

SONOMA COUNTY OFFICE OF EDUCATION

ROP COURSE OUTLINE

Cisco Networking Semester 3 & 4

Course Description

This is the second of two courses designed to provide students with classroom and laboratory experience in current and emerging networking technology that will empower them to enter employment and/or further education and training in the computer networking field. Content standards are based on a task analysis of current industry/occupational standards. The first half of this course includes switches; LAN and virtual local area network (VLAN) design, configuration, and maintenance; internetwork packet exchange (IPX) routing and interior gateway routing protocols (IGRPs); and network troubleshooting. The second half of the course includes wide area networks (WANs), integrated services data networks (ISDNs), point-to-point protocols (PPPs), and frame relay design, configuration, and maintenance. Students develop practical experience in skills related to configuring WANs, ISDN, PPP, and frame relay protocols and network troubleshooting. Integrated throughout the course are career preparation standards, which include basic academic skills, communication, interpersonal skills, problem solving, safety, technology, and other employment skills.

CBEDS Title: Telecommunications

CBEDS Number: 4618

Career Development / Workforce Preparation

Course Created:

County Board Approval: _____
(Date)

Course Revised:

California Department of Education Approval: _____
(Date)

Information Services

The information services industry is struggling to recover from significant layoffs and declining demand for infrastructure, equipment and services over the last four years. According to the Sonoma County Economic Development Board's North Bay and Employment report for Fall 2004 the technology industry is beginning to show signs of recovery. Telecom markets are stabilizing with businesses increasing their purchases of telecom equipment and service. In addition, the consumer market for information technology and digital "gadgets" has helped improve demand for information technology products and service. According to the Wall Street Journal, technology convergence is the trend in consumer electronics bundling voice, data, video and internet access in cell phones, portable music players and even home appliances. This trend suggests that information services, both in terms of product development and service and consulting, will remain and grow into a strong industry for potential employment. The trick is to estimate which aspect of information services to focus training.

Computer Applications continues to be the staple of Information service jobs. Nearly any job that is available today requires computer skills. Nearly any job involves the ability to use a computer effectively and manage and share information. Communicating and sharing information are skills listed throughout the occupations outlined in the North Bay Counties Occupational Outlook – 2003-2004. Occupations such as Administrative Assistants, Billing Clerks, Cashiers, Database Administrators, Office Clerks, Customer Service Representatives, and Secretaries all use computers extensively.

Networking and computer technicians are in high demand and enjoy medium to large size occupations. Growth in these occupations is expected to be faster than average with a strong probability of upward movement with further training beyond high school. Sonoma County with its high technology manufacturing has a strong labor market for computer technicians.

Web design and computer graphics are popular fields with volatile job markets. The North Bay Counties Occupational Outlook for 2003-2004 was unable to estimate employment trends for these occupations. However, according to the publication, employers are expecting their hiring in these fields to grow over the next two years. With much of page layout and design work being done in-house, more jobs may require this skill than can be easily estimated.

Digital video and animation are also popular fields with unclear job markets. Certainly, there are high-end jobs and the popular computer gaming industry draws a great deal of computer programmers and animators. However, employment data, especially local employment data, for these fields is hard to find. Traditionally, much of the growth in computer graphics, video and animation has happened as individuals work as private contractors. There is a large demand for digital video and entertainment. Unfortunately, there is little data to document the demand for jobs in the digital video and computer graphics fields.

Given the extent of our information economy, occupations in information services are prevalent. Such training is often considered basic for most occupations.

Cisco Networking Semester 3 & 4

This course is linked directly to occupations in the following industries:

Manufacturing
Government

Utilities
Business

**This course is a part of the following Career Pathway
Pathway**

| Recommended Sequence | Courses |
|-----------------------------|----------------------------------|
| Introductory | Computer Foundations |
| Skill Building | Cisco Networking: Semester 1 & 2 |
| Advanced Skill | Cisco Networking: Semester 3 & 4 |

Core Academic Standards

This course addresses the following Core Academic Standards

Instructional Unit: Career Preparation:

English Language Arts Standards:

Grade 8: Reading – 1.3: Use the word meanings within the appropriate context and show ability to verify those meanings by definition, restatement, example, comparison, or contrast.

Grade 8: Reading – 2.1: Compare and contrast the features and elements of consumer material to gain meaning from documents (e.g., warranties, contracts, product information, instructional materials).

