

Information Technology

CIP Code: 110401

McCann Technical School
70 Hodges Cross Road
North Adams, MA 01247

Instructors:

Mr. Perry Burdick

Mr. Richard Bergendahl

Program Philosophy

The demand for information technology (IT) support in the global business world has exploded at an exponential rate. Students in the McCann Information Technology program will attain skills in networking, computer maintenance, web design and computer programming to support this demand. While this program has been designed to meet the standards identified in the Massachusetts VTE Frameworks for Information Support Services and Networking, the main goals of this program are to provide local industry with skilled IT employees. Employability skills as identified by the 1992 SCANS report are fully implemented by the Skills USA Professional Development Program. Additionally, the students will be provided the opportunity to test for national certifications in computer maintenance technology and networking. In order to meet these goals, the program must incorporate additional competencies and expand upon the standards in the frameworks. The resulting graduate students will be valuable workplace assets with the ability to self-learn and solve real world problems.

Program Description

Students enrolled in the Information Technology program will be exposed to a wide variety of applications, design, development and management concepts related to the IT field. A student will also have the basic level of knowledge expected to use information technology tools for learning and work. The program complies with the Massachusetts VTE Frameworks and National IT Standards. The standards will prepare students to enter into three IT cluster areas: computer maintenance, networking, web design and programming. The IT program of study will provide the student with an understanding of how each cluster area relates to and interacts with the others. Once a student has been introduced to the foundation concepts, they should have the knowledge necessary to help them make an educated choice about continued study in the IT field, or, to enter the work force directly in their career interest area.

Students studying computer maintenance are required to install equipment, do preventative maintenance and troubleshoot problems with computer hardware and software. The program also prepares students for the A+ industry certification established by the Computer Industry Technology Industry Association. Two exams are necessary to be certified: CompTIA A+ Essentials, exam code 220-701; and CompTIA A+ Practical Application, exam code 220-702.

CompTIA A+ Essentials measures the necessary competencies of an entry-level IT professional with a recommended 500 hours of hands-on experience in the lab or field. It tests for technical understanding of computer technology, networking and security, as well as the communication skills and professionalism now required of all entry-level IT professionals.

CompTIA A+ Practical Application is an extension of the knowledge and skills identified in CompTIA A+ Essentials, with more of a "hands-on" orientation focused on scenarios in which troubleshooting and tools must be applied to resolve problems.

Network technicians plan, integrate and maintain software and hardware for local or wide area networks, including operating systems software and network communications software. Students successfully completing the Cisco Networking Academy curriculum can seek employment as network technicians. The Cisco Academy curriculum imparts detailed knowledge of structured cabling, network software concepts, client-based networks, peer-based networks, bridging, switching, routing, and TCP/IP addressing, configuration and troubleshooting. The Cisco Academy student is prepared for the Cisco Certified Networking Associate certification established by Cisco Systems Inc.

While studying the web design and programming course, students will create interactive websites using image processing, hypertext markup language, scripting languages, and database technology. Because of the employer demand in this area for advanced web design the students will learn to program with scripting languages such as PHP and Javascript. Concepts discussed are the use of variables, functions, loops, file I/O and database design. Students successfully completing this course are competent web designers for companies and organizations.

In addition to the national certifications available to the students enrolled in the IT program, college credits are awarded to students meeting the criteria outlined in the articulation agreement between the McCann IT program and Berkshire Community College.

Students that meet school requirements are eligible for the cooperative work program during their junior year. Students will report to employers to perform relative work to their chosen skill area.

Program Syllabus

The freshman student will engage in shop exploratory for the first quarter of the year. The exploratory curriculum is a project-based curriculum that explores the fundamentals of networking, computer maintenance and web design. When the freshman are assigned to their chosen technical area, they will begin studying computer maintenance technology, in preparation for the A+ certification exam. The student will receive hands-on training for installing, troubleshooting, and performing preventative maintenance on computer systems. Web design is taught concurrently with hardware computer maintenance. Aspects of web design such as HTML, FTP, image processing, and cascading style sheets are introduced. Web projects are chosen to integrate with the computer maintenance curriculum.

In the sophomore year, students will continue studying for the A+ certification exam. This module will focus more on the software aspect of computer technology, covering operating system fundamentals, installing programs, and troubleshooting computer software. Study for web design will continue with PHP scripting and interfacing to relational databases, such as MySQL and Access. The students will be required to develop a database-driven website.

The the junior and senior students will be enrolled in the Cisco Networking Academy Discovery Program. The Cisco CCNA Discovery curriculum provides general networking theory, practical experience, and opportunities for career exploration and soft-skills development. The curriculum teaches networking based on application, covering networking concepts within the context of network environments students may encounter in their daily lives – from small office and home office (SOHO) networking to more complex enterprise and theoretical networking models later in the curriculum.

CCNA Discovery is designed for students with basic PC skills and foundational math and problem solving skills. The curriculum offers an engaging learning experience for more visual and kinetic learners. Many interactive activities are embedded in all of the courses to break up the text and help reinforce student comprehension. In addition, a large number of labs encourage additional hands-on practice.

CCNA Discovery helps prepare students for entry-level career opportunities, continuing education, and globally-recognized Cisco CCENT and CCNA certifications. Seniors at McCann are also required to develop and present a senior project. Projects are submitted that have a degree of difficulty representative of the four years at McCann. Seniors will be provided with materials and one hundred hours of time to complete the project. Upon completion, the students are required to present their project to their peers, teachers, and community members. The senior project represents a large portion of their final grade.

Program Time Line

Year 1

- Exploratory
- Computer Maintenance
- Web Design/Javascript

Year 2

- Computer Maintenance
- Web Design/PHP/Database Integration
- OSHA 10-hour Safety

Year 3

- Cisco Networking Academy – Discovery Program

Year 4

- Cisco Networking Academy – Discovery Program
- Senior Project

Occupational Analysis

The area's industry has changed, and Information Technology has become an important part of the picture. A March 2002 study by the University Of Massachusetts Donahue Institute stated that, "Berkshire County, with 150 firms and 1,143 employees has the highest proportion of IT services employment in Western Mass. The rate of growth in the Berkshires between 1993 and 2000 is (135%) almost double the rate of growth in (other counties)..." Based on this, and similar trends, the Electronics program at McCann Tech will be changing its program of study to IT. This change will benefit our students and employers.

Massachusetts Information Technology Job Outlook

Massachusetts employs a higher number of IT employees than the nation as a whole (6.7% of the jobs in Massachusetts are IT or IT related vs. 3.7% nationally).

Average salaries for Information Technology professionals range from \$77,800 for computer information systems managers to computer support specialists at an average of \$46,370.

Computer Software and Related IT Services has the biggest projected rate of growth in Massachusetts in the next 7 years (90% Rate of Growth).

This growth is expected to generate 69,100 new jobs in the computer software and related IT services area (already the largest high-tech industry in the state).

These jobs will most likely fall in the service industries including networking, data communications and other on-line services.

Professional jobs for computer analysts, computer engineers, database administrators, and computer scientists should grow the fastest with an increase of 75% or 38,200 new jobs by the year 2008.

The fastest growing occupations in Massachusetts include the following IT jobs:

<u>Occupation</u>	<u>Number of Jobs by 2008</u>	<u>Growth Through 2008</u>
Computer Support Specialist	15,190	88%
Computer Engineers	18,700	76%
System Analysts	14,460	74%
Database Administrators	1,280	44%
Engineering, Science & Computer Managers	5,920	37%
Computer Programmers	4,650	23%

Listed below are the Information Technology related occupations projected to grow the fastest during the 1998-2010 time period by the National Bureau of Labor Statistics.

Occupation	Employment		Percent change *
	1998	2008	
All Other Computer Scientists	97,500	212,100	118%
Computer Engineers	299,300	622,100	108%
Computer Support Specialists	429,300	868,700	102%
Systems Analysts, Electronic Data Processing	616,900	1,194,200	94%
Data Base Administrators	87,400	154,900	77%
Electronic Pagination System Operators	25,600	44,200	73%
Data Processing Equipment Repairers	79,300	116,600	47%

What Career Tracks Are There?

There are many different careers within the IT field that are available to students who enroll in the McCann Information Technology program. These include, but are not limited to, the following jobs:

- Computer Engineer
- Computer Programmer
- Computer Scientist
- Computer Support Specialist
- Computer User
- Database Administrator
- Database Specialist
- Interface Designer
- Network Specialist
- Software Engineer
- Statistician
- Systems Analyst
- Technical Communicator
- Web Designer

Validated Competency Listing

We are in alignment with the Massachusetts VTE frameworks, and all competencies have been validated by our program advisory board.

Competency Reporting System

As taken from the Charles H. McCann Technical School Student/Parent Handbook:

“Report cards are issued quarterly and serve as a guideline for students and their parents to measure achievement. Parents are encouraged to contact teachers and counselors to ensure a continuing participation in student progress. Courses are graded numerically in accordance with the following values.”

90-100	Advanced
80-89	Proficient
70-79	Satisfactory
65-69	Passing
0-64	Failing

Theory (30%)		Performance (70%)	
20%	Homework	75%	Competency/Performance
15%	Notebook	10%	Attendance/Participation
40%	Tests/quizzes	15%	Skills USA Project
10%	Attendance/Participation		

Student competencies are recorded using these performance indicators as used by the Massachusetts DESE Vocational Technical Competency Tracking System (VTCTS) application.

---	No attempt
1	Attempted
2	Developing
3	Proficient
4	Exemplary

Instructional Activities

The curriculum is project-based with the projects designed around real world scenarios. In addition to assigned project work, students provide support assistance for the network and computers within the school. Related student work at off site non-profit organizations has provided excellent training in the past and future opportunities are always sought. The IT department fully participates in the Skills USA program. We have successfully competed in the inter-networking, computer maintenance technology, and web design competitions.

Resources

Computer Maintenance Textbook: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs*. 3rd ed. New York: McGrawHill, 2010. Print.

Computer Maintenance Lab Manual: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs Lab Manual*. 3rd ed. New York: McGrawHill, 2010. Print.

Duckett, Jon. *Beginning HTML, XHTML, CSS, and JavaScript*. Indianapolis, IN: Wrox/Wiley, 2010. Print.

OSHA 10-hour Training:

http://www.osha.gov/dte/outreach/construction_generalindustry/index.html

Cisco Networking Academy: <http://cisco.netacad.net>

Information Technology
Grade 9

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Course Syllabus

Course Description

In the freshman year, after completion of the exploratory program, students will begin studying computer maintenance technology and web design. Students studying computer maintenance are required to install equipment, do preventative maintenance and troubleshoot problems with computer hardware and software. The first year of this course will begin preparing the student to take the A+ industry certification established by the Computer Technology Industry Association. The requirements for the exam are that of an entry-level IT professional with a recommended 500 hours of hands-on experience in the lab or field. It tests for technical understanding of computer technology, networking and security, as well as the communication skills and professionalism now required of all IT professionals.

The students will concurrently begin studying web design. The students will be introduced to the basics of HTML, Cascading Style Sheets, image processing, multimedia formats, and JavaScript. This course will help students prepare for entry-level career opportunities as a Web designer, Graphical Designer, Web project manager, and Webmaster.

Course Objectives

Upon successful completion of readings, exercises, labs, and assignments, the student will:

1. Begin work on mastering the tasks defined by the Information and Support Systems VTE Framework.
2. Begin the preparation process to take the CompTIA A+ Certification Exam.
3. Understand the components of a web site, the copyright laws involved with web design, and create a web site utilizing HTML, CSS, and JavaScript.

4. Understand the different formats and properties of images, and edit images and other media properly.

Course Sequence (Computer Maintenance)

1. Certifications and the process
2. Professionalism, communication, safety and tools
3. How computers work, component recognition
4. Understanding Windows
5. Microprocessors
6. Random Access Memory
7. BIOS and CMOS
8. Expansion bus
9. Motherboards
10. Power supplies
11. Hard drive technologies
12. Implementing hard drives
13. Removable media
14. Installing and upgrading Windows
15. Maintaining and troubleshooting Windows
16. Securing Windows resources
17. Maintaining and troubleshooting Windows
18. Input/Output
19. Video
20. Multimedia
21. Portable computers
22. Printers
23. Local area networking
24. Wireless networking
25. The Internet
26. Computer security
27. Troubleshooting

Course Sequence (Web Design)

1. Introducing HTML and XHTML
2. Basic Text Formatting
3. Lists
4. Grouping Elements with <div> and
5. Basic Links
6. Understanding Directories and Directory Structures
7. Understanding URLs
8. Adding Images Using the Element
9. Client-Side Image Maps
10. Choosing the Right Image Format
11. Adding Flash, Video, and Audio to Your Web Page
12. Table Elements and Attributes

13. Introducing Forms
14. Introducing the Frameset
15. Introducing CSS
16. CSS Properties
17. Text Formatting
18. Selectors
19. Lengths
20. Introducing the Box Model
21. More Cascading Style Sheets
22. CSS and Backgrounds
23. Applying CSS to Lists
24. Applying CSS to Tables
25. Positioning and Layout with CSS
26. Page Size (and Screen Resolution)
27. Learning JavaScript
28. JavaScript Variables
29. Operators
30. Functions
31. Conditional Statements
32. Looping
33. Events
34. Built-in Objects
35. JavaScript and Form Validation
36. Meta Tags
37. Validating HTML, XHTML, and CSS

VTE Frameworks Cross Reference to Textbook

Strand	Chapter Reference/Resource
1.A.01a Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.02a Identify and apply EPA and other environmental protection regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.03a Identify and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.04a Explain procedures for documenting and reporting hazards to appropriate authorities.	2, 10-hour OSHA Certification
1.A.05a List penalties for non-compliance with appropriate health and safety regulations.	2, 10-hour OSHA Certification

1.A.06a Identify contact information for appropriate health and safety agencies and resources.	2, 10-hour OSHA Certification
1.B.01a Identify, describe and demonstrate the effective use of Material Safety Data Sheets (MSDS).	2, 10-hour OSHA Certification
1.B.02a Read chemical, product, and equipment labels to determine appropriate health and safety considerations.	2, 10-hour OSHA Certification
1.B.03a Identify, describe and demonstrate personal, shop and job site safety practices and procedures.	2, 10-hour OSHA Certification
1.B.04a Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus.	2, 10-hour OSHA Certification
1.B.05a Illustrate appropriate safe body mechanics, including proper lifting techniques and ergonomics.	2, 10-hour OSHA Certification
1.B.06a Locate emergency equipment in your lab, shop, and classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits.	2, 10-hour OSHA Certification
1.B.07a Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom.	2, 10-hour OSHA Certification
1.B.08a Describe safety practices and procedures to be followed when working with and around electricity.	2, 10-hour OSHA Certification
1.B.09a Properly handle, store, dispose of, and recycle hazardous, flammable, and combustible materials.	2, 10-hour OSHA Certification
1.B.10a Demonstrate proper workspace cleaning procedures.	2, 10-hour OSHA Certification
1.C.01a Illustrate First Aid procedures for potential injuries and other health concerns in the occupational area.	2, 10-hour OSHA Certification

1.C.02a Describe the importance of emergency preparedness and an emergency action plan.	2, 10-hour OSHA Certification
1.C.03a Illustrate procedures used to handle emergency situations and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures.	2, 10-hour OSHA Certification
1.C.04a Identify practices used to avoid accidents.	2, 10-hour OSHA Certification
1.C.05a Identify and describe fire protection, precautions and response procedures.	2, 10-hour OSHA Certification
1.C.06a Discuss the role of the individual and the company/organization in ensuring workplace safety.	2, 10-hour OSHA Certification
1.C.07a Discuss ways to identify and prevent workplace/school violence.	2, 10-hour OSHA Certification
2.A.01c Define and document a problem.	27
2.A.02c Define possible causes of a problem.	27
2.A.03c Determine and discuss possible solutions to a problem.	27
2.A.04c Explain and perform basic troubleshooting and maintenance tasks.	27
2.AA.01 Identify various types of cards and their uses.	8
2.AA.02 Identify bus type based upon physical appearances.	8
2.AA.03 Install and configure and test various cards.	8
2.AA.04 Retrieve and install appropriate drivers.	8
2.B.01c Describe the function of the internet and intranets.	25
2.B.02c Define network terms.	23
2.B.03c Differentiate between LANs, MANs and WANs.	23
2.B.04c Describe the purposes of a network.	23
2.B.05c Trace the evolution of networks.	23

2.B.06c Analyze the current trends and developments in LANs.	23
2.B.07c Identify OSI Layer 1 through Layer 7.	23
2.B.08c Explain passwords and log ins as they relate to network structures.	23
2.B.09c Demonstrate the basic design and components of LAN and WAN systems.	23
2.B.10c Describe network topologies (ring, star, bus).	23
2.B.11c Identify voice communication, data communications, and telecommunications systems.	23
2.B.12c Compare and contrast wireless networking to wired networking.	24
2.B.13 Identify major network operating systems: Unix, Microsoft, Novell.	23
2.B.14 Define the function of a NIC, hubs, switches, routers, bridges and repeaters.	23
2.B.15 Differentiate between broadband and baseband.	23
2.B.16 Identify purpose, and function of a gateway.	23
2.B.17 Identify advantages and disadvantages of peer-to-peer networks.	23
2.B.18 Identify advantages and disadvantages of client-server networks.	23
2.BB.01 Identify and describe the various output devices and their technologies.	8, 18
2.BB.02 Install, configure and test output devices.	18
2.BB.03 Retrieve and install appropriate drivers.	8, 18
2.BB.04 Identify basic concepts, operations, and components of printers.	22
2.BB.05 Identify types of printers.	22
2.BB.06 Identify printer connections.	22

