CSIS-791: CCNA 2: SWITCHING, ROUTING, AND WIRELESS ESSENTIALS

Effective Term
Fall 2026

BOT Approval Date
05/15/2025

Discipline
CSIS - Computer Sci/Info Systems
Course Number
791

Course Title
CCNA 2: Switching, Routing, and Wireless Essentials

Short Title
Routing & Switching Essentials

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
3.00

Total Units
3.00

Hours

Lecture Contact Hours
48-54
Out of Class Hours Lecture
96-108

Total Contact Hours
48 - 54

Total Out of Class Hours
96 - 108

Total Student Learning Hours
144 - 162

Distance Education
Yes

Distance Education

Distance Education Type
Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:
a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course

b. Any planned face-to-face meetings, such as an orientation or study session, must be optional
c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods: • Orientation - Students must be oriented to the online and face-to-face portions at the start of the course. • Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc. • Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction. • MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students. • Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS. • Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Catalog Description

This course is designed to provide classroom and practical experience to help prepare for certification as a Cisco Certified Network Associate (CCNA). Students learn how to configure a router and a switch for basic functionality. By the end of this course, students will be able to configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPng, single-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)
CSIS-202 (with a grade of C or better).

Codes

TOP Code (CB 03)

0708.10* - *Computer Networking

CIP Code

11.1001 - Network and System Administration/Administrator.

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Computer Information Systems	End

Learning Objectives

Learning Objectives

Learning Objective
1. Formulate the processes routers and switches perform in enabling communications across multiple networks.
2. Evaluate the purpose and nature of routing tables.
3. Set up and verify router and switch interfaces.
4. Generalize the purpose and procedure for configuring static routes.
5. Generalize the characteristics of distance vector routing protocols.
6. Generalize the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP).
7. Dissect the functions, characteristics, and operations of the RIPv1 protocol.
8. Compare and contrast classful and classless IP addressing and routing behaviors.
9. Design and implement a classless IP addressing scheme for a given network.
10. Appraise how network design can influence equitable access to technology and the internet, particularly for underserved or marginalized communities.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. The student will analyze the process routers and switches employ to enable communication across multiple networks.
2. The student will perform, with an increasing degree of proficiency, basic router and swtich configurations, demonstrating increasing comprehension of routing and switching metrics and protocols.
3. The student will design and implement a classless Internet Protocol (IP) addressing scheme, applying the skills and knowledge obtained in this class.

Content

Course Lecture Content

1. Basic Switching Concepts
   a. Configuration Basic Switch Configuration
   b. Switch Security Management
2. Implementation of Virtual Local Area Networks(VLANs)
   a. VLAN Segmentation
   b. VLAN Implementation
   c. VLAN Security
3. Design Routing Concepts
   a. Initial configuration of a Router
   b. Routing Decisions
   c. Router Operation
4. Single-Area OSPF
   a. Characteristics of OSPF
   b. Configuring Single-Area Open Shortest Path First (OSPF) version 2
   c. Configure Single-Area OSPFv3
5. Access Control Lists (ACL)
   a. Internet Protocol (IP)
   b. ACL Operations
   c. Standard IPv4
   d. ACLS Extended
   e. IPv4 ACLs
   f. Troubleshoot ACLs
6. IPv6 ACLs

a. Dynamic Host Configuration Protocol (DHCP)
b. Dynamic Host Configuration Protocol DHCPv4
c. Dynamic Host Configuration Protocol v6

7. Network Address Translation (NAT) for IPv4 NAT
   a. Operation Configuring NAT
   b. Troubleshooting NAT
8. DEI In Technology
   a. The importance of DEI in networking and wireless communication.
   b. Historical barriers and challenges faced by underrepresented groups in technology fields.
   c. Diverse contributions to networking technologies.
   d. Designing networks that prioritize accessibility for individuals with disabilities.

Methods of Instruction

Method

Discussion

Integration

The weekly discussion will be conducted as a means to dissect the functions, characteristics, and operations of the RIPv1 protocol, The implementation of a classless IP addressing scheme for a given network, The generalization, and characteristics of distance vector routing protocols, the influence of network design has on the equitable access to technology and the internet.