Grade 8: Reading – 2.6: Use information from a variety of consumer, workplace, and public documents to explain a situation or decision and to solve a problem.

Grade 8 Writing – 1.3: Support theses or conclusions with analogies, paraphrases, quotations, opinions from authorities, comparisons, and similar devices.

Grade 8 Writing – 2.5: Write documents related to career development, including simple business letters and job applications:

- a. Present information purposefully and succinctly and meet the needs of the intended audience.
- b. Follow the conventional format for the type of document (e.g., letter of inquiry, memorandum).

Grade 8 Language Conventions -- 1.4: *Grammar:* Edit written manuscripts to ensure that correct grammar is used.

Grade 8 Language Conventions -- 1.5: *Punctuation and Capitalization:* Use correct punctuation and capitalization.

Grade 8 Language Conventions -- 1.6: *Spelling:* Use correct spelling conventions.

Grade 8 Listening and Speaking -- 1.2: *Comprehension:* Paraphrase a speaker's purpose and point of view and ask relevant questions concerning the speaker's content, delivery, and purpose.

Grade 8 Listening and Speaking -- 1.3: *Organization and Delivery of Oral Communication:* Organize information to achieve particular purposes by matching the message, vocabulary, voice modulation, expression, and tone to the audience and purpose.

Grade 9/10 Reading -- 2.1: *Structural Features of Informational Materials:* Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes.

Grade 9/10 Reading-- 2.3: *Comprehension and Analysis of grade-Level-Appropriate Text:* Generate relevant questions about readings on issues that can be researched.

Grade 9/10 Reading – 2.6: Demonstrate use of sophisticated learning tools by following technical directions (e.g., those found with graphic calculators and specialized software programs and in access guides to World Wide Web sites on the Internet).

Grade 9/10 Writing – 2.5: Write business letters:

- a. Provide clear and purposeful information and address the intended audience appropriately.
- b. Use appropriate vocabulary, tone, and style to take into account the nature of the relationship with, and the knowledge and interests of, the recipients.
- c. Highlight central ideas or images.
- d. Follow a conventional style with page formats, fonts, and spacing that contribute to the documents' readability and impact.

Grade 9/10 Language Conventions –1.4: *Manuscript Form:* Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.

Grade 9/10 Listening and Speaking – 1.1: *Comprehension:* Formulate judgments about the ideas under discussion and support those judgments with convincing evidence.

Grade 9/10 Listening and Speaking – 2.3: Apply appropriate interviewing techniques:

- a. Prepare and ask relevant questions.
- b. Make notes of responses.
- c. Use language that conveys maturity, sensitivity, and respect.
- d. Respond correctly and effectively to questions.
- e. Demonstrate knowledge of the subject or organization.
- f. Compile and report responses.
- g. Evaluate the effectiveness of the interview.

Grade 11/12 Reading –2.3: *Comprehension and Analysis of Grade-Level-Appropriate Text:* Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents.

Grade 11/12 Writing – 2.5: Write job applications and resumés:

- a. Provide clear and purposeful information and address the intended audience appropriately.
- b. Use varied levels, patterns, and types of language to achieve intended effects and aid comprehension.
- c. Modify the tone to fit the purpose and audience.
- d. Follow the conventional style for that type of document (e.g., resumé, memorandum) and use page formats, fonts, and spacing that contribute to the readability and impact of the document.

Grade 11/12 Language Conventions – 1.2: Produce legible work that shows accurate spelling and correct punctuation and capitalization.

Math Standards:

Grade 7: Number Sense – 1.2: Add, subtract, multiply, and divide rational numbers to whole-number powers.

Grade 7: Number Sense – 1.3: Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.

Grade 7: Number Sense – 1.7: Solve problems that involve discounts, markups, commissions, and profit and compute simple and compound interest.

Grade 7: Mathematical Reasoning – 1.1: Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

Grade 7: Mathematical Reasoning – 1.3: Determine when and how to break a problem into simpler parts.

Grade 7: Mathematical Reasoning – 2.1: Use estimation to verify the reasonableness of calculated results.

Grade 7: Mathematical Reasoning – 2.7: Indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.

Grade 7: Mathematical Reasoning – 2.8: Make precise calculations and check the validity of the results from the context of the problem.