2.C.01c Construct networks using different types of cables.	23
2.C.02c Describe how terminals are connected in a network configuration.	23
2.C.03c Identify and utilize modems used for dial-up access.	25
2.C.04c Identify network applications (fax, voice mail, online services, email).	25
2.C.05c Summarize the characteristics and uses of TCP/IP protocol.	23
2.C.06c Differentiate between local computer operating systems and network operating systems.	23
2.C.07c Open, and communicate over, an internet connection.	25
2.C.08c Demonstrate basic diagnostic skills.	27
2.C.09c Configure a simple peer-to-peer network.	23
2.C.10c Share a resource in a peer-to-peer networked environment.	23
2.C.11c Access a shared resource in a peer-to-peer networked environment.	23
2.C.12c Demonstrate how bandwidths affect data transfer.	25
2.C.13 Install and configure necessary hardware and software for a basic network installation, including the creation of a shared resource.	23
2.C.14 Distinguish between prevalent networking media and connectors (length, speed, appearance, advantages, disadvantages).	23
2.C.15 Identify layer 1, 2, 3, and 4 networking devices, their purpose and their operations.	23
2.C.16 Determine where layer 1, 2, 3, and 4 devices are needed.	23
2.C.17 Identify various data management outsources.	23

2.C.18 Identify channel access methods and their operations.	23
2.C.19 Identify protocols, services, hardware and functions that pertain to each layer of OSI model.	23
2.C.20 Define packets and encapsulation.	23
2.C.21 Define current 802.1 and 802.3 specifications.	24
2.C.22 Identify function and characteristics of MAC addressing.	23
2.C.23 Identify function and characteristics of protocol addressing.	23
2.CC.01 Identify the purpose of various types of preventive maintenance products and procedures.	27
2.CC.02 Schedule and perform preventive procedures including hard drive maintenance utilities.	27
2.CC.03 Describe the need for and implementation of surge protection.	10
2.D.01c Define what a computer program is.	PHP/JavaScript
2.D.02c Define how a computer program runs.	PHP/JavaScript
2.D.03c Identify the applications appropriate for each programming language.	PHP/JavaScript
2.D.04c Define functions/methods/procedures.	PHP/JavaScript
2.D.05c Define programming structures.	PHP/JavaScript
2.D.06c Differentiate between procedural and object oriented programming.	PHP/JavaScript
2.D.07c Define purpose and use of flowcharting.	PHP/JavaScript
2.DD.01 Discuss effective backup and recovery strategies, and media used.	4, 17
2.DD.02 Perform a simple data backup.	17
2.DD.03 Perform a simple data restoration.	17
2.E.01c Describe various interactive media tools.	Web Design

2.E.02c Create and manipulate illustrations using a drawing or painting program.	Web Design
2.E.03c Import and export graphics using external peripherals.	Web Design
2.E.04c Identify and define different graphic file formats.	Web Design
2.E.05c Open and run video clips.	Web Design
2.E.06c Create a simple video clip.	Web Design
2.E.07c Play and record sound clips.	Web Design
2.EE.01 Identify stages of the troubleshooting process.	27
2.EE.02 Differentiate between normal and abnormal operations.	27
2.EE.03 Describe common faults to system boards.	8, 9
2.EE.04 Describe common faults to memory.	6
2.EE.05 Describe common faults to data storage devices.	11,12,17
2.EE.06 Describe common faults to power supplies.	10
2.EE.07 Describe common faults in adapter interface cards.	8
2.EE.08 Demonstrate procedures used to troubleshoot I/O ports.	8
2.EE.09 Identify and resolve IRQ conflicts.	8
2.EE.10 Describe common faults to peripheral devices.	8, 18, 22
2.EE.11 Solve common hardware problems after they have been identified.	5, 6, 8, 9, 10, 11
2.F.01c Work with multiple applications (ASCII editor and browser).	Web Design
2.F.02c Create an HTML document using simple HTML tags.	Web Design
2.F.03c Launch HTML document in a browser.	Web Design
2.F.04c Apply basic debugging techniques.	PHP/JavaScript

2.FF.01 Differentiate between operating system and application errors.	17
2.FF.02 Describe common faults with an operating system.	17
2.FF.03 Describe common faults with an application.	17
2.FF.04 Demonstrate use of appropriate diagnostic utilities.	17
2.FF.05 Solve common software problems after they have been identified.	17
2.G.01c Identify main classification of computers.	5
2.G.02c Identify major hardware components, their functions and relationships.	3
2.G.03c Identify types of computer storage devices.	11
2.G.04c Practice proper handling procedures for components.	2
2.G.05c Install and configure hardware in a computer system.	5, 6, 8, 9, 10, 11
2.H.01c Identify major operating system fundamentals and components, and hardware compatibility.	4
2.H.02c Perform basic operations within an operating system.	4
2.H.03c Troubleshoot basic problems within an operating system.	17
2.H.04c Customize the operating system environment.	4
2.H.05c Return an operating system back to original configuration.	14, 17
2.H.06 Discuss the evolution of operating system types.	4
2.H.07 Demonstrate ability to navigate through various operating systems.	4
2.H.08 Describe major system files and their functions.	4

2.H.09 Illustrate various operating system file structures.	4
2.H.10 Determine hardware requirements for various operating systems.	14
2.H.11 Prepare hard drive for installation of operating system.	12
2.H.12 Install, configure and test operating system.	14
2.H.13 Explain memory management within operating systems.	17
2.H.14 Create a system boot disk.	14, 17
2.H.15 Demonstrate the appropriate use of system utilities.	4, 17
2.H.16 Retrieve, install and test appropriate device drivers.	4, 7, 14
2.H.17 Identify steps necessary to perform an upgrade.	14
2.H.18 Retrieve, install, and test system patches, updates and service packs.	14
2.H.19 Determine and delete unused files.	17
2.I.01c Install software programs.	14
2.I.02c Perform basic configuration operations.	14
2.I.03c Describe basic compatibility issues.	4
2.I.04c Uninstall applications.	4
2.I.05 Validate operating system and hardware compatibility with installation requirements of the application.	14
2.I.06 Acquire or verify software license for installation.	14
2.I.07 Perform custom installations, including network-based installations.	14
2.I.08 Identify steps necessary to perform an upgrade.	14
2.I.09 Retrieve, install, and test application patches, updates and service packs.	14

2.J.01c Illustrate the IT timeline (evolution).	1	
2.J.02c Identify professional certifications.	1	
2.J.03c Define impact of technologies on society.	26	
2.J.04c Identify technologies and describe their uses in the workplace and society.	26	
2.J.05c Illustrate uses of interactive media in society/industry.	26	
2.K.01c Discuss security principles, vulnerability and threats.	26	
2.K.02c Explain principles of secure passwording strategies.	26	
2.K.03c Illustrate what fundamental legal issues involved with security management.	26	
2.M.02c Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs.		Cisco Networking Academy
2.N.01 Describe ways to orient user to network policies and operations.		Cisco Networking Academy
2.O Identify network design concepts.	23	
2.O.02 Identify power consumption requirements.	10	
2.O.04 Identify the importance of a UPS.	10	
2.O.06 Identify physical requirements for network implementation.	23	
2.O.07 Identify the standards of efficiency and effectiveness (uniformity) for the design.	23	
2.O.08 Identify system requirements for network implementation including specialized servers.	23	
2.O.09 Identify application requirements for network implementation.	23	
2.O.10 Identify environmental factors on computer networks.	23	
2.P.01 Describe name resolution technologies and methods.	23	

2.P.02 Define DHCP, DNS, WINS and host files.	23
2.P.03 Summarize TCP/IP addressing.	23
2.P.04 Test, validate, and troubleshoot IP connectivity using TCP/IP utilities.	23
2.P.05 Describe various telecom considerations and processes including convergence, and Voice Over IP.	23
2.Q.01 Perform software upgrades and fixes.	14, 17
2.Q.02 Perform standard server backup procedures.	4, 17
2.Q.04 Maintain accurate network documentation.	Cisco Networking Academy
2.Q.05 Monitor system status and performance.	Cisco Networking Academy
2.Q.06 Identify abnormal system performance.	Cisco Networking Academy
2.Q.07 Recognize system alerts.	Cisco Networking Academy
2.Q.08 Monitor system log files.	Cisco Networking Academy
2.Q.09 Recognize security problems.	26
2.Q.10 Recognize environmental problems.	26
2.Q.11 Analyze how server usage effects network performance (web server, file server, print server, etc).	Cisco Networking Academy
2.Q.12 Establish network documentation of inventory and assets.	Cisco Networking Academy
2.Q.13 Identify various security, video, building utility monitoring systems and how they link to the network.	Cisco Networking Academy
2.Q.14 Demonstrate ability to monitor performance from PC to hubs to server.	Cisco Networking Academy
2.Q.15 Identify basic troubleshooting steps.	27
2.Q.16 Identify problems using diagnostic tools when appropriate.	27
2.Q.17 Identify and test solutions.	27
2.Q.18 Document results and solution.	27

2.Q.19 Identify the need for and use appropriately, network troubleshooting tools such as ping, ns lookup, telnet, and tracert.	23, 24, 25
2.R.01 Configure a NIC.	23
2.R.02 Identify major operating systems: UNIX, LINUX, Microsoft, Novell.	23
2.R.03 Install server software.	23
2.R.04 Configure server software for network access.	23
2.R.05 Compare and contrast file level security and domain or directory services.	16
2.R.06 Create shared user resources.	16
2.R.07 Differentiate between a switch and a router.	23
2.R.08 Identify hardware needed to connect switch/router to a network.	23
2.R.09 Describe the use of functions of a switch/router.	23, 24, 25
2.R.10 Demonstrate procedures used to communicate with a switch/router.	23, 24, 25
2.R.11 Demonstrate procedures used to configure a switch/router.	23, 24, 25
2.R.12 Demonstrate procedures used to install a switch/router.	Cisco Networking Academy
2.S.01 Install and configure internet browser software packages.	Cisco Networking Academy
2.S.02 Install and configure network-based application.	Cisco Networking Academy
2.S.03 Configure network resources at the client level (mapped drives, printers, folders, etc).	16
2.T.01 Demonstrate how to establish and maintain user accounts, rights, and permissions.	16
2.T.02 Explain the use of scripts in customizing user environments.	16

2.T.03 Document and manage patch panels and connections.	Cisco Networking Academy
2.T.04 Distinguish between user level and share level server models.	16
2.T.05 Describe good practices of password procedures.	26
2.T.06 Illustrate concepts of data encryption and its use with protecting network resources.	Cisco Networking Academy
2.T.07 Describe firewall uses.	17, 26
2.T.08 Implement and maintain system wide virus protection software.	26
2.T.09 Identify uses for VPN and network data encryption.	25
2.U.01 Identify types of motherboards.	9
2.U.02 Identify major motherboard components and architecture.	9
2.U.03 Install, configure and test motherboard.	9
2.U.04 Retrieve and install appropriate drivers for motherboard.	9
2.U.05 Configure jumpers and dipswitch settings.	9
2.V.01 Identify and explain physical bus types.	8
2.V.02 Identify and explain logical bus types.	8
2.V.03 Give a detailed explanation of IRQs.	8
2.V.04 Define DMA and its functions.	8
2.V.05 Give a detailed explanation of I/O addresses.	8
2.W.01 Illustrate the evolution of the CPU.	5
2.W.02 Distinguish between the popular CPU chips in terms of their basic characteristics.	5
2.W.03 Install various types of CPUs.	5
2.W.04 Install required cooling components.	5
2.X.01 Identify RAM terminology, locations and physical characteristics.	6

2.X.02 Identify the purpose of CMOS, what it contains, and how to change its basic parameters.	7
2.X.03 Install memory modules.	6
2.Y.01 Describe the evolution of storage devices and the technologies used.	11, 12, 13
2.Y.02 Identify drive structures.	11, 12, 13
2.Y.03 Identify cluster sizes used with various file systems.	11
2.Y.04 Identify the various types of storage devices, their advantages and disadvantages.	11, 12, 13
2.Y.05 Install, configure and test IDE/EIDE devices.	11
2.Y.06 Install, configure and test SCSI storage devices.	11
2.Y.07 Describe RAID and its uses.	11
2.Z.01 List different case characteristics.	3, 9
2.Z.02 List different power supply properties and characteristics.	10
2.Z.03 Test voltages employing proper load requirements using a digital multi-meter.	10
2.Z.04 Determine wattage requirements of a system.	10
3.C.03c Describe the characteristics of waves (wavelength, frequency, velocity, amplitude).	10
3.C.08c Identify and explain the components of a circuit including a source, conductor, load, and controllers (controllers are switches, relays, diodes, transistors, integrated circuits).	10
3.C.09c Explain the relationship between resistance, voltage, and current (Ohm's Law).	10
3.C.10c Determine the voltages and currents in a series circuit and a parallel circuit.	10
3.C.11c Identify appropriate units of measurement for current, voltage, and resistance, and explain how they are measured.	10

3.C.12c Analyze circuits (find the current at any point and the potential difference between any two points in the circuit) using Kirchoff and Ohm's laws.	10
3.C.13c Identify and explain the applications of light in communications, e.g., reflection, refraction, additive, and subtractive color theory.	23
3.C.14c Explain how information travels through different media, e.g., electrical wire, optical fiber, air, space.	23
3.C.15c Compare the difference between digital and analog communication devices.	25
3.C.16c Explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.	Cisco Networking Academy
3.C.17c Identify and explain the applications of laser and fiber optic technologies, e.g., telephone systems, cable television, medical technology, and photography.	23
3.C.22c Distinguish between mechanical and electromagnetic waves.	10
3.C.24c Recognize the characteristics of static charge, and explain how a static charge is generated.	2
3.C.26c Develop a qualitative and quantitative understanding of current, voltage, resistance, and the connection between them.	10
3.C.27c Describe the differences between Alternating Current (AC) and Direct Current (DC).	10
3.C.28c Explain the differences between analog and digital information and the use of binary numbers in data storage.	11, 18
4.B.02a Apply reading skills and strategies to work-related documents.	All
4.B.03a Locate information from books, journals, magazines, and the Internet.	All
4.B.04a Apply basic writing skills to work-related communication.	All

4.B.05a Write work-related materials.	All
4.B.09a Explain proper telephone etiquette and skills.	2
5.F.04a Define ethical business practices for your field.	2
6.A.01a Select and utilize the appropriate technology to solve a problem or complete a task.	All
6.A.02a Demonstrate file management skills (e.g., install new software, compress and expand files as needed, download files as appropriate).	14
6.A.03a Differentiate between different operating systems and demonstrate use of at least one to open and switch between programs and files.	4, 14, 17
6.A.04a Identify and demonstrate resolutions to simple hardware and software problems as they occur (e.g., frozen screen, disk error, printing problems).	17
6.A.06a Demonstrate the proper use of a variety of external peripherals and how they connect to a computer.	18, 22
6.D.01c Explain directory structure.	4
6.D.02c Navigate directory structure to find a specific file/folder.	4
6.D.03c Explain and apply procedures used to manipulate folders.	4
6.D.04c Explain and apply procedures used to manipulate files.	4
6.D.06c Explain and apply procedures used to associate file types with appropriate programs.	4
6.D.07c Differentiate between local and network drives, internet and intranet files.	16
6.E.01c Identify common user interface properties.	4, 15
6.E.02c Identify common application components, such as help, file, view, tools, options.	4

6.E.03c Select source and destination applications.	15
6.F.05c Demonstrate ability to create and use tables.	Web Design
6.J.06c Demonstrate the use of help functions.	4
6.K.01c Identify components of the internet.	25
6.K.02c Identify components incorporated in a web site.	Web Design
6.K.03c Identify the components of an internet address (URL).	Web Design
6.K.04c Describe the function of search engines.	Web Design
6.K.05c Demonstrate strategies to locate and retrieve electronic information.	Web Design
6.K.06c Create and organize bookmarks in a browser.	Web Design
6.K.07c Explain laws relating to copyright and internet use.	Web Design
6.K.08c Evaluate electronic sources of information for authenticity.	Web Design
6.K.09c Properly document and cite electronic sources of information.	Web Design
6.K.10c Discuss the concerns regarding electronic communication and privacy.	Web Design
6.K.11c Define E-Mail protocol and uses.	Cisco Networking Academy
6.K.12c Define Instant Messaging protocol and uses.	Cisco Networking Academy
6.L.01c Define the various virus types and their potential effects.	26
6.L.02c Perform anti virus procedures, including installing, updating and scanning.	26
6.L.03c Identify potential sources of virus infection.	26
6.L.04c Identify basic security risks to system and personal computing equipment.	26

6.L.05c Explain the benefits and demonstrate the use of privacy, password, and protection utilities. 26

The IT Program is in alignment with the Massachusetts VTE frameworks, and the curriculum has been validated by the IT Program Advisory Board. Any strand not listed is either covered outside of the curriculum, or the resources are not available.

CompTIA Crosswalk to Textbook

Is available as a separate document, but has been omitted for space purposes.

Competency Reporting System

As taken from the Charles H. McCann Technical School Student/Parent Handbook: “Report cards are issued quarterly and serve as a guideline for students and their parents to measure achievement. Parents are encouraged to contact teachers and counselors to ensure a continuing participation in student progress. Courses are graded numerically in accordance with the following values.”

90-100	Advanced
80-89	Proficient
70-79	Satisfactory
65-69	Passing
0-64	Failing

Theory (30%)		Performance (70%)	
20%	Homework	75%	Competency/Performance
15%	Notebook	10%	Attendance/Participation
40%	Tests/quizzes	15%	Skills USA Project
10%	Attendance/Participation		

Student competencies are recorded using these performance indicators as used by the Massachusetts DESE Vocational Technical Competency Tracking System (VTCTS) application.