DE Adaptations for MOI

Discussions will occur using the course management system's (CMS) discussion tool, designed with accessibility in mind. Features such as screen reader support, adjustable text size, and keyboard navigation ensure active participation from all students. Feedback on discussion contributions will be provided within one week via the CMS, ensuring timely and accessible engagement for everyone.

Method

Lab Activities

Integration

Labs will be used to guide students through the practical application of such concepts as the setup and verification of router and switch interfaces, the configuration of static routes, the operations of the RIPv1 protocol, and the influence network design has on equitable access to technology and the internet.

DE Adaptations for MOI

Lab activities will be conducted through the CMS, featuring accessible closed-captioned instructional videos, step-by-step tutorials, and hands-on exercises. Students will engage in real-time interactive simulations and virtual labs hosted within the CMS, providing practical experience and reinforcing key concepts. These lab activities are designed to be fully accessible, ensuring all students can actively participate and apply their learning in a dynamic, supportive environment.

Method

Lecture

Integration

Lecture, with supporting visual materials (slide set presentation or multimedia) will introduce conceptual and practical skills such as routing tables, switch interfaces, and routing protocols, and the influence network design has on equitable access to technology and the internet.

DE Adaptations for MOI

The CMS will be a central hub for online students, offering accessible recorded lectures, online presentations, and supplementary materials. To promote inclusivity, live webinars and recorded lectures will be provided with closed captions (CC), enabling real-time interaction and discussions.

Method

Observation and Demonstration

Integration

Observation and demonstration will illustrate lecture principles and reading assignments focusing on fundamental networking concepts and applying them to problem-solving and potential solutions to homework and lab assignments. Guided practice will include analyzing the processes routers and switches employ to enable communication across multiple networks, basic router and switch configurations, and designing and implementing a classless Internet Protocol (IP) addressing scheme.

DE Adaptations for MOI

Observation and demonstrations will be accessible through the CMS, offering closed-captioned videos, web-based tutorials, and hands-on activities. Interactive software simulations hosted within the CMS will provide students with real-time engagement opportunities and practical experience, ensuring accessibility and active learning for all participants.

Methods of Evaluation

Method

Other

Integration

A Comprehensive final exam that measures each student's ability to synthesize and apply course concepts such as analyzing the processes routers and switches employ to enable communication across multiple networks; Basic router and switch configurations including routing and switching metrics and protocols; Design and implement a classless Internet Protocol (IP) addressing scheme; the influence of network design has on the equitable access to technology and the internet. The Comprehensive final exam will be evaluated based on completeness and correctness.

DE Adaptations for MOE

The comprehensive final exam will be administered through the course management system (CMS), consisting of multiple-choice, true/false, and short-answer questions. Students will submit their completed exams directly through the CMS. Immediate feedback will be provided for objective questions, such as multiple-choice and true/false, while feedback on short-answer responses will be given within 48 hours. This approach ensures timely reinforcement of key concepts and provides clarity on areas that may require further improvement. Any resources or documents provided will comply with accessibility standards.

Method

Exams/Tests

Integration

Weekly exams will be composed of short answers and multiple-choice questions. The exams will be designed to evaluate the mastery of distance vector routing protocols, classless IP addressing, and routing behaviors, the influence of network design on equitable access to technology and the internet, and procedures for configuring static routes. Weekly exams will be evaluated based on the correct answer given.

DE Adaptations for MOE

Weekly exams will be administered through the course management system (CMS), consisting of multiple-choice, true/false, and short-answer questions. Students will submit their completed exams directly through the CMS. Immediate feedback will be provided for objective questions, such as multiple-choice and true/false, while feedback on short-answer responses will be given within 48 hours. This ensures timely reinforcement of learning and offers clarity on areas for improvement. Any resources or documents provided will comply with accessibility standards.

Method

Homework

Integration

Weekly homework assignments will be given that apply essential concepts and skills to the student’s experience outside the classroom. The focus might be on communications across multiple networks, classless IP addressing schemes, operations of the

RIPv1 protocol, and the influence of network design on equitable access to technology and the internet. Homework assignments will be evaluated based on correctness and completeness.