Grade 7: Mathematical Reasoning – 3.1: Evaluate the reasonableness of the solution in the context of the original situation.

Instructional Unit: Cisco Networking Semester 3 & 4

English Language Arts Standards:

Grade 9-10: Reading – 2.1: Analyze the structure and format of functional workplace documents, including the graphics and headers, and explain how authors use the features to achieve their purposes.

Grade 11-12: Reading – 1.3: Discern the meaning of analogies encountered, analyzing specific comparisons as well as relationships and inferences.

Grade 11-12: Reading – 2.3: Verify and clarify facts presented in other types of expository texts by using a variety of consumer, workplace, and public documents.

Grade 9-10: Listening and Speaking – 1.1: Formulate judgments about the ideas under discussion and support those judgments with convincing evidence.

Grade 9-10: Listening and Speaking – 1.3: Choose logical patterns of organization (e.g., chronological, topical, cause and effect) to inform and to persuade, by soliciting agreement or action, or to unite audiences behind a common belief or cause.

Grade 9-10: Listening and Speaking – 1.4: Choose appropriate techniques for developing the introduction and conclusion (e.g., by using literary quotations, anecdotes, references to authoritative sources).

Grade 9-10: Listening and Speaking – 1.11: Assess how language and delivery affect the mood and tone of the oral communication and make an impact on the audience.

Grade 9-10: Listening and Speaking – 1.12: Evaluate the clarity, quality, effectiveness, and general coherence of a speaker's important points, arguments, evidence, organization of ideas, delivery, diction, and syntax.

Grade 11-12: Writing – 1.7: Use systematic strategies to organize and record information (e.g., anecdotal scripting, annotated bibliographies).

Math Standards:

Grade 7: Number Sense – 1.1: Read, write, and compare rational numbers in scientific notation (positive and negative powers of 10) with approximate numbers using scientific notation.

Grade 7: Number Sense – 1.3: Convert fractions to decimals and percents and use these representations in estimations, computations, and applications.

Grade 8-12: Algebra II – 1.0: Students solve equations and inequalities involving absolute value.

Grade 8-12: Algebra II – 2.0: Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.

Grade 8-12: Algebra II – 3.0: Students are adept at operations on polynomials, including long division.

Grade 8-12: Algebra II – 11.1: Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

Grade 8-12: Algebra II – 11.2: Students judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.

Grade 8-12: Algebra II – 13.0: Students use the definition of logarithms to translate between logarithms in any base.

Grade 8-12: Algebra II – 14.0: Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.

Grade 8-12: Algebra II – 18.0: Students use fundamental counting principles to compute combinations and permutations.

Grade 8-12: Algebra II – 21.0: Students apply the method of mathematical induction to prove general statements about the positive integers.

Model Curriculum Standards for Cisco Networking Semester 3 & 4

**This course addresses the following Business Education and Information
Technology Model Curriculum Standards**

Business Core 1.0

1.3 Career Preparation, Job Acquisition and Retention (C):

Students will understand the career preparation and job acquisition skills required for employment, professional growth, and employment transitions in the field of business occupations. They will demonstrate competency by researching career options, applying job acquisition skills,

preparing job search documentation, and modeling appropriate workplace demeanor.

- 1.3.1 Career Exploration—explore career opportunities and projected trends; investigate required education, training and experience; and develop an individual education plan for life long learning
- 1.3.2 Employment Transitions—analyze the effects of job changes, including the impact of unemployment
- 1.3.3 Goal Setting—identify steps for setting goals and write personal goals and objectives
- 1.3.4 Interest Assessment—examine aptitudes related to career options; relate personal characteristics and interests to educational and occupational opportunities
- 1.3.5 Job Acquisition—develop job acquisition documents and interview skills
- 1.3.6 Job Retention—identify appropriate work attitudes and behaviors

1.5 Employability Skills (C):

Students will understand the factors essential to a productive workforce in a culturally diverse global environment. They will demonstrate competency by identifying the skills, which positively affect productivity.

