

I. COURSE DESCRIPTION:

This course continues the preparation for certification in the Cisco Certified Networking Associate (CCNA) program. It describes the architecture, components, and 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 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. **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.
- 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 Routing Information Protocol (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 RIP v1.

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 multiaccess 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 RIP v1
4. VLSM, CIDR and RIP v2
5. EIGRP
6. Link-state Routing Protocols and OSPF

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Optional Textbook:

Routing Protocols and Concepts CCNA Exploration Companion Guide, Rick
Graziani and Allan Johnson
Cisco Press ISBN -10: 1587132060
ISBN -13: 9781587132063

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%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 - 59%	1.00
F (Fail)	49% or below	0.00
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 placement or non-graded subject areas.
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.

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 must be discussed with the instructor ahead of time. Opportunities to re-write quizzes or tests will be based on this requirement.

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 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.

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 Code of Conduct*. 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.

VII. DIRECT CREDIT TRANSFERS:

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. This will also involve verification that 60% or above was achieved on the Cisco final exam for the course.