Course Outline

Information and Communication Technologies **REVISED: August/2017**

Job Title:
Network Control Operator

Career Pathway:
Networking

Industry Sector:
Information and Communication Technologies

O*NET-SOC CODE:
15-1152.00

CBEDS Title:
Network Engineering

CBEDS No.:
4604

79-45-60

Network Control Operator

Credits: 20 **Hours:** 240

Course Description:
This competency-based course is designed to provide students with an introduction to network administration. It includes a review of the micro-computer, DOS, Windows, an understanding of the relationship of desktop hardware and software to the network, general networking concepts, and reinforcement of the relationship between desktop networking components. This course also includes instruction in employability skills. The competencies in this course are aligned with the California High School Academic Content Standards and the Career Technical Education Model Curriculum Standards.

Prerequisites:
Enrollment requires a 8.0 reading level as measured by the TABE D 9/10, math skills equivalent to Math 2 (53-03-76), and completion of Computer Operation/2: Applications (75-35-90) course.

NOTE: For Perkins purposes this course has been designated as a **concentrator/capstone** course.

This course cannot be repeated once a student receives a Certificate of Completion.

Los Angeles Unified School District
Division of Adult and Career Education
Instructional and Counseling Services Unit
Adult Curriculum Office
www.wearedace.org

COURSE OUTLINE COMPETENCY-BASED COMPONENTS

A course outline reflects the essential intent and content of the course described. Acceptable course outlines have six components. (Education Code Section 52506). Course outlines for all apportionment classes, including those in jails, state hospitals, and convalescent hospitals, contain the six required elements:

(EC 52504; 5CCR 10508 [b]; Adult Education Handbook for California [1977], Section 100)

COURSE OUTLINE COMPONENTS	**LOCATION**
GOALS AND PURPOSES	Cover

The educational goals or purposes of every course are clearly stated and the class periods are devoted to instruction. The course should be broad enough in scope and should have sufficient educational worth to justify the expenditure of public funds.

The goals and purpose of a course are stated in the COURSE DESCRIPTION. Course descriptions state the major emphasis and content of a course, and are written to be understandable by a prospective student.

PERFORMANCE OBJECTIVES OR COMPETENCIES	pp. 7-19

Objectives should be delineated and described in terms of measurable results for the student and include the possible ways in which the objectives contribute to the student's acquisition of skills and competencies.

Performance Objectives are sequentially listed in the COMPETENCY-BASED COMPONENTS section of the course outline. Competency Areas are units of instruction based on related competencies. Competency Statements are competency area goals that together define the framework and purpose of a course. Competencies fall on a continuum between goals and performance objectives and denote the outcome of instruction.

Competency-based instruction tells a student before instruction what skills or knowledge they will demonstrate after instruction. Competency-based education provides instruction which enables each student to attain individual goals as measured against pre-stated standards.

Competency-based instruction provides immediate and continual repetition and In competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies. Curriculum, instruction and assessment in competency-based education are: explicit, known, agreed upon, integrated, performance oriented, and adaptive.

COURSE OUTLINE COMPETENCY-BASED COMPONENTS (continued)

COURSE OUTLINE COMPONENTS	LOCATION
INSTRUCTIONAL STRATEGIES	p. 21
Instructional techniques or methods could include laboratory techniques, lecture method, small-group discussion, grouping plans, and other strategies used in the classroom. Instructional strategies for this course are listed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructional strategies and activities for a course should be selected so that the overall teaching approach takes into account the instructional standards of a particular program, i.e., English as a Second Language, Programs for Adults with Disabilities.	
UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT	Cover
The approximate time devoted to each instructional unit within the course, as well as the total hours for the course, is indicated. The time in class is consistent with the needs of the student, and the length of the class should be that it ensures the student will learn at an optimum level. Units of study, with approximate hours allotted for each unit are listed in the COMPETENCY AREA STATEMENT(S) of the course outline. The total hours of the course, including work-based learning hours (community classroom and cooperative vocational education) is listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.	pp. 7-19
EVALUATION PROCEDURES	pp. 21-22
The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performances as well as anticipated skills and competencies to be achieved. Evaluation procedures are detailed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructors monitor students' progress on a continuing basis, assessing students on attainment of objectives identified in the course outline through a variety of formal and informal tests (applied performance procedures, observations, and simulations), paper and pencil exams, and standardized tests.	
REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT	Cover
After a student has completed all the objectives of the course, he or she should not be allowed to reenroll in the course. There is, therefore, a need for a statement about the conditions for possible repetition of a course to prevent perpetuation of students in a particular program for an indefinite period of time.	