- 1.5.1 Adapting to Change—provide a workplace example of a constantly changing environment and discuss how employees should incorporate lifelong learning as a career goal
- 1.5.2 Conflict Resolution—demonstrate skills necessary to resolve disagreements in a professional manner
- 1.5.3 Diversity—describe and compare cultural differences as related to work styles
- 1.5.4 Occupational Safety—discuss safety practices and develop a plan to maintain a work environment in a safe and secure manner
- 1.5.5 Positive Attitude—role play a work situation to demonstrate positive working relationships with customers, employers and employees
- 1.5.6 Teamwork—develop the ability to work in teams by participating in group activities
- 1.5.7 Time Management—prioritize work to fulfill responsibilities, meet deadlines, and achieve personal satisfaction
- 1.5.8 Work Ethics—define ethics and explain how standards and scruples affect human relations

Information Technology Standards:

I. Information Technology: Students will understand information technology concepts necessary to function in a rapidly changing technological, global society. They will demonstrate competency by appropriately using a variety of resources to develop, access, modify, manage and provide information effectively.

- I.a Accessibility – identify and develop systems that allow access to all users, including those with cultural, physical and cognitive differences
- I.b Business and Technology Ethics – define, explain, and demonstrate proper business and technology ethics, including management of intellectual property and copyright laws
- I.c Computer and Communications Systems – use operating systems, hardware and peripherals, integrating communication tools and appropriate resources, to share, store and manage information
- I.d Computer Applications – identify, select, and use a variety of business and industry standard applications software; discuss emerging technology trends
- I.e Knowledge Management and Business Processes – use technology and electronic media to identify, analyze, design, and create processes to manage workflow, communicate a collective understanding, and provide feedback for operational management
- I.f Personal Security – identify and understand procedures for keeping personal information secure to ensure safety
- I.g Project Management – prioritize activities and manage the details including project scope and scale, timelines, and budgets for the life cycle of the system in a team environment
- I.h System Models – identify and compare system models and data elements and structures
- I.i System Security – illustrate and implement security plans and procedures for information systems
- I.j Systems Analysis and Design – analyze information systems and develop efficient and effective solutions
- I.k Technical Resources – locate, organize, and utilize appropriate resources necessary to implement and support systems and/or solve problems

IV. Network Communications: Students will understand the concepts, systems, and business models necessary to install, create, and manage diverse types of communication technologies and networking systems. They will demonstrate competency by performing tasks related to the creation, installation, management, and security of a chosen networking system.

- IV.d Emerging Technology and Trends – discuss emerging products, services, and business models in relation to the creation, setup, and management of network communication products and services
- IV.e Media Types – identify, evaluate, create, and process voice and data transmissions
- IV.f Network and Systems Administration – analyze, manage, and maintain various types of electronic networks
- IV.g Network Communication Applications – describe and illustrate appropriate use of communication services, products, and applications
- IV.h Network Communication Infrastructure – evaluate, select, and configure compatible systems across various platforms and media types
- IV.i Resource Management – discuss the effective management of human, financial, and communications resources from the standpoint of both a user and a provider
- IV.j Security Monitoring and Investigation – classify appropriate monitoring devices and procedures for quick identification, and prevention of security violations; describe investigative procedures to follow
- IV.k Security Program – develop policies and procedures including user agreements, incident reporting, and recovery for users; design orientation and training programs to educate technicians and end users
- IV.l Security Risk Assessment – identify potential risks and entrance points including internal and external risks, and select appropriate hardware and software including firewalls, monitoring, and antivirus protection
- IV.m Standards and Protocol – analyze implications of protocols and international standards and discuss their impact on data transmission
- IV.n Topology – diagram physical and logical layouts of network communication systems
- IV.o Training – provide information and instruction to users that will enable them to utilize network communication systems
- IV.p Troubleshooting – identify problems, develop appropriate methods and tools for resolving problems, and implement solutions

Course Outline

Sonoma County Office of Education
Career Development / Workforce Preparation

This course outline is presented in the state approved format - 2004

Cisco Networking Semester 3 & 4

COURSE OUTLINE

1. Course Title: Cisco Networking: Semester 3 & 4

2. CBEDS Title: Telecommunications

3. CBEDS Number: 4618

4. Job Titles:

Network Support Specialist Network Control Technician LAN/WAN Technicians Network Specialists Network Systems Technician Cisco-Certified Network Technician

