

I. COURSE DESCRIPTION:

This course continues the preparation for certification in the Cisco Certified Networking Associate (CCNA) program. It describes the architecture, components and the operation of routers and explains the principles of routing and routing protocols. Students analyze configure verify and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP and OSPF. By the end of this course students will be able to recognize and correct common routing issues and problems.

Rationale:

The CCNA curriculum is extensive and beyond the domain of a single course. Two additional Network Certification courses will further the students progress towards full certification. The four courses are referred to by Cisco as CCNA1 - 4. The courses themselves do not result in CCNA certification; one formal exam must be taken at a Pearson VUE™ 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. Describe routing and routers and perform basic router configuration.

Potential Elements of the Performance:

- Describe the components of a router
- Perform basic router configuration and addressing
- Describe the structure of a routing table
- Describe how a router performs routing and switching

This learning outcome will constitute approximately 15% of the course. Reference: Module 1

2. Describe Static and Dynamic routing protocols

Potential Elements of the Performance:

- Define the general role a router plays in networks
- Describe directly connected networks and the different router interfaces
- Examine directly connected networks in the routing table and use the CDP protocol to gather information about neighbour devices
- Describe static routes with exit interfaces
- Describe summary and default routes.
- Examine how packets get forwarded when using static routes

- Identify how to manage and troubleshoot static routes
- Describe the role of dynamic routing protocols and identify ways to classify them
- Describe the metrics used by dynamic routing protocols
- Identify the different elements in the routing table
- Given constraints, devise and apply subnetting schemes.

This learning outcome will constitute approximately 20% of the course. Reference: Module 2,3

3. Describe distance Vector routing protocols and implement RIP version 1 on routers.

Potential Elements of the Performance:

- Identify the characteristics of distance vector routing protocols
- Describe the network discovery process of distance vector routing protocols using RIP
- Describe the processes for maintaining accurate routing tables that are used by distance vector routing protocols
- Identify the conditions leading to a routing loop and explain the implications for router performance
- Identify the types of distance vector routing protocols in use today
- Describe the functions, characteristics and operation of the RIP v1 routing protocol
- Configure and verify proper operation of a RIP v1 device
- Describe how RIP v1 performs automatic summarization
- Use recommended techniques to solve problems related to RIPv1.

This learning outcome will constitute approximately 20% of the course. Reference: Module 4,5

4. Describe and implement VLSM, CIDR and RIP version 2 on routers.

Potential Elements of the Performance:

- Compare and contrast classful and classless IP addressing
- Implement addressing using VLSM (Variable Length Subnet Masking)
- Describe the role of classless Inter-domain routing (CIDR) in making efficient use of IP addressing.
- Describe the limitations of RIP v1.

- Apply RIPv2 routing configuration and verification commands
- Analyze and troubleshoot RIPv2 router operation
- Describe the various route types in the routing table
- Describe the route lookup procedure
- Describe routing behaviour in routed networks

This learning outcome will constitute approximately 20% of the course. Reference: Module 6,7,8

5. Describe and implement the EIGRP routing protocol

Potential Elements of the Performance:

- Describe the background, history, features and operation of EIGRP routing protocol.
- Implement EIGRP routing on routers
- Calculate the composite metric used by EIGRP
- Describe the concepts and operation of DUAL

This learning outcome will constitute approximately 10% of the course. Reference: Module 9

6. Describe and Implement Link-state routing protocols using OSPF

Potential Elements of the Performance:

- Describe the basic features and concepts of link-state routing protocols
- List the benefits and requirements of link-state protocols
- Describe the background and features of OSPF
- Apply and identify the basic OSPF configuration commands
- Describe and calculate the metric used by OSPF
- Describe the designated router/backup designated router process used in multi-access networks
- Employ the default-information originate command

This learning outcome will constitute approximately 15% of the course. Reference: Module 10,11

III. TOPICS:

1. Routing and Packet Forwarding Concepts
2. Static and Dynamic routing Protocols

3. Distance Vector routing and RIPv1
4. VLSM, CIDR and RIPv2
5. EIGRP
6. Link-state Routing Protocols and OSPF

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

None.

V. EVALUATION PROCESS/GRADING SYSTEM:

Theory:

Online Cisco Module exams	35%
Online Final Cisco Exam	25%

Lab:

Practical Test	20%
Lab Activities	20%

Notes:

- It is necessary to attain a grade of 50% on the final Cisco Exam in order to proceed to the next Cisco Certification Course.
- Online Cisco exams must be written in class during class time. It is unacceptable to print or otherwise copy any of the online Cisco exams.
- Minor modifications to the evaluation scheme may be made during the semester to accurately reflect changes in emphasis.

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

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 - 59%	0.00
F (Fail)	49% or below	
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
U	Unsatisfactory achievement in field	

X	placement or non-graded subject areas. A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies & Procedures Manual – Deferred Grades and Make-up</i>).
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has not been possible for the faculty member to report grades.
W	Student has withdrawn from the course without academic penalty

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 satisfactory.
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

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 instructor.

VI. SPECIAL NOTES:

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.

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.

Prior Learning Assessment:

Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

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

Disability Services:

If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Communication:

The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:

Students should refer to the definition of "academic dishonesty" in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade "C", (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. 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.

Student Portal:

The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations, in addition to announcements, news, academic calendar of events, class cancellations, your learning management system (LMS), and much more. Go to <https://my.saultcollege.ca>.

Electronic Devices in the Classroom:

Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

Attendance:

Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session. *It is the departmental policy that once the classroom door has enclosed, the learning process has begun. Late arrivers may not be granted admission to the room.*

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)	1.0% /hr
4 hrs/week (60 hrs)	1.5% /hr
3 hrs/week (45 hrs)	2.0% /hr
2 hrs/week (30 hrs)	3.0% /hr

Absentee reports will be discussed with each student. Final penalties will be reviewed and assessed at the discretion of the professor.

Tuition Default:

Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not honoured) as of the first week of *November* will be removed from placement and clinical activities. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default. Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.