Unit 3

Content Area: **Sample Content Area**
Course(s): **Sample Course**
Time Period:
Length: **Sample Length & Grade Level**
Status: **Published**

Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Cisco III: CCNA - Routing & Switching

Grades 11-12

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: Sean Rutherford

Dr. Richard Tomko, Superintendent of Schools

Mr. Thomas D'Elia, Director of Curriculum and Instruction

Ms. Diana Kelleher, District Supervisor of ELA/Social Studies

Mr. George Droste, District Supervisor of Math/Science

Board Approved: August 22, 2016

Unit Overview

The CCNA Routing and Switching curriculum consists of four courses that make up the recommended learning path. Students will be prepared to take the Cisco CCENT® certification exam after completing a set of two courses (Introduction to Networks and Routing & Switching).

This unit also helps students develop workforce readiness skills and builds a foundation for success in networking-related careers and degree programs.

Students will learn technology concepts with the support of interactive media and apply and practice this knowledge through a series of hands-on and simulated activities that reinforce their learning.

NJSLS

PFL.9.1.12.A.6	Summarize the financial risks and benefits of entrepreneurship as a career choice.
CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.
CAEP.9.2.12.C.6	Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.12.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.F.CS1	Identify and define authentic problems and significant questions for investigation.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.
TECH.8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
TECH.8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.

Exit Skills

- Comprehensive networking concepts and skills, from network applications to the protocols and services provided to those applications by the lower layers of the network.
- Students will progress from basic networking to more complex enterprise and theoretical networking models later in the curriculum.

Enduring Understanding

- Understand and describe basic switching concepts and the operation of Cisco switches
- Understand and describe the purpose, nature, and operations of a router, routing tables, and the route lookup process
- Understand and describe how VLANs create logically separate networks and how routing occurs between them
- Understand and describe dynamic routing protocols, distance vector routing protocols, and link-state routing protocols
- Configure and troubleshoot static routing and default routing (RIP and RIPng)
- Configure and troubleshoot an Open Shortest Path First (OSPF) network
- Understand, configure, and troubleshoot access control lists (ACLs) for IPv4 and IPv6 networks
- Understand, configure, and troubleshoot Dynamic Host Configuration Protocol (DHCP) for IPv4 and IPv6 networks
- Understand, configure, and troubleshoot Network Address Translation (NAT) operations

Essential Questions

- Single-Area OSPF
    - What are Characteristics of OSPF?
    - How do you configure Single-Area OSPFv2?
    - How do you configure Single-Area OSPFv3?
- Access Control Lists
    - What is an IP ACL Operation?
    - What are Standard IPv4 ACLs?
    - What are Extended IPv4 ACLs?
    - Troubleshoot ACLs
    - IPv6 ACLs

Learning Objectives

- Students learn the basics of routing, switching, and advanced technologies to prepare for the Cisco CCENT and CCNA certification exams, networking related degree programs, and entry-level networking careers.
- The language used to describe networking concepts is designed to be easily understood by learners at all levels and embedded interactive activities help reinforce comprehension.
- Courses emphasize critical thinking, problem solving, collaboration, and the practical application of skills.
- Multimedia learning tools, including videos, games, and quizzes, address a variety of learning styles and help stimulate learning and promote increased knowledge retention.
- Hands-on labs and Cisco® Packet Tracer simulation-based learning activities help students develop critical thinking and complex problem solving skills.
- Embedded assessments provide immediate feedback to support the evaluation of knowledge and acquired skills.

Tips on Writing Good Learning Objectives

Bloom's Taxonomy

Applying Bloom's Taxonomy to Learning Objectives

Effective learning objectives need to be observable and/or measureable, and using action verbs is a way to achieve this. Verbs such as "identify", "argue," or "construct" are more measureable than vague or passive verbs such as "understand" or "be aware of". As you develop your syllabus focus on articulating clear learning objectives and then use these objectives to guide class assignments, exams and overall course assessment questions.