---	No attempt
1	Attempted
2	Developing
3	Proficient
4	Exemplary

Instructional Activities

The curriculum is project-based with the projects designed around real world scenarios. In addition to assigned project work, students provide support assistance for the network and computers within the school. Related student work at off site non-profit organizations has provided excellent training in the past and future opportunities are always sought.

The IT department fully participates in the Skills USA program. We have successfully competed in the inter-networking, computer maintenance technology, and web design competitions.

Resources

- a) Computer Maintenance Textbook: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs*. 3rd ed. New York: McGrawHill, 2010. Print.
- b) Computer Maintenance Lab Manual: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs Lab Manual*. 3rd ed. New York: McGrawHill, 2010. Print.
- c) Duckett, Jon. *Beginning HTML, XHTML, CSS, and JavaScript*. Indianapolis, IN: Wrox/Wiley, 2010. Print.
- d) OSHA 10-hour Training:
http://www.osha.gov/dte/outreach/construction_generalindustry/index.html
- e) [Cisco Networking Academy: http://cisco.netacad.net](http://cisco.netacad.net)

Information Technology
Grade 10

CIP Code: 110401

McCann Technical School
70 Hodges Cross Road
North Adams, MA 01247

Instructors:
Mr. Perry Burdick
Mr. Richard Bergendahl

Program Philosophy

The demand for information technology (IT) support in the global business world has exploded at an exponential rate. Students in the McCann Information Technology program will attain skills in networking, computer maintenance, web design and computer programming to support this demand. The main goals of this program are to meet the standards identified in the Massachusetts VTE Frameworks for Information Support Services and Networking, provide industry with skilled Information Technology employees, and to develop the employability skills identified by the 1992 SCANS report. The students will be provided the opportunity to test for national certifications in computer maintenance technology and networking. In order to meet these goals, the program must incorporate additional competencies and expand upon the standards in the frameworks. The resulting graduate students will be valuable workplace assets with the ability to self-learn and solve real world problems.

Course Syllabus

Course Description

In the sophomore year, students will continue studying computer maintenance technology to finish preparing for the Computing Technology Industry Association (CompTIA) A+ Certification. The requirements for the exam are that of an entry-level IT professional with a recommended 500 hours of hands-on experience in the lab or field. It tests for technical understanding of computer technology, networking and security, as well as the communication skills and professionalism now required of all IT professionals.

The students will also continue studying web design and programming. This year, the students will be introduced to the more advanced concept of scripting languages such as PHP and Javascript. Concepts discussed are the use of variables, functions, loops, file I/O, object-oriented programming, and database integration. Students successfully completing this course can seek employment as web application developers. Additionally, the students will receive certification in the 10-hour OSHA Safety Program.

Course Objectives

Upon successful completion of readings, exercises, labs, and assignments, the student will:

1. Continue completing the required tasks defined by the Information and Support Systems VTE Framework.
2. Be prepared to take the CompTIA A+ Certification Exam.
3. Be able to identify and practice safe work measures established by the OSHA 10-hour program and pass the certification exam.
4. Have the ability to develop Web applications using HTML, CSS, PHP, Javascript, and MySQL.

Course Sequence (Computer Maintenance)

1. Certifications and the process
2. Professionalism, communication, safety and tools

3. How computers work, component recognition
4. Understanding Windows
5. Microprocessors
6. Random Access Memory
7. BIOS and CMOS
8. Expansion bus
9. Motherboards
10. Power supplies
11. Hard drive technologies
12. Implementing hard drives
13. Removable media
14. Installing and upgrading Windows
15. Maintaining and troubleshooting Windows
16. Securing Windows resources
17. Maintaining and troubleshooting Windows
18. Input/Output
19. Video
20. Multimedia
21. Portable computers
22. Printers
23. Local area networking
24. Wireless networking
25. The Internet
26. Computer security
27. Troubleshooting

Course Sequence (PHP and MySQL)

1. Combining HTML and PHP
2. Using the Echo Function
3. Using Comments in PHP
4. Variables
5. Data Types
6. Operators and Expressions
7. Constants
8. Using Conditional Statements
9. Using Program Loops
10. Understanding Functions
11. Calling Functions
12. Defining Functions
13. Understanding Arrays
14. Creating Arrays
15. Associative Arrays
16. Multidimensional Arrays
17. Accessing Arrays

18. Manipulating Arrays
19. Sorting Arrays
20. Understanding Objects
21. Creating an Object
22. Object Properties
23. Object Methods
24. Inheritance
25. Working with HTML Forms
26. File Upload Forms and Scripts
27. Working with Files
28. Working with DBA Functions
29. Database Integration
30. Working with Images
31. Working with Dates and Times
32. Working with Strings
33. Saving State with Cookies and Query Strings
34. Saving State with Session Functions
35. XML

VTE Frameworks Cross Reference to Textbook

Strand	Chapter Reference/Resource
1.A.01a Identify and apply OSHA and other health and safety regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.02a Identify and apply EPA and other environmental protection regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.03a Identify and apply Right-To-Know (Hazard Communication Policy) and other communicative regulations that apply to specific tasks and jobs in the occupational area.	2, 10-hour OSHA Certification
1.A.04a Explain procedures for documenting and reporting hazards to appropriate authorities.	2, 10-hour OSHA Certification
1.A.05a List penalties for non-compliance with appropriate health and safety regulations.	2, 10-hour OSHA Certification
1.A.06a Identify contact information for appropriate health and safety agencies and resources.	2, 10-hour OSHA Certification

- 1.B.01a Identify, describe and demonstrate the effective use of Material Safety Data Sheets (MSDS). 2, 10-hour OSHA Certification
- 1.B.02a Read chemical, product, and equipment labels to determine appropriate health and safety considerations. 2, 10-hour OSHA Certification
- 1.B.03a Identify, describe and demonstrate personal, shop and job site safety practices and procedures. 2, 10-hour OSHA Certification
- 1.B.04a Demonstrate safe dress and use of relevant safety gear and personal protective equipment (PPE), including wrist rests, adjustable workspaces and equipment, gloves, boots, earplugs, eye protection, and breathing apparatus. 2, 10-hour OSHA Certification
- 1.B.05a Illustrate appropriate safe body mechanics, including proper lifting techniques and ergonomics. 2, 10-hour OSHA Certification
- 1.B.06a Locate emergency equipment in your lab, shop, and classroom, including (where appropriate) eyewash stations, shower facilities, sinks, fire extinguishers, fire blankets, telephone, master power switches, and emergency exits. 2, 10-hour OSHA Certification
- 1.B.07a Demonstrate the safe use, storage, and maintenance of every piece of equipment in the lab, shop, and classroom. 2, 10-hour OSHA Certification
- 1.B.08a Describe safety practices and procedures to be followed when working with and around electricity. 2, 10-hour OSHA Certification
- 1.B.09a Properly handle, store, dispose of, and recycle hazardous, flammable, and combustible materials. 2, 10-hour OSHA Certification
- 1.B.10a Demonstrate proper workspace cleaning procedures. 2, 10-hour OSHA Certification
- 1.C.01a Illustrate First Aid procedures for potential injuries and other health concerns in the occupational area. 2, 10-hour OSHA Certification
- 1.C.02a Describe the importance of emergency preparedness and an emergency action plan. 2, 10-hour OSHA Certification

1.C.03a Illustrate procedures used to handle emergency situations and accidents, including identification, reporting, response, evacuation plans, and follow-up procedures.	2, 10-hour OSHA Certification
1.C.04a Identify practices used to avoid accidents.	2, 10-hour OSHA Certification
1.C.05a Identify and describe fire protection, precautions and response procedures.	2, 10-hour OSHA Certification
1.C.06a Discuss the role of the individual and the company/organization in ensuring workplace safety.	2, 10-hour OSHA Certification
1.C.07a Discuss ways to identify and prevent workplace/school violence.	2, 10-hour OSHA Certification
2.A.01c Define and document a problem.	27
2.A.02c Define possible causes of a problem.	27
2.A.03c Determine and discuss possible solutions to a problem.	27
2.A.04c Explain and perform basic troubleshooting and maintenance tasks.	27
2.AA.01 Identify various types of cards and their uses.	8
2.AA.02 Identify bus type based upon physical appearances.	8
2.AA.03 Install and configure and test various cards.	8
2.AA.04 Retrieve and install appropriate drivers.	8
2.B.01c Describe the function of the internet and intranets.	25
2.B.02c Define network terms.	23
2.B.03c Differentiate between LANs, MANs and WANs.	23
2.B.04c Describe the purposes of a network.	23
2.B.05c Trace the evolution of networks.	23
2.B.06c Analyze the current trends and developments in LANs.	23

2.B.07c Identify OSI Layer 1 through Layer 7.	23
2.B.08c Explain passwords and log ins as they relate to network structures.	23
2.B.09c Demonstrate the basic design and components of LAN and WAN systems.	23
2.B.10c Describe network topologies (ring, star, bus).	23
2.B.11c Identify voice communication, data communications, and telecommunications systems.	23
2.B.12c Compare and contrast wireless networking to wired networking.	24
2.B.13 Identify major network operating systems: Unix, Microsoft, Novell.	23
2.B.14 Define the function of a NIC, hubs, switches, routers, bridges and repeaters.	23
2.B.15 Differentiate between broadband and baseband.	23
2.B.16 Identify purpose, and function of a gateway.	23
2.B.17 Identify advantages and disadvantages of peer-to-peer networks.	23
2.B.18 Identify advantages and disadvantages of client-server networks.	23
2.BB.01 Identify and describe the various output devices and their technologies.	8, 18
2.BB.02 Install, configure and test output devices.	18
2.BB.03 Retrieve and install appropriate drivers.	8, 18
2.BB.04 Identify basic concepts, operations, and components of printers.	22
2.BB.05 Identify types of printers.	22
2.BB.06 Identify printer connections.	22
2.C.01c Construct networks using different types of cables.	23

2.C.02c Describe how terminals are connected in a network configuration.	23
2.C.03c Identify and utilize modems used for dial-up access.	25
2.C.04c Identify network applications (fax, voice mail, online services, email).	25
2.C.05c Summarize the characteristics and uses of TCP/IP protocol.	23
2.C.06c Differentiate between local computer operating systems and network operating systems.	23
2.C.07c Open, and communicate over, an internet connection.	25
2.C.08c Demonstrate basic diagnostic skills.	27
2.C.09c Configure a simple peer-to-peer network.	23
2.C.10c Share a resource in a peer-to-peer networked environment.	23
2.C.11c Access a shared resource in a peer-to-peer networked environment.	23
2.C.12c Demonstrate how bandwidths affect data transfer.	25
2.C.13 Install and configure necessary hardware and software for a basic network installation, including the creation of a shared resource.	23
2.C.14 Distinguish between prevalent networking media and connectors (length, speed, appearance, advantages, disadvantages).	23
2.C.15 Identify layer 1, 2, 3, and 4 networking devices, their purpose and their operations.	23
2.C.16 Determine where layer 1, 2, 3, and 4 devices are needed.	23
2.C.17 Identify various data management outsources.	23

2.C.18 Identify channel access methods and their operations.	23
2.C.19 Identify protocols, services, hardware and functions that pertain to each layer of OSI model.	23
2.C.20 Define packets and encapsulation.	23
2.C.21 Define current 802.1 and 802.3 specifications.	24
2.C.22 Identify function and characteristics of MAC addressing.	23
2.C.23 Identify function and characteristics of protocol addressing.	23
2.CC.01 Identify the purpose of various types of preventive maintenance products and procedures.	27
2.CC.02 Schedule and perform preventive procedures including hard drive maintenance utilities.	27
2.CC.03 Describe the need for and implementation of surge protection.	10
2.D.01c Define what a computer program is.	PHP/JavaScript
2.D.02c Define how a computer program runs.	PHP/JavaScript
2.D.03c Identify the applications appropriate for each programming language.	PHP/JavaScript
2.D.04c Define functions/methods/procedures.	PHP/JavaScript
2.D.05c Define programming structures.	PHP/JavaScript
2.D.06c Differentiate between procedural and object oriented programming.	PHP/JavaScript
2.D.07c Define purpose and use of flowcharting.	PHP/JavaScript
2.DD.01 Discuss effective backup and recovery strategies, and media used.	4, 17
2.DD.02 Perform a simple data backup.	17
2.DD.03 Perform a simple data restoration.	17
2.E.01c Describe various interactive media tools.	Web Design

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2.E.02c Create and manipulate illustrations using a drawing or painting program.	Web Design
2.E.03c Import and export graphics using external peripherals.	Web Design
2.E.04c Identify and define different graphic file formats.	Web Design
2.E.05c Open and run video clips.	Web Design
2.E.06c Create a simple video clip.	Web Design
2.E.07c Play and record sound clips.	Web Design
2.EE.01 Identify stages of the troubleshooting process.	27
2.EE.02 Differentiate between normal and abnormal operations.	27
2.EE.03 Describe common faults to system boards.	8, 9
2.EE.04 Describe common faults to memory.	6
2.EE.05 Describe common faults to data storage devices.	11,12,17
2.EE.06 Describe common faults to power supplies.	10
2.EE.07 Describe common faults in adapter interface cards.	8
2.EE.08 Demonstrate procedures used to troubleshoot I/O ports.	8
2.EE.09 Identify and resolve IRQ conflicts.	8
2.EE.10 Describe common faults to peripheral devices.	8, 18, 22
2.EE.11 Solve common hardware problems after they have been identified.	5, 6, 8, 9, 10, 11
2.F.01c Work with multiple applications (ASCII editor and browser).	Web Design
2.F.02c Create an HTML document using simple HTML tags.	Web Design
2.F.03c Launch HTML document in a browser.	Web Design

2.F.04c Apply basic debugging techniques.	PHP/JavaScript
2.FF.01 Differentiate between operating system and application errors.	17
2.FF.02 Describe common faults with an operating system.	17
2.FF.03 Describe common faults with an application.	17
2.FF.04 Demonstrate use of appropriate diagnostic utilities.	17
2.FF.05 Solve common software problems after they have been identified.	17
2.G.01c Identify main classification of computers.	5
2.G.02c Identify major hardware components, their functions and relationships.	3
2.G.03c Identify types of computer storage devices.	11
2.G.04c Practice proper handling procedures for components.	2
2.G.05c Install and configure hardware in a computer system.	5, 6, 8, 9, 10, 11
2.H.01c Identify major operating system fundamentals and components, and hardware compatibility.	4
2.H.02c Perform basic operations within an operating system.	4
2.H.03c Troubleshoot basic problems within an operating system.	17
2.H.04c Customize the operating system environment.	4
2.H.05c Return an operating system back to original configuration.	14, 17
2.H.06 Discuss the evolution of operating system types.	4
2.H.07 Demonstrate ability to navigate through various operating systems.	4

2.H.08 Describe major system files and their functions.	4
2.H.09 Illustrate various operating system file structures.	4
2.H.10 Determine hardware requirements for various operating systems.	14
2.H.11 Prepare hard drive for installation of operating system.	12
2.H.12 Install, configure and test operating system.	14
2.H.13 Explain memory management within operating systems.	17
2.H.14 Create a system boot disk.	14, 17
2.H.15 Demonstrate the appropriate use of system utilities.	4, 17
2.H.16 Retrieve, install and test appropriate device drivers.	4, 7, 14
2.H.17 Identify steps necessary to perform an upgrade.	14
2.H.18 Retrieve, install, and test system patches, updates and service packs.	14
2.H.19 Determine and delete unused files.	17
2.I.01c Install software programs.	14
2.I.02c Perform basic configuration operations.	14
2.I.03c Describe basic compatibility issues.	4
2.I.04c Uninstall applications.	4
2.I.05 Validate operating system and hardware compatibility with installation requirements of the application.	14
2.I.06 Acquire or verify software license for installation.	14
2.I.07 Perform custom installations, including network-based installations.	14
2.I.08 Identify steps necessary to perform an upgrade.	14

2.I.09 Retrieve, install, and test application patches, updates and service packs.	14
2.J.01c Illustrate the IT timeline (evolution).	1
2.J.02c Identify professional certifications.	1
2.J.03c Define impact of technologies on society.	26
2.J.04c Identify technologies and describe their uses in the workplace and society.	26
2.J.05c Illustrate uses of interactive media in society/industry.	26
2.K.01c Discuss security principles, vulnerability and threats.	26
2.K.02c Explain principles of secure pass-wording strategies.	26
2.K.03c Illustrate what fundamental legal issues involved with security management.	26
2.M.02c Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs.	Cisco Networking Academy
2.N.01 Describe ways to orient user to network policies and operations.	Cisco Networking Academy
2.O Identify network design concepts.	23
2.O.02 Identify power consumption requirements.	10
2.O.04 Identify the importance of a UPS.	10
2.O.06 Identify physical requirements for network implementation.	23
2.O.07 Identify the standards of efficiency and effectiveness (uniformity) for the design.	23
2.O.08 Identify system requirements for network implementation including specialized servers.	23
2.O.09 Identify application requirements for network implementation.	23

2.O.10 Identify environmental factors on computer networks.	23
2.P.01 Describe name resolution technologies and methods.	23
2.P.02 Define DHCP, DNS, WINS and host files.	23
2.P.03 Summarize TCP/IP addressing.	23
2.P.04 Test, validate, and troubleshoot IP connectivity using TCP/IP utilities.	23
2.P.05 Describe various telecom considerations and processes including convergence, and Voice Over IP.	23
2.Q.01 Perform software upgrades and fixes.	14, 17
2.Q.02 Perform standard server backup procedures.	4, 17
2.Q.04 Maintain accurate network documentation.	Cisco Networking Academy
2.Q.05 Monitor system status and performance.	Cisco Networking Academy
2.Q.06 Identify abnormal system performance.	Cisco Networking Academy
2.Q.07 Recognize system alerts.	Cisco Networking Academy
2.Q.08 Monitor system log files.	Cisco Networking Academy
2.Q.09 Recognize security problems.	26
2.Q.10 Recognize environmental problems.	26
2.Q.11 Analyze how server usage effects network performance (web server, file server, print server, etc).	Cisco Networking Academy
2.Q.12 Establish network documentation of inventory and assets.	Cisco Networking Academy
2.Q.13 Identify various security, video, building utility monitoring systems and how they link to the network.	Cisco Networking Academy
2.Q.14 Demonstrate ability to monitor performance from PC to hubs to server.	Cisco Networking Academy
2.Q.15 Identify basic troubleshooting steps.	27