5. Course Description:

This is the second of two courses designed to provide students with classroom and laboratory experience in current and emerging networking technology that will empower them to enter employment and/or further education and training in the computer networking field. Content standards are based on a task analysis of current industry/occupational standards. The first half of this course includes switches; LAN and virtual local area network (VLAN) design, configuration, and maintenance; internetwork packet exchange (IPX) routing and interior gateway routing protocols (IGRPs); and network troubleshooting. The second half of the course includes wide area networks (WANs), integrated services data networks (ISDNs), point-to-point protocols (PPPs), and frame relay design, configuration, and maintenance. Students develop practical experience in skills related to configuring WANs, ISDN, PPP, and frame relay protocols and network troubleshooting. Integrated throughout the course are career preparation standards, which include basic academic skills, communication, interpersonal skills, problem solving, safety, technology, and other employment skills.

Student Outcomes and Objectives:

Upon Completion for this course students will have an understanding of the following:

Switching and Intermediate Routing

- Switching and VLAN's
- Spanning-Tree Protocol
- Access Control Lists (ACLs)
- Network documentation, security and troubleshooting

WAN Technology Basics

- WAN devices, encapsulation formats, and communication
- PPP Components, session establishment, and authentication
- ISDN uses, services, and configuration

Integrated throughout the course are career preparation standards, which include basic academic skills, communication, interpersonal skills, problem solving, workplace safety, technology, and employment literacy.

Pathway

| Recommended Sequence | Courses |
|----------------------|----------------------------------|
| Introductory | Computer Foundations |
| Skill Building | Cisco Networking: Semester 1 & 2 |
| Advanced Skill | Cisco Networking: Semester 3 & 4 |

6. Hours: *Students receive up to 180 hours of classroom instruction*

7. Prerequisites: Cisco Networking: Semester 1 & 2

8. Date (of creation/revision): December 2004

9. Course Outline

COURSE OUTLINE

Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.

| Instructional Units and Competencies | Course Hours | Model Curr. Standards | CA Academic Content Standard | CAHSEE |
|--|---|-------------------------------------|--|--|
| <p>I. CAREER PREPARATION STANDARDS</p> <p>A. Understand how personal skill development (including positive attitude, honesty, self-confidence, work ethic, time management, and other positive traits) affects employability.</p> <ol style="list-style-type: none"> 1. Demonstrate an understanding of classroom policies and procedures. 2. Define workplace ethics and explain the importance of ethical standards and confidentiality in the business environment. 3. Discuss importance of the following personal skills in the work environment: <ol style="list-style-type: none"> a. positive attitude b. self-confidence c. honesty d. perseverance e. self-discipline 4. Define personal hygiene and identify acceptable workplace attire. 5. Prioritize tasks and meet deadlines. 6. Discuss the importance of lifelong learning. <p>B. Understand principles of effective interpersonal skills, including group dynamics, conflict resolution, and negotiation.</p> <ol style="list-style-type: none"> 1. Identify and discuss the key concepts of group dynamics. 2. Identify strategies for solving conflict in the workplace. <ol style="list-style-type: none"> a. setting limits that build mutual respect b. using key words and phrases that establish a spirit of cooperation c. building win/win relationships d. avoiding manipulation, stereotyping, harassment, and intimidation e. resolving conflicting job assignments 3. Discuss negotiation and its importance within the business environment. 4. Work cooperatively, share responsibilities, accept supervision, and assume leadership roles. 5. Demonstrate cooperative working relationships and proper etiquette across gender and cultural groups. <p>C. Understand the importance of good academic skills, critical thinking and problem-solving skills in the workplace.</p> <ol style="list-style-type: none"> 1. Recognize the importance of good reading, writing, math and computer skills in the work environment and implement a plan for self-improvement as needed. 2. Read, write, and give directions. 3. Exhibit critical and creative thinking skills. 4. Recognize problem situations; identify, locate and organize needed information or data; and propose, evaluate, and select from alternative solutions. 5. Use appropriate reference materials. | <p>10</p> <p>Additional hours are integrated throughout the course.</p> | <p>Business Core; 1.3 & 1.5</p> | <p><u>Language Arts</u> (8) R 1.3, 2.6 W1.3, 2.5. LC 1.4,1.5 1.6 LS1.2, 1.3, (9/10) R2.1,2.3,2 W2.5 LC1.4 LS 1.1, 2.3 (11/12) R2.3 W2.5 LC1.2 <u>Math</u> (7) NS1.2, 1.7 MR 1.1,1.3 2.7,2.8, 3.1</p> | <p>Lang. Arts R 8.2.1</p> <p>(9/10) R 2.1, 2.3 W2.5</p> <p>Math (7) NS 1.2, 1.3, 1.7 MR 1.1, 2.1, 3.1</p> |