ACKNOWLEDGMENTS

Thanks to GONZALO PEREZ and BRENDA VELA for developing and editing this course outline. Acknowledgment is also given to ERICA ROSARIO for designing the original artwork for the course covers.

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CALIFORNIA CAREER TECHNICAL EDUCATION MODEL CURRICULUM STANDARDS
Information and Communication Technologies Industry Sector
Knowledge and Performance Anchor Standards

1.0 Academics
Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Information and Communication Technologies academic alignment matrix for identification of standards.

2.0 Communications
Acquire and accurately use Information and Communication Technologies sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management
Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology
Use existing and emerging technology, to investigate, research, and produce products and services, including new information, as required in the Information and Communication Technologies sector workplace environment.

5.0 Problem Solving and Critical Thinking
Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Information and Communication Technologies sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety
Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Information and Communication Technologies sector workplace environment.

7.0 Responsibility and Flexibility
Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Information and Communication Technologies sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities
Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork
Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution such as those practiced in the Future Business Leaders of America and SkillsUSA career technical student organization.

10.0 Technical Knowledge and Skills
Apply essential technical knowledge and skills common to all pathways in the Information and Communication Technologies sector, following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application
Demonstrate and apply the knowledge and skills contained in the Information and Communication Technologies anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through career technical student organizations such as Future Business Leaders of America and SkillsUSA.

B. Networking Pathway

Students in the Networking pathway prepare for careers that involve network analysis, planning, and implementation, including the design, installation, maintenance, and management of network systems. The successful establishment, maintenance, and securing of information and communication technologies infrastructure is critical to the success of every twenty-first century organization. Employment continues to grow for persons with expertise in networking.

Sample occupations associated with this pathway:

- Computer Security Specialist
- Network Technician
- Network Engineer
- Network Administrator
- Telecommunication Specialist

B1.0 Identify and describe the principles of networking and the technologies, models, and protocols used in a network.

B2.0 Identify, describe, and implement network media and physical topologies.

B3.0 Install, configure, and differentiate between common network devices.

B4.0 Demonstrate proper network administration and management skills.

B5.0 Demonstrate how to communicate and interpret information clearly in industry-standard visual and written formats.

B6.0 Use and assess network communication applications and infrastructure.

B7.0 Analyze a customer's organizational needs and requirements to identify networking needs.

B8.0 Identify security threats to a network and describe general methods to mitigate those threats.

CBE
Competency-Based Education

COMPETENCY-BASED COMPONENTS
for the Network Control Operator Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. ORIENTATION AND SAFETY Recognize skills and safety regulations required for employment in the network control operators/network service and support technician field. (3 hours)	1. Describe qualifications and prerequisites for this trade. 2. Describe working conditions and employee responsibilities. 3. Prepare a list of prospective employers and their addresses from the internet. 4. Know emergency procedures. 5. Describe causes of and preventative measures for short circuits. 6. Describe causes of and preventative measures for static electricity. 7. Pass a safety examination with 100% accuracy.	**Career Ready Practice:** 1, 2, 4, 7, 9, 12 **CTE Anchor:** Communications: 2.4 Career Planning and Management: 3.1, 3.2, 3.4, 3.9 Technology: 4.1, 4.3, 4.5, 4.6 Responsibility and Flexibility: 7.3, 7.7 Ethics and Legal Responsibilities: 8.1 Leadership and Teamwork: 9.2, 9.6 Technical Knowledge and Skills: 10.1, 10.4, 10.13, 10.14 Demonstration and Application: 11.2 **CTE Pathway:** B1.2, B2.2
B. INTRODUCTION TO MICROCOMPUTERS Understand microcomputers and microprocessors.	1. Describe the components of the basic computer architectural model. 2. List and describe six major hardware components of a microcomputer.	**Career Ready Practice:** 1, 2, 4, 11