2.Q.16 Identify problems using diagnostic tools when appropriate.	27
2.Q.17 Identify and test solutions.	27
2.Q.18 Document results and solution.	27
2.Q.19 Identify the need for and use appropriately, network troubleshooting tools such as ping, ns lookup, telnet, and tracer.	23, 24, 25
2.R.01 Configure a NIC.	23
2.R.02 Identify major operating systems: UNIX, LINUX, Microsoft, Novell.	23
2.R.03 Install server software.	23
2.R.04 Configure server software for network access.	23
2.R.05 Compare and contrast file level security and domain or directory services.	16
2.R.06 Create shared user resources.	16
2.R.07 Differentiate between a switch and a router.	23
2.R.08 Identify hardware needed to connect switch/router to a network.	23
2.R.09 Describe the use of functions of a switch/router.	23, 24, 25
2.R.10 Demonstrate procedures used to communicate with a switch/router.	23, 24, 25
2.R.11 Demonstrate procedures used to configure a switch/router.	23, 24, 25
2.R.12 Demonstrate procedures used to install a switch/router.	Cisco Networking Academy
2.S.01 Install and configure internet browser software packages.	Cisco Networking Academy
2.S.02 Install and configure network-based application.	Cisco Networking Academy
2.S.03 Configure network resources at the client level (mapped drives, printers, folders, etc).	16

2.T.01 Demonstrate how to establish and maintain user accounts, rights, and permissions.	16
2.T.02 Explain the use of scripts in customizing user environments.	16
2.T.03 Document and manage patch panels and connections.	Cisco Networking Academy
2.T.04 Distinguish between user level and share level server models.	16
2.T.05 Describe good practices of password procedures.	26
2.T.06 Illustrate concepts of data encryption and its use with protecting network resources.	Cisco Networking Academy
2.T.07 Describe firewall uses.	17, 26
2.T.08 Implement and maintain system wide virus protection software.	26
2.T.09 Identify uses for VPN and network data encryption.	25
2.U.01 Identify types of motherboards.	9
2.U.02 Identify major motherboard components and architecture.	9
2.U.03 Install, configure and test motherboard.	9
2.U.04 Retrieve and install appropriate drivers for motherboard.	9
2.U.05 Configure jumpers and dipswitch settings.	9
2.V.01 Identify and explain physical bus types.	8
2.V.02 Identify and explain logical bus types.	8
2.V.03 Give a detailed explanation of IRQs.	8
2.V.04 Define DMA and its functions.	8
2.V.05 Give a detailed explanation of I/O addresses.	8
2.W.01 Illustrate the evolution of the CPU.	5

2.W.02 Distinguish between the popular CPU chips in terms of their basic characteristics.	5
2.W.03 Install various types of CPUs.	5
2.W.04 Install required cooling components.	5
2.X.01 Identify RAM terminology, locations and physical characteristics.	6
2.X.02 Identify the purpose of CMOS, what it contains, and how to change its basic parameters.	7
2.X.03 Install memory modules.	6
2.Y.01 Describe the evolution of storage devices and the technologies used.	11, 12, 13
2.Y.02 Identify drive structures.	11, 12, 13
2.Y.03 Identify cluster sizes used with various file systems.	11
2.Y.04 Identify the various types of storage devices, their advantages and disadvantages.	11, 12, 13
2.Y.05 Install, configure and test IDE/EIDE devices.	11
2.Y.06 Install, configure and test SCSI storage devices.	11
2.Y.07 Describe RAID and its uses.	11
2.Z.01 List different case characteristics.	3, 9
2.Z.02 List different power supply properties and characteristics.	10
2.Z.03 Test voltages employing proper load requirements using a digital multi-meter.	10
2.Z.04 Determine wattage requirements of a system.	10
3.C.03c Describe the characteristics of waves (wavelength, frequency, velocity, amplitude).	10
3.C.08c Identify and explain the components of a circuit including a source, conductor, load, and controllers (controllers are switches, relays, diodes, transistors, integrated circuits).	10

3.C.09c Explain the relationship between resistance, voltage, and current (Ohm's Law).	10
3.C.10c Determine the voltages and currents in a series circuit and a parallel circuit.	10
3.C.11c Identify appropriate units of measurement for current, voltage, and resistance, and explain how they are measured.	10
3.C.12c Analyze circuits (find the current at any point and the potential difference between any two points in the circuit) using Kirchoff and Ohm's laws.	10
3.C.13c Identify and explain the applications of light in communications, e.g., reflection, refraction, additive, and subtractive color theory.	23
3.C.14c Explain how information travels through different media, e.g., electrical wire, optical fiber, air, space.	23
3.C.15c Compare the difference between digital and analog communication devices.	25
3.C.16c Explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.	Cisco Networking Academy
3.C.17c Identify and explain the applications of laser and fiber optic technologies, e.g., telephone systems, cable television, medical technology, and photography.	23
3.C.22c Distinguish between mechanical and electromagnetic waves.	10
3.C.24c Recognize the characteristics of static charge, and explain how a static charge is generated.	2
3.C.26c Develop a qualitative and quantitative understanding of current, voltage, resistance, and the connection between them.	10
3.C.27c Describe the differences between Alternating Current (AC) and Direct Current (DC).	10

3.C.28c Explain the differences between analog and digital information and the use of binary numbers in data storage.	11, 18
4.B.02a Apply reading skills and strategies to work-related documents.	All
4.B.03a Locate information from books, journals, magazines, and the Internet.	All
4.B.04a Apply basic writing skills to work-related communication.	All
4.B.05a Write work-related materials.	All
4.B.09a Explain proper telephone etiquette and skills.	2
5.F.04a Define ethical business practices for your field.	2
6.A.01a Select and utilize the appropriate technology to solve a problem or complete a task.	All
6.A.02a Demonstrate file management skills (e.g., install new software, compress and expand files as needed, download files as appropriate).	14
6.A.03a Differentiate between different operating systems and demonstrate use of at least one to open and switch between programs and files.	4, 14, 17
6.A.04a Identify and demonstrate resolutions to simple hardware and software problems as they occur (e.g., frozen screen, disk error, printing problems).	17
6.A.06a Demonstrate the proper use of a variety of external peripherals and how they connect to a computer.	18, 22
6.D.01c Explain directory structure.	4
6.D.02c Navigate directory structure to find a specific file/folder.	4
6.D.03c Explain and apply procedures used to manipulate folders.	4

6.D.04c Explain and apply procedures used to manipulate files.	4
6.D.06c Explain and apply procedures used to associate file types with appropriate programs.	4
6.D.07c Differentiate between local and network drives, internet and intranet files.	16
6.E.01c Identify common user interface properties.	4, 15
6.E.02c Identify common application components, such as help, file, view, tools, options.	4
6.E.03c Select source and destination applications.	15
6.F.05c Demonstrate ability to create and use tables.	Web Design
6.J.06c Demonstrate the use of help functions.	4
6.K.01c Identify components of the internet.	25
6.K.02c Identify components incorporated in a web site.	Web Design
6.K.03c Identify the components of an internet address (URL).	Web Design
6.K.04c Describe the function of search engines.	Web Design
6.K.05c Demonstrate strategies to locate and retrieve electronic information.	Web Design
6.K.06c Create and organize bookmarks in a browser.	Web Design
6.K.07c Explain laws relating to copyright and internet use.	Web Design
6.K.08c Evaluate electronic sources of information for authenticity.	Web Design
6.K.09c Properly document and cite electronic sources of information.	Web Design
6.K.10c Discuss the concerns regarding electronic communication and privacy.	Web Design

6.K.11c Define E-Mail protocol and uses.	Cisco Networking Academy
6.K.12c Define Instant Messaging protocol and uses.	Cisco Networking Academy
6.L.01c Define the various virus types and their potential effects.	26
6.L.02c Perform anti virus procedures, including installing, updating and scanning.	26
6.L.03c Identify potential sources of virus infection.	26
6.L.04c Identify basic security risks to system and personal computing equipment.	26
6.L.05c Explain the benefits and demonstrate the use of privacy, password, and protection utilities.	26

The IT Program is in alignment with the Massachusetts VTE frameworks, and the curriculum has been validated by the IT Program Advisory Board. Any strand not listed is either covered outside of the curriculum, or the resources are not available.

CompTIA Crosswalk to Textbook

Is available as a separate document, but has been omitted for space purposes.

Competency Reporting System

As taken from the Charles H. McCann Technical School Student/Parent Handbook:

“Report cards are issued quarterly and serve as a guideline for students and their parents to measure achievement. Parents are encouraged to contact teachers and counselors to ensure a continuing participation in student progress. Courses are graded numerically in accordance with the following values.”

- 90-100 Advanced
- 80-89 Proficient
- 70-79 Satisfactory
- 65-69 Passing
- 0-64 Failing

Theory (30%)	Performance (70%)
20% Homework	75% Competency/Performance
15% Notebook	10% Attendance/Participation
40% Tests/quizzes	15% Skills USA Project
10% Attendance/Participation	

Student competencies are recorded using these performance indicators as used by the Massachusetts DESE Vocational Technical Competency Tracking System (VTCTS) application.

- No attempt
- 1 Attempted
- 2 Developing
- 3 Proficient
- 4 Exemplary

Instructional Activities

The curriculum is project-based with the projects designed around real world scenarios. In addition to assigned project work, students provide support assistance for the network and computers within the school. Related student work at off site non-profit organizations has provided excellent training in the past and future opportunities are always sought. The IT department fully participates in the Skills USA program. We have successfully competed in the inter-networking, computer maintenance technology, and web design competitions.

Resources

- a) Computer Maintenance Textbook: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs*. 3rd ed. New York: McGrawHill, 2010. Print.
- b) Computer Maintenance Lab Manual: Meyers, Michael. *Mike Meyers' CompTIA A Guide to Managing and Troubleshooting PCs Lab Manual*. 3rd ed. New York: McGrawHill, 2010. Print.
- c) Duckett, Jon. *Beginning HTML, XHTML, CSS, and JavaScript*. Indianapolis, IN: Wrox/Wiley, 2010. Print.
- d) OSHA 10-hour Training:
http://www.osha.gov/dte/outreach/construction_generalindustry/index.html
- e) [Cisco Networking Academy: http://www.cisco.netacad.net](http://www.cisco.netacad.net)

**CCNA Discovery 1 Curriculum
Networking For Home and Small Business.**

**Information Technology
ISS Networking
CIP Code: 110401**

Charles H. McCann Technical School
70 Hodges Cross Road
North Adams, MA.01247

Instructors:
Mr. Richard Bergendahl
Mr. Perry Burdick

CCNA Discovery 1 v4.0 Course Outline:
Networking For Home and Small Business.
ISS Networking CIP Code: 110401

Program Philosophy

The demand for information technology (IT) support in the global business world has exploded at an exponential rate. Students in the McCann Information Technology program will attain skills in networking, computer maintenance, web design, and computer programming to support this demand. While this program has been designed to meet the standards identified in the Massachusetts VTE Frameworks for Information Support Services and Networking, the main goals of this program are to provide local industry with skilled IT employees. Employability skills as identified by the 1992 SCANS report are fully implemented by the Skills USA Professional Development Program. Additionally, the students will be provided the opportunity to test for national certifications in computer maintenance technology and networking. In order to meet these goals, the program must incorporate additional competencies and expand upon the standards in the frameworks. The resulting graduate students will be valuable workplace assets with the ability to self-learn and solve real world problems.

Course Syllabus

Networking for Home and Small Businesses v4.0

This course teaches students the skills needed to obtain entry-level home network installer jobs. It also helps students develop some of the skills needed to become network technicians, computer technicians, cable installers, and help desk technicians. It provides a hands-on introduction to networking and the Internet using tools and hardware commonly found in home and small business environments. Instructors are encouraged to facilitate field trips and outside-the-classroom learning experiences. Labs include PC installation, Internet connectivity, wireless connectivity, file and print sharing, and the installation of game consoles, scanners, and cameras. ***

The IT Department currently utilizes the Moodle Open Source Course Management System to deliver content to the students. Students are enrolled into the Moodle system where they have access to the required curriculum and assignments needed to complete the Cisco Discovery Modules and Courses.

After the completion of each module, students are required to test their knowledge using an on-line assessment located on the Cisco Networking Academy website.

CCNA Discovery 1 v4.0 Course Outline:
Networking For Home and Small Business.

<u>Module 1: Personal Computer Hardware</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
1.0			<u>Personal Computer Hardware</u>	
	1.1		Personal Computers and Applications	
		1.1.1	<u>How and Where Computers are Used</u> Identify the multiple uses of a computer.	2.B.11c 2.J.03c 2.J.04c 6.B.01a
		1.1.2	<u>Local and Network Applications</u> Differentiate between local apps and network apps. Differentiate between business software and general use software.	2.I.03c 6.D.07c
	1.2		Types of Computers	
		1.2.1	<u>Classes of Computers</u> Differentiate between the different types of computers on a network.	2.G.01c
		1.2.2	<u>Servers, Desktops, and Workstations</u> Describe the features of a server, workstation, and desktop computer, and how they are used.	2.G.01c
		1.2.3	<u>Portable Devices</u> Describe the features of different types of portable devices and how they are used.	2.G.01c
	1.3		Binary Representation of Data	
		1.3.1	<u>Representing Information Digitally</u> Explain what a bit is. Explain what a byte is. ASCII Code	3.C.28c
		1.3.2	<u>Measuring Data Storage Capacity</u> Kilobytes, Megabytes, Gigabytes, and Terabytes. Conversion between bits and bytes Lab: 1.3.2.2 Measuring Data Storage Capacity	3.B.02c
		1.3.3	<u>Measuring Speed, Resolution, and Frequency</u> Media Types Download calculations and bandwidth Frequency measure Lab 1.3.3.4 Determining Screen Resolution	2.C.12c 3.C.03c

<u>Module 1: Personal Computer Hardware</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
1.0			<u>Personal Computer Hardware</u>	
	1.4		<u>Computer Components and Peripherals</u>	
		1.4.1	<u>Computer Systems</u> Differentiate between preassembled and custom built computer systems.	
		1.4.2	<u>Motherboard, CPU, and RAM</u> Describe the computer system components and their purpose.	2.G.02c
		1.4.3	<u>Adapter Cards</u> Identify and describe computer system components and their purpose.	2.G.02c
		1.4.4	<u>Storage Devices</u> Describe the different types of storage used in computers. Magnetic, Optical, Flash.	2.G.03c
		1.4.5	<u>Peripheral Devices</u> Identify and describe peripherals and their purpose.	2.G.02c
		1.4.6	<u>Cases and Power Supplies</u> Describe the purposes of Power Supplies, Surge Suppressors, and UPSs.	2.G.02c
	1.5		<u>Computer System Components</u>	
		1.5.1	<u>Safety and Best Practices:</u> Describe computer safety procedures and best practices.	1.B.03a 1.B.08a
		1.5.2	<u>Installing Components and Verifying Operation:</u> Connect computer system components and verify.	2.G.04c 2.G.05c
		1.5.3	<u>Installing Peripherals and Verifying Operation</u> Connecting peripherals to the computer and verifying functionality Lab: 1.5.3.4 Installing a Printer	2.G.04c 2.G.05c 2.BB.02 2.BB.03
	1.6		<u>Module Summary</u>	
		1.6.1	<u>Module Summary</u>	
	1.7		<u>Module Quiz</u>	
		1.7.1	<u>Module Quiz</u>	
1.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 1 Exam	

<u>Module 2: Operating Systems</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
2.0			<u>Operating Systems</u>	
	2.1		<u>Choosing the Operating Systems</u>	
		2.1.1	<u>Purpose of an Operating System</u> Describe the purpose of an OS.	2.C.06c
		2.1.2	<u>Operating System Requirements</u> Identify common operating systems and describe hardware and licensing requirements.	2.H.01c 2.R.02
		2.1.3	<u>Operating System Selection</u> Choosing the OS for the user's needs.	2.B.13
	2.2		<u>Installing the Operating System</u>	
		2.2.1	<u>OS Installation Methods</u> Describe and select an installation method for an operating system. (Full Install or Upgrade)	2.H.12
		2.2.2	<u>Preparing for OS Installation</u> Describe how to complete a pre-installation checklist for installing an operating system.	2.H.01c 2.H.10
		2.2.3	<u>Configuring a Computer for the Network</u> Configure the PC with basic IP configuration information.	2.C.13 2.R.01
		2.2.4	<u>Computer Naming</u> Use logical naming conventions	2.P.01
		2.2.5	<u>Network Name and Address Planning</u> Document network naming schemes	2.P.01
	2.3		<u>Maintaining the Operating System</u>	
		2.3.1	<u>Why and When to Apply Patches</u> Describe the purpose of a patch for an operating system and identify when a patch should be applied.	2.H.18
		2.3.2	<u>Applying OS Patches</u> Identify the sources of patches and how they are applied.	2.H.18
		2.3.3	<u>Application Patches and Updates</u> Describe the purpose of a patch for an application and identify when a patch should be applied. Lab: 2.3.3.2 Examining OS and Application Versions	2.I.09