| Instructional Units and Competencies | Hours | Model Curr. Standards. | CA Academic Standards | CAHSEE |
|---|-------|------------------------|-----------------------|--------|
| <p>I. CAREER PREPARATION STANDARDS (Cont.)</p> <p>D. Understand principles of effective communication.</p> <ol style="list-style-type: none"> 1. Read and implement written instructions, technical manuals, written communication, and reference books. 2. Present a positive image through verbal and nonverbal communication through use of appropriate methods. 3. Demonstrate active listening through oral and written feedback. 4. Demonstrate proper etiquette in workplace communications. 5. Demonstrate writing/editing skills as follows: <ol style="list-style-type: none"> a. Write, proofread, and edit workplace documents. b. Use correct grammar, punctuation, capitalization, vocabulary, and spelling. c. Select and use appropriate forms of technology for communication. 6. Exhibit a proficiency in the use of commonly used reference books. <p>E. Understand occupational safety issues, including avoidance of physical hazards.</p> <ol style="list-style-type: none"> 1. Discuss and implement good safety practices, including: <ol style="list-style-type: none"> a. avoidance and reporting of physical hazards in the work environment b. safe operation of equipment c. proper handling of hazardous materials 2. Apply sound ergonomic principles in organizing one's work space. <p>F. Understand career paths and strategies for obtaining employment.</p> <ol style="list-style-type: none"> 1. Identify career opportunities, projected trends, and required education, training, and experience. 2. Define scope of practice. 3. Explain the role of professional organizations and their benefits. 4. Explain industry certifications and the employment benefits associated with attaining certification. 5. Identify further recommended training. 7. Identify related career pathways and their requirements. 8. Develop job acquisition documents, including the following: <ol style="list-style-type: none"> a. job application b. resume c. appropriate cover and follow-up correspondence d. portfolio 9. Identify and demonstrate effective interviewing techniques. <p>G. Understand and adapt to changing technology.</p> <ol style="list-style-type: none"> 1. Identify and demonstrate use of computer hardware and peripherals. 2. Identify common computer software used in Business. 3. Understand the importance of lifelong learning in adapting to changing technology. | | | | |

| Instructional Units and Competencies | Hours | Model Curr. Standards. | CA Academic Standards | CAHSEE |
|--|-------|------------------------|--|--------|
| <p>I. Classless Routing and Routing Protocols Using Classless Routing</p> <p>A. Classless inter-domain routing (CIDR)</p> <ol style="list-style-type: none"> 1. Calculate subnets with variable-length subnet masking (VSLM). 2. Describe route aggregation with VLSM 3. Describe Routing Information Protocol version 2 (RIPv2) 4. Configure RIPv2 5. Verify and troubleshoot RIPv2 <p>B. OSPF</p> <ol style="list-style-type: none"> 1. Describe the designated router election process. 2. List OSPF types 3. Configure OSPF 4. Verify and troubleshoot OSPF <p>C. EIGRP features and fundamentals</p> <ol style="list-style-type: none"> 1. Describe DUAL 2. List EIGRP data structures 3. Configure EIGRP 4. Verify and troubleshoot EIGRP | 25 | Info. Tech. 4g - p | ELA 9-10; R; 2.1 ELA 11-12; R; 1.3, 2.3 M. 7; 1.1, 1.3 Alg. 2; 1.0-3.0, 11.1, 11.2, 13.0, 14.0, 18.0, 21.0 | |
| <p>II. Switching and LAN Design</p> <p>A. Switching Concepts</p> <ol style="list-style-type: none"> 1. Ethernet/802.3 LANS 2. LAN Design Concepts 3. Layer 2 bridging and switching processes <p>B. Placements of a switch</p> <ol style="list-style-type: none"> 1. Components of a switch 2. Describe and identify where access layer switches are used. 3. Describe and identify where distribution layers switches are used. 4. Describe and identify where core layer switches are used. <p>C. Configuring a switch</p> <ol style="list-style-type: none"> 1. Describe Microsegmentation 2. Describe how a switch learns addresses 3. Describe switch forwarding 4. Understand switches and collision domains 5. Understand switches and broadcast domains 6. Configure LAN switches 7. Verify LAN switch configuration 8. Manage LAN switches | 25 | Info. Tech. 4g - p | M. Alg. 2; 1.0-3.0, 11.1, 11.2, 13.0, 14.0, 18.0, 21.0 | |
| <p>III. Spanning Tree Protocol</p> <p>A. Goals of redundant topologies</p> <ol style="list-style-type: none"> 1. Define Spanning Tree Protocol (STP) 2. Describe the stages of spanning-tree port states and election of designated ports. 3. Describe the stages of selecting a root bridge 4. Describe Path cost 5. Set STP timers 6. Explain how STP helps convergence 7. Describe Rapid Spanning Tree Protocol (RSTP) | 15 | Info. Tech. 4g - p | | |

