATE

TOTAL CREDITS: 5

PREREQUISITE(S): NONE

HOURS/WEEK: 4

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COURSE DESCRIPTION:**I.**

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 courses will further the students progress towards full certification. The four courses are referred to by Cisco as CCNA1, 2, 3 and 4. The four courses themselves do not result in CCNA certification; one formal exam must be taken at a Prometric™ 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. Understand the requirements for Internet connectivity.Potential Elements of the Performance:

- Recall the components of a computer including CPU, RAM, ROM, BUS and describe their role in the computer.
- Install and configure a Network Interface Card to be used on a LAN.
- Configure the basic network parameters for a PC, including a web browser, in order for it to function on a network.
- Describe various types of networks and their characteristics.
- Perform binary, hexadecimal, and decimal number conversions.
- Describe networking terminology, topologies and devices.
- Describe the OSI reference model for networks and the basic process of communication among the layers of the OSI model.

Reference: Chap. 1 and 2, CCNA1 (Modules 1 and 2)

2. **Compare various networking media, cabling and associated standards.**

Potential Elements of the Performance:

- Understand the basic theory of electricity as it applies to networking.
- Describe the primary types of copper, optical and wireless media, including their operating principles, advantages and uses in networking.
- Describe modulation techniques and spread-spectrum technology.
- Identify various standards associated with networking media.
- Understand cable testing methods and the effect of noise on data signals.
- Describe the various standards that apply to structured cabling
- Identify safety and performance issues that apply to network cabling.
- Describe the purpose of, identify and construct network patch cables including straight-through, crossover and rollover cables.
- Plan and install network cables using structured cabling standards and techniques.

Reference: Chap. 3, 4 and 5, CCNA1 (Modules 3, 4 and 5)

3. **Understand Ethernet Technologies, Ethernet switching and their operation.**

Potential Elements of the Performance:

- Understand the operation of Ethernet networks and their associated standards.
- Describe and be able to identify collisions, collision domains and broadcast domains in networks.
- Understand the frame formats, transmission processes, specific media, and encoding used in each Ethernet technology.
- Understand the architectural considerations of each Ethernet technology.
- Describe network segmentation, bridging and Ethernet switching.
- Identify the common switching methods.
- Describe the functions and features of the Spanning Tree Protocol, how it works and its different STP port states.

Reference: Chap. 6, 7 and 8, CCNA1 (Modules 6, 7 and 8)

4. **Understand the TCP/IP Protocol suite, and IP addressing**

Potential Elements of the Performance:

- Identify the TCP/IP model components and their relationship to the OSI model.
- Identify applications and protocols from each layer of the TCP/IP model.
- Use IP address format and class information to determine the significance of the parts of an IP address.
- Use packet capture and protocol analyzer software to analyze network traffic.
- Calculate valid IP subnetwork addresses and mask values such that requirements are met when given an IP address scheme.

Reference: Chap. 9, CCNA1 (Module 9)

5. **Implement Routing and Subnetting**

Potential Elements of the Performance:

- Explain how routers operate at the network layer.
- Explain how routing protocols are used between routers to determine paths and maintain routing tables.
- Describe the differences between distance-vector and link-state routing protocols.
- Describe the differences between interior and exterior routing protocols and cite examples of each.
- Understand the purpose and benefits of subnetting.
- Create subnets using the subnet mask based on requirements.

Reference: Chap. 10, CCNA1 (Module 10)

6. **Describe TCP/IP Transport and Application layer protocols and applications**

Potential Elements of the Performance:

- Describe the functions of the TCP/IP transport layer.
- Describe the Transport layer header format, port numbering, use of flow control, connection establishment, windowing and acknowledgement characteristics.
- Describe the User Datagram Protocol (UDP).
- Describe the TCP/IP Application layer and its protocols.

Reference: Chap. 11, CCNA1 (Module 11)

III. TOPICS:

- 1. Module 1-2: Introduction to Networking and Networking Fundamentals
- 2. Module 3 - 5: Networking Media and Cabling
- 3. Module 6 - 8: Ethernet Fundamentals, Technologies and Switching
- 4. Module 9: TCP/IP Protocol Suite and IP Addressing
- 5. Module 10: Routing Fundamentals and Subnets
- 6. Module 11: TCP/IP Transport and Application Layer

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

The curriculum is provided on-line but the following text is recommended (although not mandatory):

“Cisco Networking Academy Program CCNA 1 and 2 Companion Guide”, Revised Third Edition, Cisco Press, 2005, ISBN 1-58713-150-1

V. EVALUATION PROCESS/GRADING SYSTEM:

Theory:

| | |
|----------------------------|-----|
| Online Cisco Chapter exams | 30% |
| Written Mid-term exam | 20% |
| Cisco Final Exam | 25% |

Lab:

| | |
|-------------------------------|-----|
| Lab Activities and Attendance | 25% |
|-------------------------------|-----|

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 following semester grades will be assigned to students in postsecondary courses:

| Grade | <u>Definition</u> | <i>Grade Point Equivalent</i> |
|--------------|--------------------------|-------------------------------|
| A+ | 90 – 100% | |
| A | 80 – 89% | 4.00 |
| 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:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Special Needs office. Visit Room E1101 or call Extension 2493 so that support services can be arranged for you.

Retention of Course Outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Plagiarism:

Students should refer to the definition of “academic dishonesty” in *Student Rights and Responsibilities*. Students who engage in “academic dishonesty” will receive an automatic failure for that submission and/or such other penalty, up to and including expulsion from the course/program, as may be decided by the professor/dean. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Course Outline Amendments:

The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Substitute course information is available in the Registrar's office.

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 40% 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

ATTENDANCE:

Absenteeism will affect a student's ability to succeed in this course. Absences due to medical or other unavoidable circumstances must be discussed with the instructor. An academic penalty may be applied for poor attendance.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the professor. Credit for prior learning will be given upon successful completion of a challenge exam or portfolio.

Students who wish to apply for advanced standing in the course should consult the instructor. This course is eligible for challenge or credit transfer if CCNA accreditation has been achieved or a Cisco Network Academy CCNA1 credit can be proven with a grade of 60% or better on the final exam and 60% achieved in the course itself. Since the curriculum is currently at version 3.1, the Computer Studies department reserves the right to require that CCNA courses proposed for credit transfer be reasonably current (version 3.0 or better) before credit transfers will be granted unless a "bridge" upgrading course is passed.

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary and speak with the Coordinator, Computer Studies. Students will be required to provide a transcript, a print-out of Cisco final exam results and a course outline (if available) for the course in question.