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hours)	3. Explain how microcomputers use binary and hexadecimal numbering systems. 4. Identify units of measurement for computer data and match the correct value and abbreviation. 5. Explain how ASCII code is used. 6. List several types of microcomputer hardware currently available. 7. Pass an examination identifying microcomputer components and code.	**CTE Anchor:** Communications: 2.4 Technology: 4.3, 4.5, 4.6 Problem Solving and Critical Thinking: 5.1, 5.6 Technical Knowledge and Skills: 10.1, 10.13 **CTE Pathway:** B1.1, B1.3, B2.1, B5.1
C. REVIEW OF MICROPROCESSORS Recognize microprocessors used in various types of computers. (2 hours)	1. Describe the function of the microprocessor (CPU). 2. List four popular microprocessors and their manufacturers. 3. Describe the two main processor's architecture. 4. Describe the operation of microprocessors. 5. List five main factors that affect a microprocessor's performance. 6. Describe memory limitations of various CPUs. 7. Describe how various CPUs access memory. 8. Describe how clock speed, data path, floating point unit (FPU), and cache affect a processors performance. 9. Describe various microprocessors used in Macintosh systems. 10. Differentiate between Macintosh and IBM microprocessors. 11. List outstanding features of Macintosh and IBM microprocessors. 12. Compare performance factors for two processors, and determine which processor performs faster. 13. Pass an examination describing the various types of microprocessors.	**Career Ready Practice:** 1, 2, 4, 11 **CTE Anchor:** Communications: 2.4 Technology: 4.3, 4.6 Problem Solving and Critical Thinking: 5.1, 5.6 Technical Knowledge and Skills: 10.1, 10.13 **CTE Pathway:** B1.1, B2.1, B5.1
D. DATA BUS Recognize the use of various types of data buses.	1. Describe the function of a data bus. 2. Explain the architecture of a data bus. 3. List current bus standards. 4. Describe characteristics of the ISA bus, the MCA bus, and the EISA bus. 5. Describe characteristics of the NuBus bus and the Macintosh PDS. 6. Describe characteristics of the VL-Bus and the PCI bus. 7. Compare different bus characteristics to determine which are better performers.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11 **CTE Anchor:** Communications: 2.4, 2.7 Technology: 4.1, 4.2, 4.6