Sample Learning Objectives for a Lower Division Course

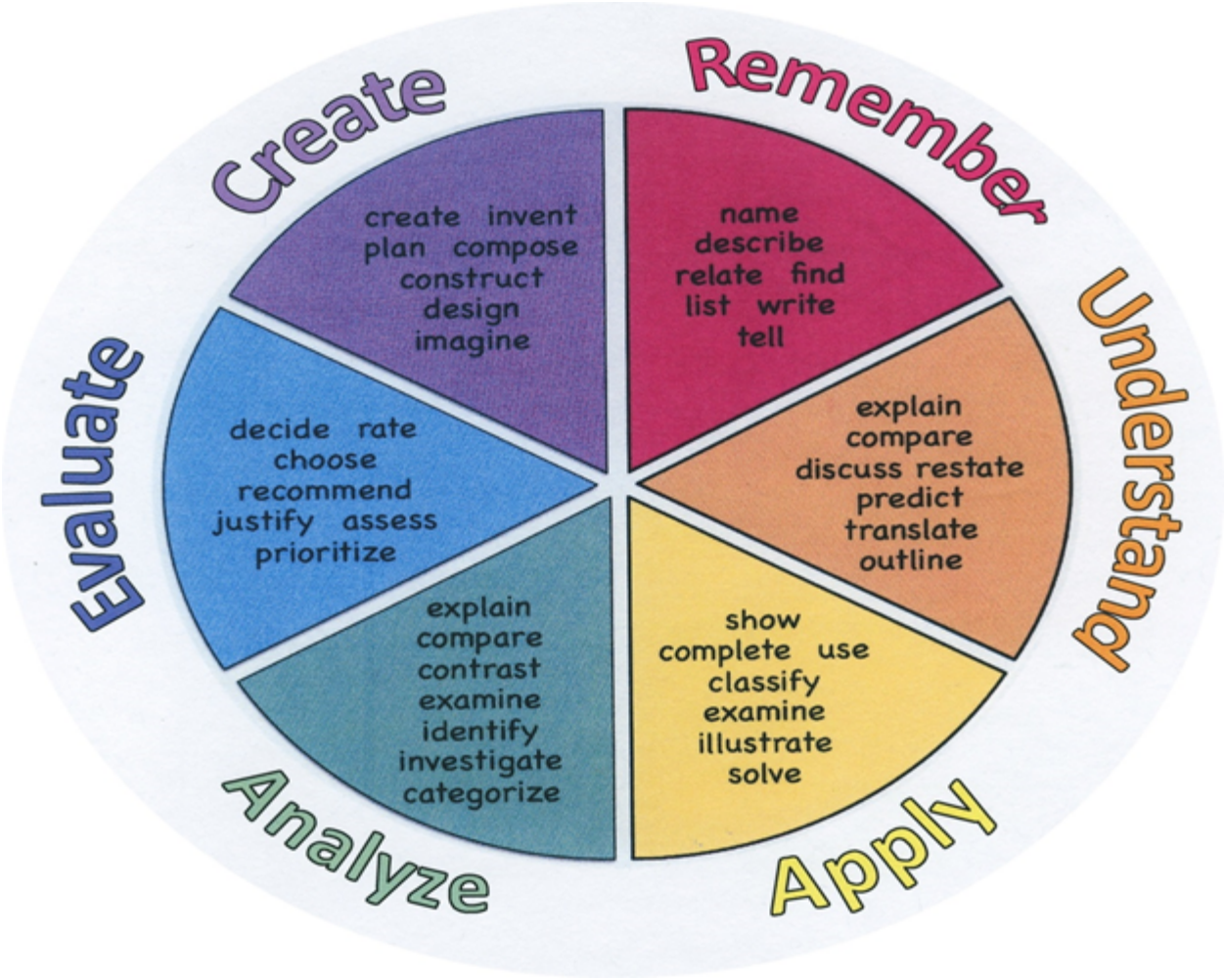
After completing Nutrition 101 *Humans and Food*, students will be able to:

- **Identify** nutrients found in common food sources via the product's nutrition label
- Use computer dietary analysis to assess a 2-day dietary intake and **summarize** results
- **Locate** nutrition-related information on the Internet and use **evaluative** criteria to **identify** reliability of the information

Action Verbs

Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy. These are useful in writing learning objectives, assignment objectives and exam questions.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				



Interdisciplinary Connections

Please list all and any cross-curricular content standards that link to this Unit.

LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.WHST.9-10.2.D	Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
MA.F-IF.A	Understand the concept of a function and use function notation
MA.A-SSE.A	Interpret the structure of expressions
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.

Alignment to 21st Century Skills & Technology

Key SUBJECTS AND 21st CENTURY THEMES

Mastery of key subjects and 21st century themes is essential for all students in the 21stcentury.

Key subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and Civics

21st Century/Interdisciplinary Themes

- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

21st Century Skills

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

Technology Infusion

What technology can be used in this unit to enhance learning?