DE Adaptations for MOE

Homework will be assessed based on accuracy, completeness, and following the provided instructions. Assignments will be submitted through the assignment editor in the course management system (CMS). Students will receive detailed feedback through the CMS grading tool, including comments on strengths and areas for improvement. Feedback will be provided within one week of the submission deadline. Depending on the task requirements, students may also submit assignments via CMS discussion boards, blogs, or wiki tools. Any resources or documents provided will comply with accessibility standards.

Assignments

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

You have been hired by a medium-sized business that is expanding its operations. They require a robust and scalable network design to accommodate the following.

Number of users: 150 employees across three departments (Administration, IT, and Sales).
Devices: Include laptops, desktops, VoIP phones, printers, and wireless devices.
Office layout: Two floors, each with three rooms dedicated to the departments.
Connectivity requirements: Internet access, inter-department communication, and secure guest wireless access.

For this design, you must address the following:

1. Switching and VLAN Configuration:
Propose a plan for the placement and configuration of switches.
Explain how VLANs will be used to segregate traffic between departments.
Discuss strategies for managing broadcast domains and enhancing network performance.

2. Routing Protocols and Configuration:
Choose a suitable routing protocol (e.g., RIP, EIGRP, OSPF) and justify your choice.
Explain how inter-VLAN routing will be configured.
Discuss how the network can scale with future expansions.

3. Wireless Network Design:
Recommend a wireless topology (e.g., single or multiple SSIDs).
Discuss the placement of wireless access points (APs) for optimal coverage.
Explain how you will secure the wireless network.

4. Redundancy and Reliability:
Propose strategies to ensure redundancy at Layer 2 and Layer 3.
Discuss the implementation of Spanning Tree Protocol (STP) to prevent loops.

5. Troubleshooting and Maintenance:
List potential issues that could arise in this network.
Suggest monitoring and troubleshooting tools (e.g., packet analyzers, SNMP) to maintain network health.

Write a report that addresses all tasks in detail. Your report should be 1000–1500 words and include diagrams, tables, or charts where necessary to support your explanations.

This assignment will be evaluated on technical accuracy, design practicality, clarity and organization, and justification.

How assignment will be adapted in online format

This assignment will be distributed and collected through the CMS assignments area. Feedback on the assignment will be given in the comments section of the grade book, which is part of the CMS.

Any external link within the assignment will have descriptive text explaining the link's destination. Any resources or documents will comply with accessibility standards.

Feedback on the assignment will be given within a 72-hours of the due date.

Assignment Type

Reading

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Read the provided excerpts from the chapter sections on VLANs and Inter-VLAN Routing from the Cisco Networking Academy course and the technical documentation for Spanning Tree Protocol (STP). After reading, complete the following tasks:

Task 1: Vocabulary and Key Concepts

Based on the reading, define the following terms:
VLAN, Default Gateway, Spanning Tree Protocol, Wireless Access Point, and Collision Domain. Explain why each of these terms is critical in network design.

Task 2: Application Questions
Based on the reading, explain how VLANs improve network performance and security.
Summarize how inter-VLAN routing enables communication between different VLANs. Include an example taken from the text.
Identify three challenges in wireless network deployment from the case study and propose solutions.

Task 3: Diagram Interpretation
Analyze the network topology diagram included in the reading material. Answer these questions:
1. What type of topology is being used?
2. How are VLANs configured in the switches?
3. What role do routers play in this topology?
4. How would STP ensure redundancy and loop prevention?

Task 4: Discussion
Form small groups and discuss and keep notes of the discussion about the following:
1. How do VLANs and inter-VLAN routing contribute to scalability?
2. What are the best practices for deploying wireless APs in a large office?

Write a brief paragraph summarizing the most important takeaway from this reading and how it applies to real-world networking.

This assignment will be evaluated based on the completeness of vocabulary definitions and application questions, the depth of group discussion notes, and the accuracy of the individual paragraph.

How assignment will be adapted in online format

This assignment will be distributed and collected through the CMS assignments area. Feedback on the assignment will be given in the comments section of the grade book, which is part of the CMS.

Any external link within the assignment will have descriptive text explaining the link's destination. Any resources or documents will comply with accessibility standards.