<i>Module 2: Operating Systems</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
2.0			<u>Operating Systems</u>	
	2.4		<u>Module Summary</u>	
		2.4.1	<u>Module Summary</u>	
	2.5		<u>Module Quiz</u>	
		2.5.1	<u>Module Quiz</u>	
2.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 2 Exam	

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
	3.1		<u>Introduction to Networking</u>	
		3.1.1	<u>What is a Network?</u> Define the term network and identify various types of networks.	2.B.04c
		3.1.2	<u>Benefits of Networking</u> Describe the benefits and impacts of computer networking.	2.B.04c
		3.1.3	<u>Basic Network Components</u> Define the high level components of an Information network.	2.B.14
		3.1.4	<u>Computer Roles in a Network</u> Describe the Roles of computers on a network.	2.B.04c
		3.1.5	<u>Peer-to-Peer Networks</u> Build a two computer peer-to-peer network and verify. Lab: 3.1.5.3 Peer-to-Peer Networks	2.B.09c 2.B.17 2.B.18 2.C.01c 2.C.09c 2.C.10c 2.C.11c 2.C.13 2.R.06
		3.1.6	<u>Network Topologies</u> Describe how networks are composed of both a physical side and logical side. Differentiate between logical and physical topologies maps, and explain how networks are represented graphically.	2.B.01c 2.B.09.c 2.B.10.c 2.O.06
	3.2		<u>Principles of Communication</u>	
		3.2.1	<u>Source, Channel, and Destination</u> Explain the concept of human communication in terms of source, channel, and destination.	3.C.16c
		3.2.2	<u>Rules of Communication</u> Explain the need for rules and protocols in order for communications to occur.	3.C.16c
		3.2.3	<u>Message Encoding</u> Explain the concept of encoding in relation to human communication.	3.C.16c

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
	3.2		<u>Principles of Communication</u>	
		3.2.4	<u>Message Formatting</u> Explain the concept of formatted message and encapsulation in relation to human communication.	3.C.16c
		3.2.5	<u>Message Size</u> Explain that message have finite unit sizes in relation to human communication.	3.C.16c
		3.2.6	<u>Message Timing</u> Explain the concept of timing in communication in relation to human communication.	3.C.16c
		3.2.7	<u>Message Patterns</u> Explain standard message patterns in relation to human communication.	3.C.16c
		3.2.8	<u>Protocol Use in Communication</u> Relate human communications concepts of messages, unit sizes, timing, encapsulation, encoding and standard message patterns to the term “protocol”.	3.C.16c
	3.3		<u>Communicating on a Local Wired Network</u>	
		3.3.1	<u>Importance of Protocols</u> Explain that devices on a local network must share common protocols to communicate (Communicating by the Rules).	2.B.01c 2.C.19
		3.3.2	<u>Standardization of Protocols</u> Identify the importance of standardization in computer communication protocols.	2.B.01c 2.C.19
		3.3.3	<u>Physical Addressing</u> Identify the source, destination and channel in an Ethernet network. Lab: 3.3.3.2 Determine the MAC Address of a Host	2.C.21 2.C.22
		3.3.4	<u>Ethernet Communication</u> Describe some of the basic characteristics of Ethernet for communicating across the channel.	2.C.20 2.C.21 2.C.22
		3.3.5	<u>Hierarchical Design of Ethernet Networks</u> Describe the need for hierarchical design in an Ethernet network.	2.C.21

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
	3.3		<u>Communicating on a Local Wired Network</u>	
		3.3.6	<u>Logical Addressing</u> Explain the purpose of a logical network address as the location of a host on a Network (source and destination). Lab 3.3.3.6: Determine the IP Address of a Computer	2.C.20 2.C.23 2.P.03
		3.3.7	<u>Access and Distribution Layers and Devices</u> Describe characteristics and devices associated with access and distribution (hosts, hubs, switches, routers).	2.B.14
	3.4		<u>Building the Access Layer of an Ethernet Network</u>	
		3.4.1	<u>Access Layer</u> Describe the purpose of the Access Layer and how it is used within an Ethernet network.	2.B.10c 2.B.14
		3.4.2	<u>Function of Hubs</u> Describe the function of a hub and how it operates within an Ethernet network as the network Access Layer device.	2.B.14
		3.4.3	<u>Function of Switches</u> Describe the function of switches and how they operate within an Ethernet network as the Access Layer device.	2.B.14 2.R.07 2.R.08 2.R.09
		3.4.4	<u>Broadcast Messaging</u> Describe the use of Broadcast messaging for communication on a local Ethernet network within the Access Layer (MAC)	2.C.21
		3.4.5	<u>Switch Behavior</u>	
		3.4.6	<u>Mac and IP Addresses</u> Describe the need for both the MAC and IP address within an Ethernet network that uses the IP protocol.	2.C.21 2.C.22
		3.4.7	<u>Address Resolution Protocol</u> Describe ARP and how it is used within an Ethernet network.	2.C.21

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
	3.5.		<u>Building the Distribution Layer of a Network</u>	
		3.5.1	<u>Distribution Layer</u> Describe the reasons for expanding your network with a Distribution Layer.	2.B.09c 2.B.10c
		3.5.2	<u>Function of Routers</u> Describe the function of routers and how they are used in the Distribution Layer of the network. Lab 3.5.2.2 IP Addresses and Network Configuration	2.R.07 2.R.08 2.R.09
		3.5.3	<u>Default Gateway</u> Explain the concept of the gateway router.	2.B.16
		3.5.4	<u>Tables Maintained by Routers</u> Describe the functions of the different tables used by routers to operate properly.	2.B.14 2.R.09
		3.5.5	<u>Local Area Networks</u> Differentiate between the rules governing communications within a single local network and the rules governing communications between multiple local networks. Define the term “local area network (LAN)” (local and remote networks).	2.B.03c 2.B.06c 2.B.09c
		3.5.6	<u>Adding Hosts to Local and Remote Networks</u> Differentiate between implications of adding hosts to “My local network” vs. adding to a “remote network”.	2.B.09c 2.C.13
		3.5.7	<u>Learn to Use Packet Tracer</u> Activity 3.5.7.2 Learn to Use Packet Tracer.	
	3.6		<u>Plan and Connect a Local Network</u>	
		3.6.1	<u>Plan and Document an Ethernet Network</u> Build a virtual model of their small home network or small business network.	2.B.09
		3.6.2	<u>Prototypes</u> Use simulation software to prototype a network. Activity 3.6.2.3 Prototyping a Network.	2.B.09
		3.6.3	<u>Multi-function Device</u> Describe the function of multifunction devices and how they are used in the network.	2.B.14 2.R.09

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
		3.6.4	<u>Connecting the Linksys Router</u> Describe the function of multifunction devices and how they are used in the network. Lab: 3.6.4.3 Connect and Configure Hosts	2.B.14 2.R.10 2.R.11 2.R.12
		3.6.5	<u>Sharing Resources</u> Sharing Resources, Configure your PCs to participate in the local network. Lab 3.6.5.3 Sharing Resources	2.C.10c 2.C.11c
	3.7		<u>Module Summary</u>	
		3.7.1	<u>Module Summary</u>	
	3.8		<u>Module Quiz</u>	
		3.8.1	<u>Module Quiz</u>	
3.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 3 Exam	

<i>Module 4: Connecting to the Internet Through an ISP</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
4.0			<u>Connecting to the Internet Through an ISP</u>	
	4.1		<u>The Internet and How We Connect To It</u>	
		4.1.1	<u>Explain What the Internet Is?</u> Explain the basics of how the Internet works.	2.B.01c
		4.1.2	<u>Internet Service Providers</u> Describe what the purpose of an ISP is.	2.B.01c
		4.1.3	<u>The ISP's Relationship with the Internet</u> Describe how ISPs connect to the Internet. Describe what a POP is.	2.B.01c
		4.1.4	<u>Options for Connecting to the ISP</u> Describe the various methods possible for a home user to connect to an ISP.	2.B.15 2.C.03c
		4.1.5	<u>ISP Levels of Service</u> Describe the various services available from ISP to both average and business consumers. Explain the difference between symmetric and asymmetric bandwidth.	2.B.01c 2.C.12c
	4.2		<u>Sending Information Across the Internet</u>	
		4.2.1	<u>Importance of the Internet Protocol</u> Define the purpose of a packet on a network.	2.C.19
		4.2.2	<u>How ISPs Handle Packets</u> Explain how the ISP NOC handles packets from your home network.	2.B.01c
		4.2.3	<u>Forwarding Packets Across the Internet</u> Use Ping and Traceroute to demonstrate how packets traverse a network and the Internet. Activity 4.2.3.2: Observing Packets Across the Network Lab 4.2.3.3: Tracing Internet Connectivity	2.B.14 2.C.20 2.C.21 2.C.23 2.P.04 2.Q.16 2.Q.19
	4.3		<u>Networking Devices in a NOC</u>	
		4.3.1	<u>Internet Cloud</u> Identify and describe the concept of the network cloud.	2.B.01c
		4.3.2	<u>Devices In The Internet Cloud</u> Identify and describe the network devices used in the network cloud.	2.B.01c

<i>Module 4: Connecting to the Internet Through an ISP</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
4.0			<u>Connecting to the Internet Through an ISP</u>	
		4.3.3	<u>Physical and Environmental Requirements</u> Physical and Environmental requirements. Provide hi-level description of how data travels within an Internet cloud.	2.B.01c
	4.4		<u>Cables and Connectors</u>	
		4.4.1	<u>Common Network Cables</u> Describe the various types of media used in data networks.	2.C.14 2.O.06c 2.O.10c
		4.4.2	<u>Twisted Pair Cables</u> Describe how TP cable works, the different categories of UTP cable, and different types of TP used in a network. (UTP, STP, SCTP)	2.C.01c 2.O.06c 2.O.10c
		4.4.3	<u>Coaxial Cable</u> Describe how coaxial cable works, and where it is used in data networks.	2.C.01c 2.O.06c 2.O.10c
		4.4.4	<u>Fiber Optic Cables</u> Describe how fiber optic cable works, and explain the different types of fiber used in data networking.	2.C.01c 2.O.06c 2.O.10c
	4.5		<u>Working with Twisted Pair Cabling</u>	
		4.5.1	<u>Cabling Standards</u> Describe why cabling standards are important.	2.C.01c 2.O.06c 2.O.10c
		4.5.2	<u>UTP Cables</u> Describe the wiring standards used with UTP, and the different types of cables that are made with UTP and how they are used. (Straight-Thru, Crossover, etc.)	2.C.01c 2.O.06c 2.O.10c
		4.5.3	<u>UTP Cable Termination</u> Use proper cable termination techniques. Lab: 4.5.3.2 Building Straight Thru and Crossover UTP Cables	2.C.01c 2.O.06c 2.O.10c
		4.5.4	<u>Terminating UTP at Patch Panels and Wall Jacks</u> Use proper techniques to terminate wall jacks, patch panels and 110 blocks. Lab 4.5.4.4: Terminating UTP Cables	2.C.01c 2.O.06c 2.O.10c
		4.5.5	<u>Cable Testing</u> Test cable for faults using tools Lab 4.5.5.4 Testing UTP Cables	2.Q.16

<i>Module 4: Connecting to the Internet Through an ISP</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
4.0			<u>Connecting to the Internet Through an ISP</u>	
	4.5		<u>Working with Twisted Pair Cabling</u>	
		4.5.6	<u>Cabling Best Practices</u> Describe cabling management techniques.	2.C.01c 2.O.06c 2.O.10c
	4.6		<u>Module Summary</u>	
		4.6.1	<u>Module Summary</u>	
	4.7		<u>Module Quiz</u>	
		4.7.1	<u>Module Quiz</u>	
4.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 4 Exam	

Module 5: Network Addressing				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Network Addressing</u>	
	5.1		<u>IP Addresses and Subnet Masks</u>	
		5.1.1	<u>Purpose of the IP Address</u> Describe what an IP Address is, and what it is used for. Activity 5.1.1.2: Connecting to a Web Server Using IP.	2.P.03 2.C.07c 2.C.23
		5.1.2	<u>IP Address Structure</u> Describe how an IP Address looks to a computer, and what it looks like to us. (32 bit binary number, decimal dotted notation, 8 bit octets) Activity: Binary Game	2.C.23 2.P.03
		5.1.3	<u>Parts of an IP Address</u> Describe the 2 different parts of an IP Address. (Network ID vs. Host ID)	2.C.23 2.P.03
		5.1.4	<u>How IP Addresses and Subnet Masks Interact</u> What is a Subnet Mask and how does it interact with an IP Address. Lab 5.1.4.3 Using Windows Calc. with Network Addresses	2.C.23 2.P.03
	5.2		<u>Types of IP Addresses</u>	
		5.2.1	<u>IP Address Classes and Default Subnet Masks</u> Define the 5 address classes used with networking, and define the default Subnet Masks.	2.C.23 2.P.03
		5.2.2	<u>Public and Private IP Addresses</u> Describe the difference between public and private IP Addresses, why they are needed, and define what ranges are reserved for each class. (Including Loopback Addresses)	2.C.23 2.P.03
		5.2.3	<u>Unicast, Broadcast, and Multicast Addresses</u> Describe the difference between Unicasts, Multicasts, and Broadcasts	2.C.23 2.P.03
	5.3		<u>How IP Addresses are Obtained</u>	
		5.3.1	<u>Static and Dynamic Address Assignment</u> Describe the difference between static IPs and Dynamically assigned IPs.	2.C.23 2.P.03
		5.3.2	<u>DHCP Servers</u> Defines the purpose of a DHCP server.	2.P.02

Module 5: Network Addressing				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Network Addressing</u>	
	5.3		<u>How IP Addresses are Obtained</u>	
		5.3.3	<u>Configuring DHCP</u> Describe the 4 stages that a computer goes through to obtain an IP Address, discuss what information is given by the DHCP server, and configure DHCP on a Multi Function Home Device. Activity 5.3.3.3 Configuring DHCP on a Multifunction Device	2.P.02
	5.4		<u>Network Address Translation</u>	
		5.4.1	<u>Network Boundaries and Address Space</u> Describe the difference between internal and external networks and where the boundaries exist between them.	2.C.23 2.P.03
		5.4.2	<u>Address Assignment</u> Determine which devices need an IP Address, and where those addresses come from. (ex. Local Hosts internal ISP, Routers, DHCP from ISP)	2.C.23 2.P.02 2.P.03
		5.4.3	<u>Network Address Translation</u> Describe the purpose of and use of NAT Activity 5.4.3.2 Examining NAT on a Multifunction Device.	2.C.23 2.P.03
	5.5		<u>Module Summary</u>	
		5.5.1	<u>Module Summary</u>	
	5.6		<u>Module Quiz</u>	
		5.6.1	<u>Module Quiz</u>	
5.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 5 Exam	

<u>Module 6: Network Services</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
6.0			<u>Network Services</u>	
	6.1		<u>Clients / Servers and Their Interaction</u>	
		6.1.1	<u>Client Server Relationship</u> Describe the difference between clients and servers, and how they work together. Identify the different types of servers that can be used on a network	2.G.01
		6.1.2	<u>Role of Protocols in Client Server Communication</u> Discuss HTTP, TCP, IP, and Networking Access Protocols (Ethernet)	2.C.19
		6.1.3	<u>TCP and UDP Transport Protocols</u> Discuss the difference between TCP and UDP and their uses.	2.B.07c 2.C.19 2.C.21
		6.1.4	<u>TCP / IP Port Numbers</u> Discuss the purpose of segments and port numbers.	2.B.07c 2.C.19 2.C.21
	6.2		<u>Application Protocols and Services</u>	
		6.2.1	<u>Domain Name Service (DNS)</u> Describe the purpose of DNS and discuss how it works. Use Ping and Nslookup. Lab 6.2.1.3: Observing DNS Name Resolution.	2.C.19 2.P.02
		6.2.2	<u>Web Clients and Servers</u> Discuss how web-servers and web-clients interact and transfer data. Activity 6.2.2.2: Observing Web Requests.	2.C.19
		6.2.3	<u>FTP Clients and Servers</u> Discuss what FTP is and what it used for. Lab 6.2.3.3 Exploring FTP	2.C.19
		6.2.4	<u>Email Clients and Servers</u> Discuss SMTP, POP3, and IMAP4 Lab 6.2.4.4: Configuring an e-mail client	2.C.19
		6.2.5	<u>IM Clients and Servers</u>	2.C.19
		6.2.6	<u>Voice Clients and Servers</u>	2.C.19
		6.2.7	<u>Port Numbers</u> Differentiate between Well Known Ports, Registered Ports, and Private Ports. Quiz: Well Known Port Numbers	2.B.07c 2.C.19 2.C.21

<u>Module 6: Network Services</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
6.0			<u>Network Services</u>	
	6.3		<u>Layered Model and Protocols</u>	
		6.3.1	<u>Protocol Interaction</u> Describe the Protocol Stack and the model approach to protocols.	2.C.19
		6.3.2	<u>Protocol Operation of Sending and Receiving a Message</u> Describe the process of sending and receiving data between hosts. (Encapsulation / De-encapsulation)	2.B.07c 2.C.19
		6.3.3	<u>Open Systems Interconnect Model (OSI Model)</u> Describe the 7 layers of the OSI Model. Describe what each layer of the model does. Activity 6.3.3.5 Viewing PDU Information	2.B.07c 2.C.19
	6.4		<u>Module Summary</u>	
		6.4.1	<u>Module Summary</u>	
	6.5		<u>Module Quiz</u>	
		6.5.1	<u>Module Quiz</u>	
6.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 6 Exam	