Differentiation

Instructional Strategies (D) Smartboard and use of technology, reading strategies (chunking, question/answer), note taking skills

Activities (D) Do Now activities, classroom assignments, written and performance assessments

Experiences (D) Individual, partner and group assignments, creative/hands on projects

Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multiple test sessions
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

ELL

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing

- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Evidence of Student Learning-CFU's

Please list ways educators may effectively check for understanding in this secion.

- Admit Tickets
- Anticipation Guide
- Common benchmarks
- Compare & Contrast

- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit tests

Primary Resources

Please list all resources available to you that are located either within the district or that can be obtained by district resources.

Online Text - Cisco Networking Academy online course (www.netacad.com)

Ancillary Resources

- Cisco provided software (Packet Tracer and Aspire)
- Cisco provided PowerPoints
- Computer Lab Equipment (Minimum)
    - Windows Vista, Windows 7, or Windows 8
    - 1 PC Case with 300W power supply
    - 1 PCI, PCIe, or AGP-compatible motherboard
    - Intel or AMD CPU, 1 gigahertz (GHz) or faster with support for PAE, NX, and SSE2
    - 1 CPU heat sink and cooling fan
    - 1 gigabyte (GB) RAM (32-bit) or 4 GB RAM (64-bit) (2 X 1GB or 2 X 2GB suggested)
    - 60 GB hard drive (minimum); 80 GB or more (recommended)
    - The system must support a full install of Windows and two partitions of the same size
    - 1 DVD-ROM (minimum), DVDR, or BD/BDR
    - 1 Ethernet Card
    - 1 PCI, PCIe (recommended), or AGP video card (DirectX 9 graphics device with WDDM driver)
    - Cables to connect HDD/CD (Quantities vary)
    - 1 Mouse
    - 1 Keyboard
    - 1 Super VGA (1024 X 768) or higher-resolution video monitor
    - 3 CISCO1941/K9 Integrated Services Routers Generation 2 (ISR-G2)
    - 3 HWIC-2T Serial WAN Interface Cards
    - 3 WS-C2960-24TT-L Cisco Catalyst switches
    - 2 Linksys EA Series routers (2700, 3500, 4500) or equivalent
    - Assorted Ethernet and Serial cables
- Computer Repair Tools (Minimum)
    - Phillips Screwdriver (various sizes)
    - Flathead Screwdriver (various seizes)
    - Hex Socket Drivers (various sizes)
    - Electrostatic discharge (ESD) wrist strap and cord
    - Electrostatic discharge (ESD) mat with a ground cord
    - Safety glasses
    - Lint-free cloth
    - Electronics cleaning solution
    - Flashlight
    - Thermal compound
    - Multimeter
    - Compressed air service canister (or air compressor)
    - Power supply tester
    - Wire cutters
    - RJ-45 Crimpers

    - Cable strippers
    - Modular cable tester
    - Network Loop back plugs
- Additional Required Lab Equipment
    - 1 Internet connection for Internet searches and driver downloads (this could be the instructor's workstation)
    - 1 printer or integrated printer/scanner/copier for the class to share
    - 1 wireless router with WPA2 support for the class to share
    - 2 Wireless network adapters (compatible with the above wireless router) for the class to share
    - Various USB flash drives for moving files between computers in the labs

Sample Lesson

One Lesson per Curriculum must bein this lesson plan template. I.e. one lesson in one unit

Unit Name: Unit I

NJSLS: CAEP.9.2.12.C.1, CAEP.9.2.12.C.2, CAEP.9.2.12.C.3, CAEP.9.2.12.C.5, CAEP.9.2.12.C.6, PFL.9.1.1.A.7, TECH.8.1.12.A.3, TECH.8.1.12.A.CS1, TECH.8.1.12.B.CS1, TECH.8.1.12.B.CS2, TECH.8.1.12.C.CS1, TECH.8.1.12.D.CS1, TECH.8.1.12.D.CS2

Statement of Objective:SWBAD outline the lab safety procedures

Anticipatory Set/Do Now: What are some hazards you may encounter when working on a computer?

Learning Activity: Lab safety

Student Assessment/CFU's: Observation, Journal Entry, Self Reflection

Materials: Online textbook, videos, computer components

21st Century Themes and Skills: Communication and Collaboration, Critical Thinking and Problem Solving, Life and Career Skills

Differentiation/Modifications: Visual Learners, Direct Instruction, Guided Instruction

Integration of Technology: Smartboard/Projector, actual computer components