Feedback on the assignment will be given within a 72-hours of the due date.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Summative

Assignment

This assignment aims to analyze the impact of networking technologies on diverse user populations and propose strategies to design, implement, and maintain inclusive and secure network infrastructures. You must apply technical networking knowledge while considering the importance of diversity, equity, and inclusion (DEI) in IT.

In a three to five-page paper, address the following four areas.

1. Technical Analysis:
• Explain the key functions of switching, routing, and wireless technologies in modern network infrastructure.
• Discuss the importance of network security and performance optimization in supporting diverse users and organizations.
• Describe best practices for configuring and maintaining networks that serve a wide range of users, including those with disabilities or limited access to high-speed internet.
2. Equity in Network Access and Design:
• Analyze the digital divide and how network infrastructure can either bridge or exacerbate gaps in access to technology.
• Discuss how network engineers can design more inclusive networks by considering accessibility, affordability, and usability for marginalized communities.
• Provide examples of real-world initiatives or policies that promote equitable access to networking resources.
3. Inclusive Language and Representation in IT:
• Evaluate the role of inclusive language in IT and networking documentation, training, and communication.
• Discuss how biased terminology in networking (e.g., "master/slave" configurations, "whitelisting/blacklisting") has been replaced with more inclusive alternatives and why these matters.
• Reflect on how inclusive networking environments can encourage more women and underrepresented groups to pursue careers in IT.
4. Ethical and Social Considerations in Network Security and Privacy:
• Examine how bias in networking security policies (e.g., surveillance, data collection) can disproportionately impact specific communities.
• Propose strategies for implementing ethical security policies that protect all users while maintaining network efficiency.

This assignment will be evaluated based on technical knowledge, DEI integration, critical thinking and analysis, organization and clarity, and citations and formatting.

How assignment will be adapted in online format

This assignment will be distributed and collected through the CMS assignments area. Feedback on the assignment will be given in the comments section of the grade book, which is part of the CMS.

Any external link within the assignment will have descriptive text explaining the link's destination. Any resources or documents will comply with accessibility standards.

Feedback on the assignment will be given within a 72-hours of the due date.

Course Materials

Textbooks

Switching, Routing, and Wireless Essentials Companion Guide (CCNAv7)
1st Edition

CCNA 200-301 Official Cert Guide Library 2nd Edition
Odom, Hucaby, Gooley
Cisco Press, 2024, ISBN 0138221391

ISBN: 0136729355
CISCO Networking Academy, 2020

Class Size Information

Class Size

35

Class Size Category

B - Facilitated learning 35

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

Diversity and inclusion are central to our Computer Science and Information Systems course, ensuring every student feels respected and valued. Through a curriculum that highlights diverse perspectives, inclusive teaching practices, and a supportive learning environment, we foster a culture of understanding and respect. Faculty receive training to enhance cultural competence, and students participate in critical discussions on the ethical implications and biases in computing and information systems. By embedding diversity and inclusion throughout the course, we prepare students to become well-rounded professionals capable of addressing global challenges in the field. For instance, Dr. Raj Reddy, an Indian computer scientist, significantly contributed to artificial intelligence and computer science. He became the first person of Indian origin to win the prestigious Turing Award for his work in human-computer interaction and robotics.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

This course's assignments will include individual and group projects to accommodate different learning preferences (e.g., solo work for independent learners and teamwork for collaborative learners). The assignments will also allow students to select case studies that align with their interests or cultural experiences. Assignments will be available in multiple formats (e.g., written instructions, video walkthroughs, and interactive simulations).

The instruction in this class will use a combination of lectures, hands-on labs, visual aids (e.g., diagrams of network topologies), and interactive simulations (e.g., Cisco Packet Tracer) to cater to different learning styles. Examples provided will reflect global networking challenges, such as deploying wireless networks in rural or underserved areas.

Formative assessments, such as quizzes and in-class exercises, will be given to provide ongoing feedback without penalizing mistakes. In addition, multiple assessment options, such as written exams, practical labs, and project-based evaluations will be given. The assessment rubric in this course will be clear and detailed to outline expectations for assignments and projects.