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(2 hours)	8. Describe limitations and incompatibilities of interface cards connected to various buses. 9. Pass an examination identifying the various types of data bus.	Problem Solving and Critical Thinking: 5.4, 5.10 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B5.1
E. MEMORY Recognize various types of memory found in microcomputers. (5 hours)	1. Describe the basic functions of microcomputer memory. 2. Explain how microcomputer memory differs from microcomputer storage. 3. Explain how RAM differs from ROM and identify the various types of RAM and ROM. 4. Identify a memory SIMM and describe the qualities that differentiate SIMMs. 5. Describe the importance of having the appropriate amount and type of memory for various configurations and applications. 6. Differentiate between virtual memory and RAM memory. 7. Identify different memory modules, such as 30 pin, 72 pin. 8. Describe how expanded memory works. 9. Explain how expanded memory differs from extended memory. 10. Pass an examination describing the various types of memory found in computers.	**Career Ready Practice:** 1, 2, 4, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B5.1
F. NETWORK STORAGE DEVICES Understand the function of various types of disk and data drives.	1. Describe various types of disk and data drives currently available for microcomputers. 2. Describe various terms used with data drives. 3. Explain the purpose of disks. 4. Describe various types of disk storage methods. 5. Describe the use of floppy disks. 6. Identify a 3.5-inch and 5.25-inch floppy disks. 7. Describe write protection options and floppy disk compatibility with both drives. 8. Explain advantages of a hard disk over a floppy disk. 9. Differentiate between hard drive interfaces. 10. Describe how hard drive formatting works.	**Career Ready Practice:** 1, 2, 4, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(4 hours)	11. Describe how data is written to the hard drive. 12. Describe why a hard disk must be partitioned. 13. Explain how the SCSI interface is different from IDE. 14. Explain how a CD-ROM stores and retrieves data. 15. List six types or removable media. 16. Pass an examination describing the function of the disk and data drive.	Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.3, B1.5, B2.2, B6.3
G. COMMUNICATION PORTS Describe the communications ports on a microcomputer. (2 hours)	1. Describe how the parallel port transmits data. 2. Explain crosstalk and what can be done to avoid the problem. 3. Describe how the serial port transmits data. 4. Describe the bits in an asynchronous data frame. 5. Pass an examination identifying the communications ports on a microcomputer.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.3, B2.2, B3.1
H. INPUT AND OUTPUT DEVICES Describe the variety of devices used to input data and devices used for outputting data in a microcomputer system.	1. Identify three pointing devices and describe how they work. 2. Identify three of four data input devices and describe how they work. 3. List four output devices. 4. Differentiate among various types of printers. 5. Explain the purpose of a page description language. 6. Pass an examination identifying various input and output devices used on a microcomputer.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4, 5.10 Technical Knowledge and Skills: 10.1

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(2 hours)		**CTE Pathway:** B1.1, B1.3, B2.2, B3.1
I. COMMUNICATION WITH OTHER COMPUTERS Understand the concepts of communication between computers. (5 hours)	1. Describe how a modem is used to communicate. 2. Identify different standards and speeds of modems. 3. Explain what is meant by baud rate and how it differs from bits per second. 4. Describe and demonstrate how computers are attached to form a network. 5. Describe and demonstrate the characteristics of a peer-to-peer network. 6. Describe and demonstrate the characteristics of a client/server network. 7. Differentiate between a peer-to-peer network and a client/server network. 8. Pass an examination identifying the different ways computers communicate.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.5, B3.1, B3.2, B3.3, B4.9, B5.2
J. PORTABLE COMPUTERS Understand the different types of portable computer technologies. (2 hours)	1. Describe functions and expansion capabilities of notebook computers. 2. Describe functions and uses of palmtop computers. 3. Pass an examination describing the various types of portable computer technology.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B2.2, B3.1, B8.5