<i>Module 7: Wireless Technologies</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
7.0			<u>Wireless Technologies</u>	
	7.1		<u>Wireless Technology</u>	
		7.1.1	<u>Wireless Technologies and Devices</u> Discuss the different types of wireless technologies used in wireless networking.	2.B.12c 2.C.21
		7.1.2	<u>Benefits and Limitations of Wireless Technology</u> Discuss the advantages and disadvantages of using wireless technologies.	2.B.12c 2.C.21 2.O.10
		7.1.3	<u>Types of Wireless Networks and Their Boundaries</u> Define the differences between WPANs, WLANs, and WWANs.	2.C.21 2.O.10
	7.2		<u>Wireless LANs</u>	
		7.2.1	<u>Wireless LAN Standards</u> Describe the 802.11 wireless standards in use today. 802.11a, 802.11b, 802.11g, 802.11n	2.C.21
		7.2.2	<u>Wireless LAN Components</u> Discuss access points, wireless clients, wireless bridges, and differences in antennas.	2.R.01 2.AA.01
		7.2.3	<u>WLANs and the SSID</u> <u>Describe SSIDs.</u> Describe the difference between ad-hoc and infrastructure wireless networks. Discuss wireless cells, BBS, and ESS.	2.B.09c
		7.2.4	<u>Wireless Channels</u> Discuss wireless channels and CSMA/CA	2.B.09c
		7.2.5	<u>Configuring the Access Point</u> Setting the SSID, Wireless Channel, and Wireless Mode on a WAP. Lab 7.2.5.3: Configuring a Wireless Access Point.	2.B.09c
		7.2.6	<u>Configuring the Wireless Client</u> Setting up the Wireless Client. Lab 7.2.6.4: Configuring the Wireless Client.	2.AA.03 2.AA04

<i>Module 7: Wireless Technologies</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
7.0			<u>Wireless Technologies</u>	
	7.3		<u>Security Considerations on a Wireless LAN</u>	
		7.3.1	<u>Why People Attack WLANs</u> War-Driving, War-Walking, Chalking. Discuss why they would want entry in the first place.	2.K.01c
		7.3.2	<u>Limiting Access to a WLAN</u> Discuss MAC Address Filtering.	2.K.01c
		7.3.3	<u>Authentication on a WLAN</u> Describe the different types of authentication that can be used on a wireless network. Open, PSK, EAP	2.K.01c
		7.3.4	<u>Encryption on a WLAN</u> Discuss traffic encryption on a wireless network. (WEP, WPA)	2.K.01c 2.T.06
		7.3.5	<u>Traffic Filtering on a WLAN</u> Controlling traffic on a network. Lab 7.3.5.2 Configuring Wireless Security	2.K.01c
	7.4		<u>Configuring an Integrated AP and Wireless Client</u>	
		7.4.1	<u>Planning the WLAN</u> Describe the steps need to implement a wireless network. Which standard to use? Most efficient layout. Backup and Security Plan.	2.B.09 2.K.01c
		7.4.2	<u>Installing and Securing the AP</u> Describe the basic items that need to be configured to set up a wireless access point.	2.B.09 2.K.01c
		7.4.3	<u>Backing-up and Restoring Configuration Files</u> Describe how to backup and restore and WAP. Discuss why a configuration backup is necessary.	2.DD.01 2.DD.02 2.DD.03
		7.4.4	<u>Updating the Firmware</u> Discuss firmware When and why to update.	2.I.09

<i>Module 7: Wireless Technologies</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
7.0			<u>Wireless Technologies</u>	
	7.5		<u>Module Summary</u>	
		7.5.1	<u>Module Summary</u>	
	7.6		<u>Module Quiz</u>	
		7.6.1	<u>Module Quiz</u>	
7.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 7 Exam	

<i>Module 8: Basic Security</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
8.0			<u>Basic Security</u>	
	8.1		<u>Networking Threats</u>	
		8.1.1	<u>Risks of Network Intrusion</u> Discuss the implications of network intrusion. (ID Theft, Info Theft, Data Loss, Disruption of Service.)	2.K.01c
		8.1.2	<u>Sources of Network Intrusion</u> Describe the difference between internal and external security threats.	2.K.01c
		8.1.3	<u>Social Engineering and Phishing</u> Describe the different ways that hackers can gain information to breach your network. (Social Engineering, Phishing, Vishing)	2.K.01c
	8.2		<u>Methods of Attack</u>	
		8.2.1	<u>Viruses, Worms, and Trojan Horses</u> Describe the difference between Viruses, Worms, and Trojan Horses and what effects they can have on a host.	2.K.01c
		8.2.2	<u>Denial of Service and Brute Force Attacks</u> Describe the different types of DoS Attacks. Describe DDoS Attacks, and Brute Force Attacks	2.K.01c
		8.2.3	<u>Spyware, Tracking Cookies, Adware and Pop-ups</u> Define each of the above.	2.K.01c
		8.2.4	<u>Spam</u> Discuss Spam and its implications.	2.K.01c
	8.3		<u>Security Policy</u>	
		8.3.1	<u>Common Security Measures</u> Discuss Security Policies, Firewalls, Spam Filters, Patches and Updates, Anti-Spyware, Popup Blocker, Anti-virus.	2.K.01c
		8.3.2	<u>Updates and Patches</u> Discuss vulnerabilities in software that allow hackers access to a host, and why updating is important. Describe the difference between an update and a patch.	2.K.01c 2.I.09

<i>Module 8: Basic Security</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
8.0			<u>Basic Security</u>	
	8.3		<u>Security Policy</u>	
		8.3.3	<u>Anti-virus Software</u> Describe the symptoms of an infected host. Describe the features included in an anti-virus program.	2.K.01c
		8.3.4	<u>Anti-Spam Software</u> Discuss the steps to help protect against Spam.	2.K.01c
		8.3.5	<u>Anti-Spyware Software</u> <u>Discuss Anti-spyware, and pop-up blocking software.</u>	2.K.01c
	8.4		<u>Using Firewalls</u>	
		8.4.1	<u>What is a Firewall?</u> Describe what a firewall is. Describe how a firewall works. Discuss the difference between Packet Filtering, Application Filtering, and Stateful Packet Inspection. Describe the difference between appliance-based, server-based, integrated, and personal firewalls.	2.K.01c 2.T.07
		8.4.2	<u>Using a Firewall</u> Discuss where and how to install a firewall(s) in a network. (1 firewall or 2) Discuss DMZs. Lab: 8.4.2.4: Configuring Access Policies and DMZ Settings	2.K.01c 2.T.07
		8.4.3	<u>Vulnerability Analysis</u> Describe what vulnerability testing is, and why it is used. Lab 8.4.3.2: Performing a Vulnerability Analysis.	2.K.01c
		8.4.4	<u>Best Practices</u>	
	8.5		<u>Module Summary</u>	
		8.5.1	<u>Module Summary</u>	
	8.6		<u>Module Quiz</u>	
		8.6.1	<u>Module Quiz</u>	
8.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 8 Exam	

<i>Module 9: Troubleshooting Your Network</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting Your Network</u>	
	9.1		<u>Troubleshooting Process</u>	
		9.1.1	<u>Troubleshooting</u> Define what troubleshooting is, and the steps and procedures that go along with it.	2.A.04.c 2.C.08c
		9.1.2	<u>Gathering Information</u> Information Checklists	2.A.01.c 2.C.08c
		9.1.3	<u>Approaches to Troubleshooting</u> Describe the different techniques that can be used to troubleshoot network problems. (Top-Down, Divide and Conquer, Bottom-Up, Substitution, and Trial and Error)	2.A.03.c 2.C.08c
	9.2		<u>Troubleshooting Issues</u>	
		9.2.1	<u>Detecting Physical Problems</u> Discuss the 5 senses used when troubleshooting. (Sight, Smell, Hearing, Touch, Common)	2.A.02.c 2.A.03.c 2.C.08c
		9.2.2	<u>Software Utilities for Troubleshooting Computers</u> Describe the 5 common software tools used to assist in network troubleshooting.	2.A.01.c 2.A.02.c 2.A.03.c 2.A.04.c 2.C.08c
		9.2.3	<u>Troubleshooting Using Ipconfig</u> Describe the different ways of using the ipconfig command. (/all, /release, /renew, /flushdns) Activity 9.2.3.2 Using the Ipconfig Command	2.A.01.c 2.A.02.c 2.A.03.c 2.A.04.c 2.C.08c
		9.2.4	<u>Troubleshooting Using Ping</u> Use the ping command to test connectivity. Activity 9.2.4.3: Using the Ping Command	2.A.01.c 2.A.02.c 2.A.03.c 2.C.08c 2.P.04
		9.2.5	<u>Troubleshooting Using Tracert</u> Describe what traceroute is and how to use it.	2.A.01.c 2.A.02.c 2.A.03.c 2.C.08c
		9.2.6	<u>Troubleshooting Using Netstat</u> Describe the purpose of netstat, and how it can be used to monitor open network connections on a PC.	2.A.01.c 2.A.02.c 2.A.03.c 2.C.08c

<i>Module 9: Troubleshooting Your Network</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting Your Network</u>	
	9.2		<u>Troubleshooting Issues</u>	
		9.2.7	<u>Troubleshooting Using Nslookup</u> Describe what nslookup is, and how it can help solve DNS issues.	2.A.01.c 2.A.02.c 2.A.03.c 2.C.08c
	9.3		<u>Common Issues</u>	
		9.3.1	<u>Connectivity Issues</u> Describe the different ways to use the ping command to help isolate network problems. (Ping loopback, self, neighbor, default gateway, outside host)	2.A.01c 2.A.02c 2.A.03c 2.C.08c 2.P.04
		9.3.2	<u>LED Indicators</u> Discuss how LED's on networking equipment can be used to help diagnose network problems.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.3	<u>Connectivity Problems</u> Discuss common physical connectivity issues for wired hosts. Lab 9.3.3.2: Troubleshooting Physical Connectivity.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.4	<u>Troubleshooting Radio Problems in a WLAN</u> Discuss common physical connectivity issues for wireless hosts.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.5	<u>Troubleshooting Association and Authentication Problems</u> Discuss common configuration issues that prevent wireless clients from accessing a WAP. Activity 9.3.5.2 Troubleshooting a Wireless Connection	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.6	<u>DHCP Issues</u> Using ipconfig to verify DHCP.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c

Module 9: Troubleshooting Your Network				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting Your Network</u>	
	9.3		<u>Common Issues</u>	
		9.3.7	<u>Troubleshooting the ISR to ISP Connection</u> Troubleshooting the WAN Link of a home based ISR.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
	9.4		<u>Troubleshooting and the Help Desk</u>	
		9.4.1	<u>Documentation</u> Discuss the importance of documentation while troubleshooting problems.	2.A.01c
		9.4.2	<u>Using Outside Sources for Help</u> Discuss sources to find additional help when needed.	6.A.07a 6.C.01a 6.c.02a
	9.4		<u>Troubleshooting and the Help Desk</u>	
		9.4.3	<u>Using the Helpdesk</u> Discuss the responsibilities of the helpdesk.	
	9.5		<u>Module Summary</u>	
		9.5.1	<u>Module Summary</u>	
	9.6		<u>Module Quiz</u>	
		9.6.1	<u>Module Quiz</u>	
9.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 9 Exam	

<i>Module 10: Course Summary</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
10.0			<u>Course Summary</u>	
	10.0		<u>Summary</u>	
		10.0.1	<u>Capstone Project</u>	2.L.01c 2.L.03c 2.L.05c 2.L.06c 2.L.07c 2.M.01c 2.M.02c
10.0			<u>Additional Assignments</u>	
			Course Practice Exam	
			Course Skills Based Assessment	
			Course Final Exam	

**CCNA Discovery 2 Curriculum
Working at a Small to Medium Business or ISP**

**Information Technology
ISS Networking
CIP Code: 110401**

Charles H. McCann Technical School
70 Hodges Cross Road
North Adams, MA.01247

Instructors:
Mr. Richard Bergendahl
Mr. Perry Burdick

CCNA Discovery 1 v4.0 Course Outline:
Networking For Home and Small Business.
ISS Networking CIP Code: 110401

Program Philosophy

The demand for information technology (IT) support in the global business world has exploded at an exponential rate. Students in the McCann Information Technology program will attain skills in networking, computer maintenance, web design, and computer programming to support this demand. While this program has been designed to meet the standards identified in the Massachusetts VTE Frameworks for Information Support Services and Networking, the main goals of this program are to provide local industry with skilled IT employees. Employability skills as identified by the 1992 SCANS report are fully implemented by the Skills USA Professional Development Program. Additionally, the students will be provided the opportunity to test for national certifications in computer maintenance technology and networking. In order to meet these goals, the program must incorporate additional competencies and expand upon the standards in the frameworks. The resulting graduate students will be valuable workplace assets with the ability to self-learn and solve real world problems.

Course Syllabus

Working at a Small-to-Medium Business or ISP v4.1

This course prepares students for jobs as network technicians and helps them develop additional skills required for computer technicians and help desk technicians. It provides a basic overview of routing and remote access, addressing, and security. It also familiarizes students with servers that provide e-mail services, Web space, and authenticated access. Students learn about the soft skills required for help desk and customer service positions, and the final chapter helps them prepare for the CCENT certification exam. Network monitoring and basic troubleshooting skills are taught in context.

Prerequisites: Networking for Home and Small Businesses ***

The IT Department currently utilizes the Moodle Open Source Course Management System to deliver content to the students. Students are enrolled into the Moodle system where they have access to the required curriculum and assignments needed to complete the Cisco Discovery Modules and Courses.

After the completion of each module, students are required to test their knowledge using an on-line assessment located on the Cisco Networking Academy website.

***The above information was provided by Cisco, from the CCNA Discovery Scope and Sequence Document.

CCNA Discovery 2 v4.1 Course Outline:
Working at a Small-to-Medium Business or ISP

<u>Module 1: The Internet and Its Uses</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
1.0			<u>The Internet and Its Uses</u>	
	1.1		<u>What is the Internet?</u>	
		1.1.1	<u>The Internet and Standards</u> Discuss what the Internet is, and how it came about, and how it is used today. Discuss why standards are so important to the function of the Internet.	2.B.01c 6.K.01c
		1.1.2	<u>ISP and ISP Services</u> Discuss what an ISP is, and what services they can provide to their customers. (Equipment co-location, web hosting, VoIP, etc.)	2.B.01c 2.B.03c 2.B.04c
	1.2		<u>ISPs</u>	
		1.2.1	<u>Delivering Internet Services to End Users</u> Differentiate between the different ways that users can connect their home or businesses to an ISP. (Dial-up, DSL, Cable, Satellite, Leased Lines, and Metro Ethernet) Discuss Bandwidth and how it is measured. Discuss POPs and authentication for such.	2.B.15
		1.2.2	<u>Internet Hierarchy</u> Discuss the Internet Backbone and how ISP are connected to them through IXPs. Discuss the 3 different tiers of ISPs	2.B.01c 6.K.01c
		1.2.3	<u>Using Tools to Map the Internet</u> Use ping and Traceroute to construct a network map between two different locations Lab: 1.2.3.3: Mapping ISP Connectivity Using Traceroute. Activity 1.2.3.4: Interpreting Ping and Traceroute Output.	2.H.15 2.P.04 2.Q.16 2.Q.19

<i>Module 1: The Internet and Its Uses</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
1.0			<u>The Internet and Its Uses</u>	
	1.3		<u>ISP Connectivity</u>	
		1.3.1	<u>ISP Requirements</u> Discuss the physical needs of an ISP to provide services to its customers. Discuss expected services required from an ISP to stay viable. (ex, Reliability, Scalability) Activity: 1.3.1.3: Identifying Equipment to Meet Customer Requirements. * Note: This Activity should be saved until Module 3.3.4	2.B.02c
		1.3.2	<u>Roles and Responsibilities within an ISP</u> Discuss the many teams assembled by ISP for working with clients.	2.B.02c
	1.4		<u>Module Summary</u>	
		1.4.1	<u>Summary</u>	
	1.5		<u>Module Quiz</u>	
		1.5.1	<u>Module Quiz</u>	
1.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 1 Exam	

<i>Module 2: Help Desk</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
2.0			<u>Help Desk</u>	
	2.1		<u>Help Desk Technicians</u>	
		2.1.1	<u>ISP Help Desk Organization</u> Describe the 3 layers of support provided by the helpdesk.	2.N.02 2.N.03
		2.1.2	<u>Roles of ISP Technicians</u> Describe the responsibilities for each of the Layer 1, Layer 2, and Layer 3 Support Helpdesk Technicians. Discuss Service Level agreements.	2.N.01 2.N.02 2.N.03
		2.1.3	<u>Interacting With Customers</u> Describe the proper ways of handling customer support. Discuss incident management procedures. Customer Service Checklists Business Impressions created through customer service. Activity: Controlling the Call Activity: Customer Support (Helpdesk Support Role-playing Activity)	2.N.01 2.N.02 2.N.03 2.N.05 2.N.06 2.N.07 2.N.08
	2.2		<u>OSI Model</u>	
		2.2.1	<u>Using the OSI Model</u> OSI Model Review from Discovery 1 OSI Upper layers and Lower Layers	2.B.07c
		2.2.2	<u>OSI Model Protocols and Technologies</u> More In-depth discussion about the OSI Layers and what they do. Identify which OSI layer a protocol or technology works with.	2.B.07c 2.C.19
		2.2.3	<u>Troubleshooting the OSI Model</u> Review from Discovery 1 Troubleshooting Techniques. Identify common networking problems that occur at different layers of the OSI Model.	2.B.07c 2.C.19 2.A.02c 2.A.03c
	2.3		<u>ISP Troubleshooting</u>	
		2.3.1	<u>Help Desk Troubleshooting Scenarios</u> Discuss common ISP call center problems. (E-mail Configuration, Host Configuration, Connectivity Issues) Discuss DHCP problems, Local Link Addressing, and ARP requests. Discuss DNS Issues. Activity 2.3.1.4: Troubleshooting and Resolving Network Issues	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.P.01 2.P.02 2.P.04