The course content will discuss networking challenges in different contexts, such as urban, rural, or developing regions. It will also include content on accessibility in network design, like ensuring networks support assistive technologies.

Every effort will be made in this class to foster a safe environment where students feel comfortable asking questions and sharing ideas. Inclusive language will be used to encourage participation from all students. Regularly scheduled meeting times will be provided where students can interact with the instructor in a one-on-one fashion. Discussion forums will be held where students can interact with their peers.

Interactions

Explain how the course will incorporate student-to-student interaction.

By embedding student-to-student interactions into every aspect of the course, students can learn from one another, develop collaboration skills, and reinforce their understanding of Switching, Routing, and Wireless Essentials concepts.

The discussions topics presented in this class will be from real-world networking challenges where students will work in small groups to brainstorm solutions. For some of the lab assignments, students will be divided into pairs to configure and troubleshoot networks using tools like Cisco Packet Tracer. Roles will be assigned to each student (e.g., one configures the router, the other verifies the switch settings) and role-switching will be encouraged. During lectures questions will be posed about the related topic. Students will be encouraged to discuss their thoughts with classmates and share them with the class. During observation and demonstrations students will be assigned to observe and take notes on specific aspects of the process (e.g., how to configure a VLAN or troubleshoot a wireless network). Afterward, students will compare notes with a partner or small group.

Explain how the course will incorporate instructor-to-student interaction.

By embedding consistent and meaningful instructor-to-student interaction throughout the course, students are more likely to feel supported, engaged, and empowered to succeed. Instructor-to-student interaction will be achieved through the following steps:

Students' comments during the discussion will be responded to with constructive feedback and offer deeper insights or by posing follow-up questions to encourage critical thinking. The instructor will check with students individually during lab sessions to address challenges and ensure they are on the right track. During lectures, What-if scenarios will be presented to spark curiosity and engagement. In addition, the instructor will encourage students to share their understanding of key points or summarize complex concepts in their own words. During demonstrations, students will be encouraged to predict outcomes or suggest the next steps for completion. Students will also be encouraged to take over certain demonstration parts under the instructor's guidance.

Regularly scheduled meeting times (both virtually and in-person) will be held where students can ask questions or seek additional help. Personalized feedback will be given on assignments, labs, and assessments, which will offer clear steps for improvement.

Explain how the course will incorporate student-to-content interaction.

Hands-on lab activities will be given, and students can configure switches, routers, and wireless devices using tools like Cisco Packet Tracer or real hardware.

Interactive tutorials will require students to make decisions (e.g., selecting routing protocols or designing wireless topologies) based on course concepts. Step-by-step interactive tutorials will require students to make decisions (e.g., selecting routing protocols or designing wireless topologies) based on course concepts.

Diagrams of network topologies will be given, and students will be encouraged to annotate them (e.g., labeling VLANs, IP addresses, and routing paths). In addition, students will be asked to critique or improve the design of the topology.

Visual tools like Wireshark will analyze network traffic and help students understand network protocols.

Dynamic quizzes will be given to provide immediate feedback.

Students can actively engage with the course material by integrating these methods, deepening their practical and theoretical knowledge of switching, routing, and wireless essentials.

Explain how the course will incorporate student-to-self interaction (metacognitive).

This course will provide self-assessment tools such as pre-lab and post-lab assessments, which allow students to assess their confidence and understanding of topics before and after a lab activity or lesson. In addition, knowledge checks, where self-paced quizzes enable students to rate their understanding of key concepts like VLANs, routing protocols, or wireless security, will provide skill inventory. Students will also be asked to evaluate their skills in configuring switches, routers, and wireless devices at the beginning and end of the course.

A clear rubric for self-evaluation for assignments will be provided, allowing students to evaluate their work before and after submission.

Open-ended questions will promote curiosity by encouraging students to ask themselves questions like How does this concept apply in real-world networks, What would happen if I configured it differently, What are the long-term implications of this setup?

By incorporating these practices, students develop the metacognitive skills needed to monitor their learning, adapt to challenges, and approach new networking tasks confidently and strategically. Let me know if you'd like help designing specific activities or tools!

Key: 1096