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
K. HARDWARE CONFIGURATION Understand how a computer system is configured. (4 hours)	1. Explain how to set a jumper of DIP switches on a hardware device. 2. Describe the configuration options commonly set on a microcomputer. 3. Explain how and why hardware devices are terminated and addressed. 4. Describe and demonstrate how to run the SETUP utility to configure a PC. 5. Explain the purpose of a software device driver. 6. Pass an examination by demonstrating how to configure hardware on a computer.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B2.2, B3.1, B8.5
L. OPERATING SYSTEMS Understand the role of operating systems. (5 hours)	1. Describe the role of an operating system. 2. Identify the basic functions common to all operating systems. 3. List popular desktop operating systems. 4. Define terms related to operating system. 5. Pass an examination describing the role of the operating system on a computer.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.2, B4.8, B6.3
M. MS WINDOWS OPERATING SYSTEM Understand the Windows operating system.	1. Identify and describe components of a typical MS Windows window. 2. Identify and describe files and utilities that make up MS Windows. 3. Differentiate between the two MS Windows operating modes, standard and 386 enhanced modes. 4. Identify and describe the functions of two of four MS Windows configuration files.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)	5. Identify the function of the File Manager, Control Panel and Print Manager. 6. Explain how to use the MS Windows File Manager for basic directory and file management. 7. Explain how to use the MS Windows Control Panel to customize the MS Windows environment. 8. Describe how memory is allocated using MS Windows. 9. Differentiate among Windows and DOS 6.22 commands. 10. Demonstrate the installation of Windows. 11. Describe the set up and configuration of Windows. 12. Describe the use of Hardware Wizard to install and configure new hardware. 13. Demonstrate the installation of software throughout the control panel. 14. Explain networking capabilities using Windows. 15. Set up and configure direct terminal connections. 16. Describe using the Windows system monitor to troubleshoot hardware and software problems. 17. Describe steps needed to optimize Windows. 18. Explain the use of utilities and diagnostics with Windows. 19. Explain the use of network software with Windows and its limitations. 20. Explain how to use Windows and later with Microsoft Network Technologies (NT). 21. Explain how to use Windows and later with various network operating systems. 22. Pass an examination describing the Windows environment and outlining installation procedures.	**CTE Anchor:** Communications: 2.4 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.4, 5.6 Technical Knowledge and Skills: 10.3 **CTE Pathway:** B1.1, B1.4, B1.6
N. INTRODUCTION TO COMPUTER NETWORKING Understand the fundamentals of computer networking.	1. Define a network. 2. Identify the purpose of a network. 3. Explain network components. 4. Describe the evolution of networks. 5. Compare centralized processing to distributed processing. 6. Compare mainframe computing to local area networks. 7. Compare client/server networks to peer-to-peer networks. 8. Explain basic components of data communications. 9. Describe the relationships among nodes on the networks. 10. Identify and compare classifications of networks. 11. Identify components of a network. 12. Differentiate between proprietary and nonproprietary networks. 13. Define various types of servers on the network. 14. Explain how internal server components contribute to processing efficiency. 15. Identify various types of servers. 16. Define concepts of interpretability. 17. Analyze the purpose of a network operating system. 18. Define network cabling segments and the term network backbone. 19. Compare types of network interconnecting devices.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.0, B1.1, B1.2, B1.5, B3.2, B4.9

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(40 hours)	20. Describe the purpose of a cable access scheme. 21. Compare the network operating system software to the network client software. 22. Define the components of data communications. 23. Describe the architecture of several types of networks. 24. Identify and explain network standards. 25. Compare cable access methods. 26. List types of topologies. 27. Describe the type of software used. 28. Differentiate between network and local operating system. 29. Pass an examination outlining the fundamentals of computer networking.	
O. OSI MODEL Understand the open systems interconnection (OSI) and how it affects a network. (20 hours)	1. Identify and explain the different layers of the OSI model and their relationship to networking hardware and software. 2. Identify and explain the Application Layer. 3. Identify and explain the Presentation Layer. 4. Identify and explain the Session Layer. 5. Identify and explain the Transport Layer. 6. Identify and explain the Network Layer. 7. Identify and explain the Data Link Layer. 8. Identify and explain the Physical Layer. 9. Pass a quiz covering the layers of the OSI model.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.5, B4.9, B6.1
P. IEEE NETWORKING SPECIFICATIONS Understand and explain the Institute of Electrical and Electronic Engineers (IEEE) 802 networking model and related standards.	1. Explain IEEE 802.2 for Logical Link Control. 2. Explain IEEE 802.3 for CSMA/CD (Ethernet). 3. Explain IEEE 802.4 for token bus. 4. Explain IEEE 802.5 for token ring. 5. Explain IEEE 802.6 for metropolitan area networks (MAN). 6. Explain IEEE 802.11 for Wireless Networks. 7. Pass an examination identifying various IEEE standards.	**Career Ready Practice:** 1, 2, 4, 10 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)		Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4
Q. NETWORKING ARCHITECTURE Describe the different types of Network Architecture. Explain how to decide the architecture that will best fit your network selection. (15 hours)	1. Identify an Ethernet network. 2. Identify a Token Ring network. 3. Identify an AppleTalk and ArCnet (Attached Resource Computer) network. 4. Identify a FDDI (Fiber Distributed Data Interface) network. 5. Identify a Broadband Technologies network. 6. Explain a Broadcast Technologies network structure. 7. Describe a Gigabit Technologies network. 8. Pass an examination of network architectures.	**Career Ready Practice:** 1, 2, 4, 10 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4
R. DESIGN A NETWORK LAYOUT Understand the design of several types of network architecture. (10 hours)	1. Explain the various networking topologies including bus, star, ring mesh, star-bus, star-ring, and how they will work in a network structure. 2. Identify a Local Area Network (LAN); develop a sample LAN. 3. Identify a Wide Area Network (WAN); develop a sample WAN. 4. Identify a Metropolitan Area Network (MAN); develop a sample MAN. 5. Describe a Peer-to-Peer network. 6. Describe a Server-Based network. 7. Describe a Hybrid network. 8. Identify and explain server hardware requirements. 9. Describe the different specialized servers available and how they are used in network. 10. Prepare various samples of a network topology for review.	**Career Ready Practice:** 1, 2, 4, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4, B2.1, B2.2