<u>Module 2: Help Desk</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
2.0			<u>Help Desk</u>	
	2.3		<u>ISP Troubleshooting</u>	
		2.3.2	<u>Creating and Using Help Desk Records</u> Discuss the information that should be documented during a service call by the helpdesk, and what info should be collected and passed on to upper level techs.	2.M.02c
		2.3.3	<u>Customer Site Procedures</u> Discuss the proper things that a technician should do if having to be dispatched to a customer's site. (Upon arrival, during the visit, and before departing) Review Basic safety procedures from OSHA on the use of Ladders, High or Dangerous Locations, Working with Electrical Equipment, Working in Awkward and Tight Spaces, Proper Lifting and Working with Heavy Equipment Procedures.	1.B.03a 1.B.05a 1.B.08a 1.C.04a
	2.4		<u>Module Summary</u>	
		2.4.1	<u>Module Summary</u>	
	2.5		<u>Module Quiz</u>	
		2.5.1	<u>Module Quiz</u>	
2.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 2 Exam	

<i>Module 3: Planning a Network Upgrade</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<i><u>Planning a Network Upgrade</u></i>	
	3.1		<i><u>Documenting the Existing Network</u></i>	
		3.1.1	<u>Site Survey</u> Describe what a site survey is, and what information should be collected during a site survey.	2.B.02c 2.B.06c
		3.1.2	<u>Physical and Logical Topologies</u> Review Physical and Logical Topologies maps from Discovery 1. Describe the different types of physical and logical topologies used in networking. (Bus, Star, Mesh)	2.B.02c 2.B.03c 2.B.06c 2.B.10c
		3.1.3	<u>Network Requirements Documentation</u> Discuss the importance of network inventory sheets. Activity 3.1.3.2: Creating Network Diagrams	2.M.02c
	3.2		<i><u>Planning</u></i>	
		3.2.1	<u>Network Upgrade Planning Phases</u> Discuss the 5 stages of network design. Requirement Gathering Selection and Design Implementation Operation Review and Evaluation	2.B.02c 2.B.06c 2.O.06 2.O.07 2.O.08 2.O.10
		3.2.2	<u>Physical Environment</u> Describe the purpose of MDFs and IDFs, and equipment security.	2.B.02c 2.O.06 2.O.07 2.O.10
		3.2.3	<u>Cabling Considerations</u> Discuss both old and new types of media used in networks. Discuss when cabling should be replaced, and in which environments different types of media should be used in. Review Straight-thru, crossover, and serial cabling uses.	2.B.02c 2.C.02c 2.C.14 2.O.06 2.O.07 2.T.03
		3.2.4	<u>Structured Cabling</u> Discuss structured cabling techniques. Supplement with Structured Cabling PDF. Discuss Network Documentation (ex. Cutsheets) Lab 3.2.4.2: Evaluating a Cabling Upgrade Plan	2.B.02c 2.O.10 2.T.03

<u>Module 3: Connecting to the Network</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
3.0			<u>Connecting to the Network</u>	
	3.3		<u>Purchasing and Maintaining Equipment</u>	
		3.3.1	<u>Purchasing Equipment</u> Discuss the difference between Managed and In-house support. Discuss the factors that help determine which choice works best for the customer. (Considerations, Costs, Control, Reliability, End user Experience)	2.B.02c
		3.3.2	<u>Selecting Network Devices</u> Recommend equipment to meet needs.	2.B.02c 2.B.14
		3.3.3	<u>Selecting LAN Devices</u> Use information collected on speed, expandability, manageability, and cost to recommend appropriate networking equipment. Activity 3.3.3.4: Exploring Different LAN Switch Options	2.B.02c 2.B.14
		3.3.4	<u>Selecting Internetworking Devices</u> Select the appropriate router for a network based upon connectivity, features, and cost. Activity 3.3.4.3 Exploring Internetworking Devices Activity 1.3.1.3 Identifying Equipment to Meet Customer Requirements	2.B.02c 2.B.14
		3.3.5	<u>Network Equipment Upgrades</u> Discuss low-end to high-end equipment	2.B.02c 2.B.14
		3.3.6	<u>Design Considerations</u> Discuss the importance of identifying and creating failure domains, fault tolerance plans, and an IP addressing scheme for your networks.	2.B.02c 2.B.14 2.O.05
	3.7		<u>Module Summary</u>	
		3.7.1	<u>Module Summary</u>	
	3.8		<u>Module Quiz</u>	
		3.8.1	<u>Module Quiz</u>	
3.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 3 Exam	
			Instructor Project: Design a LAN.	

<i>Module 4: Planning the Address Structure</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
4.0			<u>Planning the Address Structure</u>	
	4.1		<u>IP Addressing in the LAN</u>	
		4.1.1	<u>Review of IP Addresses</u> Review from Discovery 1 Chapter 5	2.B.02C 2.P.03
		4.1.2	<u>Subnetting a Network</u> Describe what subnetting is, and why it is used.	2.B.02C 2.P.03
		4.1.3	<u>Custom Subnet Masks</u> Demonstrate how to subnet IPv4 classful networks. Activity 4.1.3.5: Implementing an IP Addressing Scheme Activity: IP Addressing Workbook	2.B.02C 2.P.03
		4.1.4	<u>VLSM and CIDR</u> Demonstrate to subnet IPv4 classless networks using VLSM and CIDR. Activity: VLSM Workbook Activity: Subnet Instructor created networks using VLSM and CIDR.	2.B.02C 2.P.03
		4.1.5	<u>Communicating Between Subnets</u> Describe how a subnet is a unique network. Demonstrate that a router must be used to communicate between subnets. Activity 4.1.5.2: Communicating between Subnets Lab 4.1.5.3: Subnetting a Network	2.B.02C 2.P.03 2.R.09
	4.2		<u>NAT and PAT</u>	
		4.2.1	<u>Basic Network Address Translation</u> Review of NAT from Discovery 1 Describe the advantages and Disadvantages of Nat	2.B.02c 2.C.23 2.P.03
		4.2.2	<u>IP NAT Terms</u> Describe how different computers see computers that use NAT from both within and outside the LAN.	2.B.02c 2.P.03
		4.2.3	<u>Static and Dynamic NAT</u> Describe the difference between using static and dynamic NAT on a network. Activity: 4.2.3.3: Examining NAT	2.B.02c 2.P.03
		4.2.4	<u>Port-based Network Address Translation</u> Describe what PAT is and how it differs from NAT Lab: 4.2.4.3: Determining PAT Translations	2.B.02c 2.P.03

<i>Module 4: Planning the Address Structure</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
4.0			<u>Planning the Address Structure</u>	
	4.2		<u>NAT and PAT</u>	
		4.2.5	<u>IP NAT Issues</u> Discuss the limitations of IPv4 and how NAT, subnetting, and private IP addressing provided a temporary solution. Discuss IPv6 (ex. Improvements over IPv4, structure)	2.B.02c 2.P.03
	4.3		<u>Module Summary</u>	
		4.3.1	<u>Module Summary</u>	
	4.4		<u>Module Quiz</u>	
		4.4.1	<u>Module Quiz</u>	
4.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 4 Exam	
			Instructor Project: Design a network using VLSM as an IP Addressing Scheme	

<i>Module 5: Configuring Network Devices</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.1		<u>Initial ISR Router Configuration</u>	
		5.1.1	<p><u>ISR</u> Discuss what an ISR is. Identify the different IOS images available for the Cisco line of ISR, and describe their features.</p>	2.B.02c 2.R.09
		5.1.2	<p><u>Physical Setup of the ISR</u> Demonstrate the procedures needed to take a Cisco Router from box and prep it for operation.</p>	2.C.13 2.R.08 2.R.10 2.R.12
		5.1.3	<p><u>Bootup Process</u> Discuss the stages that a Cisco Router goes through to become operational when power is applied. Discuss the difference between Startup and Running Configuration files. Discuss the purpose of the Show Version command on a Cisco Router, and discuss the configuration register settings. Discuss the Boot-system commands, and file locations on a Cisco Router Lab 5.1.3.5: Powering Up an Integrated Services Router.</p>	2.B.02c
		5.1.4	<p><u>Cisco IOS Programs</u> Describe the difference between In-band and Out-of-Band Management. Discuss using the Cisco CLI and GUI to program a Router. Discuss the Advantages and disadvantages of each.</p>	2.B.02c 2.R.10 2.R.11
	5.2		<u>Using Cisco SDM Express and SDM</u>	
		5.2.1	<p><u>Cisco SDM Express</u> Discuss the Cisco recommended Best Practices for installing a new network device. Discuss the configuration screen associated with SDM Express.</p>	2.B.02c 2.R.10 2.R.11

<u>Module 5: Configuring Network Devices</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.2		<u>Using Cisco SDM Express and SDM</u>	
		5.2.2	<u>SDM Express Configuration Options</u> Describe each configuration options on each screen of the SDM Express Configuration Wizard	2.B.02c 2.R.11
		5.2.3	<u>Configuring WAN Connections Using SDM Express</u> Demonstrate how to configure the WAN Connections using SDM. Discuss the different WAN encryption protocols. (HDLC, Frame Relay, PPP) Discuss the different IP Addressing option for the WAN Link. Lab 5.2.3.3: Configuring an ISR with SDM Express	2.B.02c 2.R.11
		5.2.4	<u>Configuring NAT Using Cisco SDM</u> Demonstrate how to configure NAT using the Cisco SDM. Lab 5.2.4.2: Configuring Dynamic NAT with SDM.	2.B.02c 2.R.11
	5.3		<u>Configuring a Router Using IOS CLI</u>	
		5.3.1	<u>Command Line Interface Modes</u> Describe and Demonstrate the different user modes utilized in Cisco networking equipment. (User-Exec, Priv-Exec, Global-Config, Global-Config Sub-Modes) Activity 5.3.1.2: E-Lab	2.B.02c 2.R.10 2.R.11
		5.3.2	<u>Using the Cisco IOS CLI</u> Demonstrate the Cisco IOS Help Command Demonstrate the CLI Error Indicators. Demonstrate the Cisco IOS History Commands Settings. Activity 5.3.2.5: Exploring the Cisco IOS CLI	2.B.02c 2.R.11

<i>Module 5: Configuring Network Devices</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.3		<u>Configuring a Router Using IOS CLI</u>	
		5.3.3	<u>Using Show Commands</u> Demonstrate the following Cisco IOS Show commands: Show running-config Show interfaces Show arp Show ip route Show protocols Show version Activity 5.3.3.2: E-Lab Activity 5.3.3.3: Using the Cisco IOS Show Commands	2.B.02c 2.R.11
		5.3.4	<u>Basic Configuration</u> Demonstrate the following Cisco IOS Basic Configuration Steps. Set the Hostname Apply and Encrypt Passwords Setup Login Banners Disable Sync Logging and IP Domain Lookup Configure the Console and VTY ports Activity 5.3.4.4: Performing an Initial Router Configuration	2.B.02c 2.K.02c 2.K.03c 2.R.11 2.T.01 2.T.05
		5.3.5	<u>Configuring an Interface</u> Configure LAN interfaces on a Cisco Router using the CLI. Configure WAN interfaces on a Cisco Router using the CLI. Discuss the purpose of CSU/DSUs, and DCE/DTEs. Activity 5.3.5.3: E-Lab Activity 5.3.5.4: Configuring Ethernet and Serial Interfaces Lab: 5.3.5.5: Configuring Basic Router Settings with the Cisco IOS CLI.	2.B.02c 2.R.11
		5.3.6	<u>Configuring a Default Route</u> Demonstrate and discuss what a default route is, and how to configure one on a Cisco Router. Activity 5.3.6.2: Configuring a Default Route	2.B.02c 2.R.11

<u>Module 5: Configuring Network Devices</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.3		<u>Configuring a Router Using IOS CLI</u>	
		5.3.7	<u>Configuring DHCP Services</u> Configure a Cisco Router to function as a DHCP Server using the Cisco CLI Activity 5.3.7.2: Configuring a Cisco Router as a DHCP Server Lab 5.3.7.3: Configuring DHCP with SDM and the Cisco IOS CLI	2.B.02c 2.R.11
		5.3.8	<u>Configuring Static NAT Using Cisco IOS CLI</u> Configure NAT on a Cisco Router Using the Cisco CLI. Verify the Operations of NAT on a Cisco Router using the Show Commands. Activity 5.3.8.3: Configuring Static NAT on a Cisco Router Lab 5.3.8.4: Configuring PAT with SDM and Static NAT using Cisco IOS Commands	2.B.02c 2.R.11
		5.3.9	<u>Backing Up a Cisco Router Configuration</u> Backup and restore a Cisco Router configuration file using TFTP. Backup and restore a Cisco Router configuration file using the text capture feature in HyperTerminal. Activity 5.3.9.3: Backing Up a Cisco Router Configuration to a TFTP Server Lab 5.3.9.4: Managing Router Configuration Files Using HyperTerminal Lab 5.3.9.5: Managing Router Configuration Files Using TFTP	2.B.02c 2.R.11 2.DD.01 2.DD.02 2.DD.03
	5.4		<u>Connecting the CPE to the ISP</u>	
		5.4.1	<u>Installing the CPE</u> Discuss the planning options and timelines of installing a new piece of equipment to a customer's network. Discuss Configuration Checklists, and other installation documentation used when installing CPE.	2.B.02c 2.L.05c 2.L.06c 2.L.07c 2.L.11c 2.L.17c
		5.4.2	<u>Customer Connections over a WAN</u> Describe the 3 different types of Serial WAN Connections available. (Point-to-Point, Circuit-Switched, Packet-Switched)	2.B.02c 2.B.09c

<u>Module 5: Configuring Network Devices</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.4		<u>Connecting the CPE to the ISP</u>	
		5.4.3	<u>Choosing a WAN Connection</u> Decide which WAN options are available and would work best for a particular customer. (Dial-up, DSL, Cable, Leased Lines, etc...) Lab 5.4.3.3: Planning a WAN Upgrade	2.B.02c 2.B.09c
		5.4.4	<u>Configuring WAN Connections</u> Configure a Serial Interface for WAN Communications. (CSU/DSU, HDLC / PPP / Frame Relay) Activity 5.4.4.2: Configuring a PPP Connection Between a Customer and an ISP	2.B.02c 2.B.09c 2.R.11
	5.5		<u>Initial Cisco 2960 Switch Configuration</u>	
		5.5.1	<u>Standalone Switches</u> Discuss the different Cisco Switch available. Discuss the port setting of Speed, Duplex, and Negotiation. Discuss Cisco IOS image options for Cisco Switches.	2.B.02c 2.R.09 2.R.11
		5.5.2	<u>Power Up the Cisco 2960 Switch</u> Demonstrate the procedures needed to take a Cisco 2960 Switch from box and prep it for operation. Lab 5.5.2.2: Powering Up a Switch	2.B.02c 2.R.10 2.R.11
		5.5.3	<u>Initial Switch Configuration</u> Discuss the different programs available to help configure a Cisco Switch. Demonstrate how to perform a Basic configuration of a Cisco 2960 / 2950 Switch. Configure VLAN 1 and the Default Gateway information on a Cisco switch to allow remote access. Activity 5.5.3.3: E-Lab Activity 5.5.4.4: Performing an Initial Switch Configuration.	2.B.02c 2.R.10 2.R.11

<u>Module 5: Configuring Network Devices</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
5.0			<u>Configuring Network Devices</u>	
	5.4		<u>Connecting the CPE to the ISP</u>	
		5.5.4	<u>Connecting the LAN Switch to the Router</u> Connect and Verifying proper operation of the connection between a switch and a router. Configure and Verify Port Security on a Cisco Switch. Activity 5.5.4.4: Connecting a Switch Lab 5.5.4.5: Configuring the Cisco 2960 Switch.	2.B.02c 2.R.10 2.R.11
		5.5.5.	<u>Cisco Discovery Protocol</u> Demonstrate and Discuss the Cisco Discovery Protocol. Configure and Verify CDP on a Cisco device. Activity 5.5.5.2: Using CDP as a Network Discovery Tool	2.B.02c 2.R.11
	5.6		<u>Module Summary</u>	
		5.6.1	<u>Module Summary</u>	
	5.7		<u>Module Quiz</u>	
		5.7.1	<u>Module Quiz</u>	
5.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 5 Exam	

<u>Module 6: Routing</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
6.0			<u>Routing</u>	
	6.1		<u>Enabling Routing Protocols</u>	
		6.1.1	<u>Client Server Relationship</u> Review the purpose of a router from Discovery 1. Discuss how a router uses a routing table to select a destination network. Describe the differences between direct connected routes, static route, dynamic routes, and default routes. Demonstrate how to configure a static route on a Cisco Router. Activity 6.1.1.5: Configuring Static and Default Routes	2.B.02c 2.B.14 2.R.10 2.R.11
		6.1.2	<u>Routing Protocols</u> Describe the difference between Routing Protocols (RIP, OSPF, etc) and Routed Protocols (IP) Describe what a routing protocol is. Describe the difference between a distance-vector and a link-state routing protocol. Lab 6.1.2.5: Creating a Network Diagram from Routing Tables.	2.B.02c 2.R.10 2.R.11
		6.1.3	<u>Common Interior Routing Protocols</u> Discuss the properties and features of RIP, EIGRP, and OSPF. Discuss the algorithms used in conjunction with Link-State Routing protocol such as OSPF.	2.B.02c 2.R.10
		6.1.4	<u>Routing Within an Organization</u> Describe Routing Metrics and Administrative Distances.	2.B.02c 2.R.10
		6.1.5	<u>Configuring and Verifying RIP</u> Configure RIP Versions 1 & 2 on a Cisco Router. Verify RIP is functioning correctly using the various show and debug commands. Activity 6.1.5.3: Configuring RIP Lab 6.1.5.4: Configuring and Verifying RIP	2.B.02c 2.R.10 2.Q.16
	6.2		<u>Exterior Routing Protocols</u>	
		6.2.1	<u>Autonomous Systems</u> Describe what an autonomous system is and its relationship to routing.	2.B.02c