| Instructional Units and Competencies | Hours | Model Curr. Standards. | CA Academic Standards | CAHSEE |
|--|-------|------------------------|-----------------------|--------|
| IV. Virtual LAN's A. VLAN's <ol style="list-style-type: none"> 1. Cite reasons to create VLAN's and describe the benefits of VLAN implementation 2. Name and describe the methods of VLAN implementation 3. Create, verify, and delete VLAN configurations 4. Describe basic VLAN troubleshooting methods B. VLAN Trunking Protocol <ol style="list-style-type: none"> 1. Understanding trunking 2. Understand the fundamentals of the VTP and VTP configuration 3. Understand inter-VLAN routing 4. Configure basic inter-VLAN routing | 25 | Info. Tech. 4g - p | | |
| V. Scaling IP Addresses A. Why is scaling IP addresses necessary <ol style="list-style-type: none"> 1. Describe NAT terminology 2. Describe NAT features 3. Differentiate between static NAT, dynamic NAT, and PAT 4. Configure and verify NAT and PAT 5. Troubleshoot NAT and PAT | 15 | Info. Tech. 4g - p | | |
| VI. DHCP A. Differentiate between BOOTP and DHCP B. Configure and verify DHCP C. Describe DHCP terminology D. Troubleshooting DHCP E. Identify and differentiate between Public and Private Addresses | 10 | Info. Tech. 4g - p | | |
| VII. Point-to-Point Protocol (PPP) A. Identify and describe the basic components that define PPP communication B. Define and describe the use of link control protocol (LCP) and Network control protocol (NCP) frames in PPP C. Understand the process for configuring and verifying PPP D. Describe and explain PPP authentication E. Define and describe the use of password authentication F. Define and describe the use of Challenge Handshake authentication protocol (CHAP) | 10 | Info. Tech. 4g - p | | |
| VIII. ISDN and DDR A. Describe Integrated Services Digital Network (ISDN) architecture B. Describe ISDN protocol layers C. Configure ISDN D. Configure dial-on-demand routing (DDR) E. Verify and troubleshoot ISDN F. Verify and troubleshoot DDR | 10 | Info. Tech. 4g - p | | |

| Instructional Units and Competencies | Hours | Model Curr. Standards. | CA Academic Standards | CAHSEE |
|---|-------|------------------------|---|--------|
| IX. Frame Relay A. Describe Frame Relay services, standards, and componenets B. Understand Local Management Interface (LMI) features C. Configure basic Frame Relay | 10 | Info. Tech. 4g - p | | |
| X. Network Administration A. Explain important aspects of Windows, UNIX, and Linux workstations B. Explain the functions of network services C. Understand network operating systems (NOS) | 25 | Info. Tech. 1 | ELA 9-10; LS: 1.1, 1.3, 1.4, 1.11, 1.12 11-12; W: 1.7 | |

10. Additional recommended/optional items

a. Articulation: None

b. Academic credit: None

c. Instructional strategies:

 Methods of Instruction:

 a. Lecture

 b. Audio Visual Materials

 c. Research Readings and Written Presentations

 d. Homework Assignments

 e. Group & Individual Projects

 f. Discussion & Group Dynamics

 g. Quizzes, Tests, Performance Evaluations & Final Exam

 h. Guest Speakers

 i. Internet Exploration

d. Instructional materials:

 Text book: Cisco CCNA (Online)

e. Certificates: Certified Cisco Network Associate