<u>Module 6: Routing</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
6.0			<u>Routing</u>	
	6.2		<u>Exterior Routing Protocols</u>	
		6.2.2	<u>Routing Across the Internet</u> Discuss Internal, External, and Border Gateway Protocols	2.B.02c
		6.2.3	<u>Exterior Routing Protocols and the ISP</u> Discuss the difference between Local and Transit Traffic on a network.	2.B.02c
		6.2.4	<u>Configuring and Verifying BGP</u> Configure BGP on a Cisco Router Lab 6.2.4.2: Configuring BGP with Default Routing.	2.B.02c 2.R.10
	6.3		<u>Module Summary</u>	
		6.3.1	<u>Module Summary</u>	
	6.4		<u>Module Quiz</u>	
		6.4.1	<u>Module Quiz</u>	
6.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 6 Exam	

<u>Module 7: ISP Services</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
7.0			<u>ISP Services</u>	
	7.1		<u>Introducing ISP Services</u>	
		7.1.1	<u>Customer Requirements</u> Review from Discovery 1	
		7.1.2	<u>Reliability and Availability</u> Discuss the 5 9's and equipment reliability measures MTBF and MTTR.	2.B.02c
	7.2		<u>Protocols That Support ISP Services</u>	
		7.2.1	<u>Review of TCP / IP Protocols</u> Review the relationship between typical TCP / IP protocols and the associated layers they correspond with. Compare the OSI model to the TCP / IP Model.	2.B.02c 2.B.07c 2.C.05c 2.C.19 2.P.03
		7.2.2	<u>Transport Layer Protocols</u> Review from Discovery 1 TCP and UDP Protocols. Describe in more depth how the TCP protocol works, to include the 3-way handshake, SYN, and SYN-ACK.	2.B.02c 2.B.07c 2.C.05c
		7.2.3	<u>Difference Between TCP and UDP</u> Describe the difference between TCP and UDP.	2.B.02c 2.B.07c 2.C.05c
		7.2.4	<u>Supporting Multiple Services</u> Discuss how a computer keeps track of multiple data streams while multitasking. Discuss Sockets and Socket Pairs.	2.B.02c 2.B.07c 2.C.05c
	7.3		<u>Domain Name System</u>	
		7.3.1	<u>TCP / IP Host Name</u> Discuss the purpose of name to IP association. Discuss and edit the Windows Hosts File. Lab 7.3.1.3: Editing the Hosts File in Windows.	2.B.02c 2.P.01 2.P.02
		7.3.2	<u>DNS Hierarchy</u> Discuss the different components that make up an URL Address. Discuss FQDNs, country codes, and DNS records.	2.B.02c 2.P.01

<u>Module 7: ISP Services</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
7.0			<u>ISP Services</u>	
	7.3		<u>Domain Name System</u>	
		7.3.3	<u>DNS Name Resolution</u> Describe how DNS resolves URLs even if not on their own network. Describe Dynamic DNS. Discuss Forward and Reverse Lookup Zones Lab 7.3.3.2: Examining Cached DNS Information on a DNS Server Lab 7.3.3.5: Creating Primary and Secondary Forward Lookup Zones	2.B.02c 2.P.01 2.P.02
		7.3.4	<u>Implementing DNS Solutions</u> Discuss ISP DNS vs. Local DNS Discuss DNS Fault Tolerance	2.B.02c 2.P.01 2.P.02
	7.4		<u>Services and Protocols</u>	
		7.4.1	<u>Services</u> Review the different types of services that an ISP can provide to their customers	2.B.02c
		7.4.2	<u>HTTP and HTTPS</u> Discuss how HTTP and HTTPS works and the differences between them.	2.B.02c 2.C.05c
		7.4.3	<u>FTP</u> Discuss in more detail how FTP works. Discuss the difference between Active and Passive Data Connections	2.B.02c 2.C.05c
		7.4.4	<u>SMTP, POP3, IMAP4</u> Discuss how SMTP, POP3, and IMAP4 work in conjunction to provide e-mail service.	2.B.02c 2.C.05c
	7.5		<u>Module Summary</u>	
		7.5.1	<u>Module Summary</u>	
	7.6		<u>Module Quiz</u>	
		7.6.1	<u>Module Quiz</u>	
7.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 7 Exam	

<u>Module 8: ISP Responsibility</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
8.0			<u>ISP Responsibility</u>	
	8.1		<u>ISP Security Consideration</u>	
		8.1.1	<u>ISP Security Services</u> Discuss how ISP can help protect their customers from viruses, worms, Spyware, etc...	2.B.02c 2.K.01c
		8.1.2	<u>Security Practices</u> Configure Windows Folder Security. Discuss AAA	2.B.02c 2.K.01c
		8.1.3	<u>Data Encryption</u> Describe the difference between data that is sent in clear text and encrypted data. Describe which TCP / IP protocols are encrypted and which ones are not. Lab 8.1.3.3: Securing Local Data and Transmitted Data	2.B.02c 2.K.01c
	8.2		<u>Security Tools</u>	
		8.2.1	<u>Access Control Lists and Port Filtering</u> Review the different types of attacks that can occur to a network. (DoS, DDos, DrDos) Demonstrate Port Filtering and ACLs. Lab 8.2.1.3: Planning for Access Lists and Port Filters.	2.B.02c 2.K.01c 2.T.07
		8.2.2	<u>Firewalls</u> Review of Firewalls Activity 8.2.2.3: Planning Network-based Firewalls	2.B.02c 2.K.01c 2.T.07
		8.2.3	<u>IDS and IPS</u> Describe how Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS) protect a network, and describe what the difference is between the two.	2.B.02c 2.K.01c 2.T.07
		8.2.4	<u>Wireless Security</u> Review of Wireless Security from Discovery 1. Review includes: (SSID, Authentication, MAC Add Filtering, and Encryption)	2.B.02c 2.K.01c 2.T.07
		8.2.5	<u>Host Security</u> Review of Host Based Firewalls, and the threats they help protect against. Lab 8.2.5.4: Researching an Anti-X Software Product	2.B.02c 2.K.01c 2.T.07

<u>Module 8: ISP Responsibility</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
8.0			<u>ISP Responsibility</u>	
	8.3		<u>Monitoring and Managing the ISP</u>	
		8.3.1	<u>Service Levels Agreements</u> Describe what a Service Level Agreement is and what items it contains. Lab 8.3.1.2: Interpreting a Service Level Agreement	2.B.02c
		8.3.2	<u>Monitoring Network Link Performance</u> Discuss the tools used to monitor network performance. Lab 8.3.2.2 Conducting a Network Capture with Wireshark.	2.B.02c 2.Q.14
		8.3.3	<u>Device Management Using In-band Tools</u> Demonstrate how to remotely administer a router using Telnet and SSH. Lab 8.3.3.2: Managing Remote Network Devices with Telnet. Lab 8.3.3.4: Configuring a Remote Router Using SSH	2.B.02c 2.R.10
		8.3.4	<u>Using SNMP and Syslog</u> Discuss SNMP and Syslog	2.Q.05
	8.4		<u>Backup and Disaster Recovery</u>	
		8.4.1	<u>Backup Media</u> Discuss why backups are important. Discuss what factors can cause data loss. Discuss the different types of backup media that is available.	2.DD.01
		8.4.2	<u>Methods of File Backup</u> Discuss the backup methods of (Normal, Differential, and Incremental) Discuss Backup Maintenance Lab 8.4.2.3: Planning a Backup Solution	2.DD.01
		8.4.3	<u>Cisco IOS Software Backup and Recovery</u> Demonstrate Cisco IOS and Configuration backup using TFTP Demonstrate Cisco IOS Recovery in ROMMON mode using TFTP Lab 8.4.3.2: Managing Cisco IOS Images with TFTP Lab 8.4.3.4 Managing Cisco IOS Images with ROMMON and TFTP	2.DD.01 2.DD.02 2.DD.03

<u>Module 8: ISP Responsibility</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
8.0			<u>ISP Responsibility</u>	
	8.4		<u>Backup and Disaster Recovery</u>	
		8.4.4	<u>Disaster Recovery Plan</u> Describe what a Backup Recovery Plan is. Describe the 5 phases of creating and implementing a Backup Recovery Plan.	2.O.05
	8.5		<u>Module Summary</u>	
		8.5.1	<u>Module Summary</u>	
	8.6		<u>Module Quiz</u>	
		8.6.1	<u>Module Quiz</u>	
8.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 8 Exam	

<u>Module 9: Troubleshooting</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting</u>	
	9.1		<u>Troubleshooting Methodologies and Tools</u>	
		9.1.1	<u>The OSI Model and Troubleshooting</u> Review of OSI and TCP /IP Model by layer. Review Network Device Functionality by Layer Lab 9.1.1.4: Organizing CCENT Objectives by OSI Layer	2.B.02c 2.B.07c 2.C.15 2.C.16 2.C.19
		9.1.2	<u>Troubleshooting Methodologies</u> Review the 3 troubleshooting strategies from Discovery 1 (Top-Down, Divide-Conquer, Bottom-Up)	2.B.02c 2.EE.01
		9.1.3	<u>Troubleshooting Tools</u> Review Physical and Logical Topology Maps. Use Troubleshooting Tools such as Baseline tools, knowledge bases, protocol analyzers, and network management systems. Review the use of Multimeters, Cable Testers, and Network Analyzers. Lab 9.1.3.3: Using Wireshark to Observe the 3-Way Handshake.	2.B.02c 2.Q.05 2.Q.16 2.Q.18
		9.1.4	<u>Certification Study Guide</u> Lab 9.1.4.1: CCENT Study Guide	
	9.2		<u>Troubleshooting Layer 1 and Layer 2 Issues</u>	
		9.2.1	<u>Layer 1 and Layer 2 Problems</u> Discuss the common network problems that occur at Layer 1 and Layer 2	2.B.02c 2.C.19
		9.2.2	<u>Troubleshooting Device Hardware and Boot Errors</u> Review Hardware Boot Process from Discovery 1. Describe common Hardware issues and fixes.	

<u>Module 9: Troubleshooting</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting</u>	
	9.2		<u>Troubleshooting Layer 1 and Layer 2 Issues</u>	
		9.2.3	<u>Troubleshooting Cable and Device Port Errors</u> Describe symptoms of common cabling problems. Describe media error that can affect network performance. (Runts, Noise, Collisions, Late Collisions.) Lab 9.2.3.3: Identifying Cabling and Media Errors	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.2.4	<u>Troubleshooting LAN Connectivity Issues</u> Describe how to troubleshoot LAN connectivity problems on Cisco Switches Activity 9.2.4.3: Configuring and Troubleshooting a Switched Network Lab 9.2.4.4: Troubleshooting LAN Connectivity	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.2.5	<u>Troubleshooting WAN Connectivity Issues</u> Describe how to troubleshoot WAN connectivity problems on Cisco Routers Discuss the Status and Line Protocol messages on a Cisco Router Activity 9.2.5.3: WAN Encapsulation Mismatches Lab 9.2.5.4: Troubleshooting WAN Connectivity	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.2.6	<u>Certification Study Guide</u> Lab 9.2.6.1 CCENT Study Guide	

<i>Module 9: Troubleshooting Your Network</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting Your Network</u>	
	9.3		<u>Troubleshooting Layer 3 IP Addressing Issues</u>	
		9.3.1	<u>Review of Layer 3 Functionality and IP Addressing</u> Review IP Addressing schemes and subnetting. Activity 9.3.1.4: Troubleshooting a Small IP Network	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.2	<u>IP Design and Configuration Issues</u> Discuss how overlapping subnets can cause problems on a network.	2.B.02c 2.P.03
		9.3.3	<u>IP Addressing Planning and Allocation Issues</u> Describe how poor IP Planning can lead to growth problems later on. Lab 9.3.3.3: Designing an IP Subnetting Scheme for Growth.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.4	<u>DHCP and NAT Issues</u> Discuss how to check for DHCP and NAT issues using various Cisco Show commands. Discuss the Cisco IP helper-address command. Discuss repercussions of assigning the wrong interface direction to an ACL. Discuss how to troubleshoot NAT issues on a Cisco Router. Activity 9.3.4.5: Troubleshooting DHCP and NAT	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.3.5	<u>Certification Study Guide</u> Lab 9.3.5.1: CCENT Study Guide	
	9.4		<u>Troubleshooting Layer 3 Routing Issues</u>	
		9.4.1	<u>Layer 3 Routing Issues</u> Discuss Layer 3 Routing Issues and how to use the Routing Table to help troubleshoot. Activity 9.4.1.4: Applying Routing Table Principles	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.4.2	<u>Dynamic Routing Errors</u> Use Cisco Show and Debug commands to help troubleshoot dynamic routing issues. Activity 9.4.2.3: Configuring RIPv2 Lab 9.4.2.4: Correcting RIPv2 Routing Problems	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c

<i>Module 9: Troubleshooting Your Network</i>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
9.0			<u>Troubleshooting Your Network</u>	
	9.4		<u>Troubleshooting Layer 3 Routing Issues</u>	
		9.4.3	<u>Certification Study Guide</u> Lab 9.4.3.1 CCENT Study Guide	
	9.5		<u>Troubleshooting Layer 4 and Upper Layer Issues</u>	
		9.5.1	<u>Layer 4 Traffic Filtering Errors</u> Review Firewalls Review Well Known Ports	2.C.15 2.C.16 2.T.07
		9.5.2	<u>Troubleshooting Upper Layer Problems</u> Review TCP / IP Application Layer Protocols. (Telnet, HTTP, FTP, TFTP, SMTP, etc...) Review common upper layer issues.	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.5.3	<u>Using Telnet to Check Upper Layer Connectivity</u> Discuss how using Telnet and SSH can help troubleshoot network problems. Lab 9.5.3.2: Using Telnet and SSH to Access Network Devices	2.A.01c 2.A.02c 2.A.03c 2.A.04c 2.C.08c
		9.5.4	<u>Certification Study Guide</u> CCENT Study Guide	
	9.6		<u>Preparing for Cisco Certification</u>	
		9.6.1	<u>Knowledge, Skills, and Abilities</u>	2.B.02c
		9.6.2	<u>Networking Knowledge, Skills and Abilities</u>	
		9.6.3	Making the Commitment	
		9.6.4	Creating a Plan	
		9.6.5	Practicing Test Taking	
		9.6.6	Certification Study Guide	
	9.7		<u>Module Summary</u>	
		9.7.1	<u>Module Summary</u>	
	9.8		<u>Module Quiz</u>	
		9.8.1	<u>Module Quiz</u>	
9.0			<u>Additional Assignments</u>	
			Module Vocabulary and Worksheets	2.B.02c 3.A.12.c 6.A.05a
			Module 9 Exam	

<u>Module 10: Course Summary</u>				
<u>Module</u>	<u>Section</u>	<u>Sub-Section</u>	<u>Title / Topic:</u>	<u>Frameworks Referenced</u>
10.0			<u>Course Summary</u>	
	10.0		<u>Summary</u>	
		10.0.1	Activity 10.0.1.2: Putting It All Together Lab 10.0.1.3: Putting It All Together	
10.0			<u>Additional Assignments</u>	
			Course Practice Exam	
			Course Skills Based Assessment	
			Course Final Exam	

Additionally Referenced Frameworks throughout the course:

Strand 3:

3.A.01c	19.21	For informational/expository writing: Write reports based on research that includes quotations, footnotes or endnotes, and a bibliography.
3.A.02c	24.4	Apply steps for obtaining information from a variety of sources, organizing information, documenting sources, and presenting research in individual projects:
3.A.03c	2.4	Integrate relevant information gathered from group discussions and interviews for reports.
3.A.04c	13.19	Identify and use knowledge of common graphic features (charts, maps, diagrams).
3.A.09c	3.17	Deliver formal presentations for particular audiences using clear enunciation and appropriate organization, gestures, tone, and vocabulary.
3.A.10c	4.27	Use general dictionaries, specialized dictionaries, thesauruses, histories of language, books of quotations, and other related references as needed.
3.A.11c		Explain purpose and format of specific technical documents (logs, reports, training manuals).
3.A.12c		Read technical manuals, guides, resource books and technical literature to gain information and solve problems.
3.A.13c		Write and communicate using appropriate technical language and methods (logs, reports, etc).

3.B.02c	7.M.2	Given the formulas, convert from one system of measurement to another. Use technology as appropriate.
3.B.03c	8.M.2	Given the formulas, convert from one system of measurement to another. Use technology as appropriate.
3.B.16c	10.M.4	Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.
3.C.03c	1.3	Describe the characteristics of waves (wavelength, frequency, velocity, amplitude).
3.C.05c	1.2	Demonstrate knowledge of pictorial and multi-view drawings.
3.C.06c	1.5	Interpret plans, diagrams, and working drawings in the construction of a prototype.
3.C.13c	6.1	Identify and explain the applications of light in communications, e.g., reflection, refraction, additive, and subtractive color theory.
3.C.14c	6.2	Explain how information travels through different media, e.g., electrical wire, optical fiber, air, space.
3.C.15c	6.3	Compare the difference between digital and analog communication devices.
3.C.16c	6.4	Explain the components of a communication system, i.e., source, encoder, transmitter, receiver, decoder, storage, retrieval, and destination.
3.C.17c	6.5	Identify and explain the applications of laser and fiber optic technologies, e.g., telephone systems, cable television, medical technology, and photography.
3.C.27c	5.6	Describe the differences between Alternating Current (AC) and Direct Current (DC).
3.C.28c		Explain the differences between analog and digital information and the use of binary numbers in data storage.