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
S. NETWORKING MEDIA Recognize various networking cables and connectors and how they should be used in a network. (8 hours)	1. Identify thin and thick coax, twister-pair, shielded twisted-pair, unshielded twisted-pair, and fiber optic cables. 2. Describe the advantage and disadvantages of the different cables. 3. Identify the various cable connectors. 4. Prepare different kinds of cables. 5. Test different kinds of cables using modern cable testing equipment. 6. Explain when to use a particular kind of cable. 7. Prepare various network cable samples for review.	**Career Ready Practice:** 1, 2, 4, 5, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4, B2.1, B2.2
T. NETWORKING INTERFACE CARDS Understand the different types of network cards used to make a network connection. (5 hours)	1. Identify and explain what a network interface card (NIC) is and how to install one into a computer. 2. Identify special purpose NICs. 3. How to choose the correct NIC for the type of network being setup. 4. Install software drivers for a NIC. 5. Pass an examination identifying the parts of network cards.	**Career Ready Practice:** 1, 2, 4, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4, B2.1, B2.2
U. NETWORK PROTOCOLS Identify the different communication options in a network structure.	1. Explain the various network communication protocols. 2. Analyze the function of packets in a network. 3. Explain how to implement and remove network protocols. 4. Explain the importance of choosing the correct protocols for a network.	**Career Ready Practice:** 1, 2, 4, 10, 11

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)	5. Explain the concept of IP default gateways. 6. Explain the difference between routable and non-routable protocols. 7. Explain TCP/IP (Transmission Control Protocol/Internet Protocol) addressing classes A, B, and C. 8. Identify the default subnet mask numbers. 9. Pass an examination of network protocols and their uses.	**CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4, B2.1, B2.2
V. NETWORK OPERATING SYSTEM Understand the different network operating systems (NOS). (25 hours)	1. Explain how network operating systems (NOS) work. 2. Understand the various networking software components. 3. Install a network operation system. 4. Define and implement network services. 5. Install and configure network applications. 6. Pass an examination utilizing the techniques used to install NOS.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11 **CTE Anchor:** Communications: 2.5, 2.7 Technology: 4.1, 4.2, 4.6 Problem Solving and Critical Thinking: 5.3, 5.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** B1.1, B1.2, B1.4, B2.1, B2.2
W. MULTI-VENDOR NETWORKS Understand the concepts of multi-vendor vs. single vendor operating systems.	1. Compare how to connect to a multi-vendor operating system vs. a single network with various operating systems. 2. Describe the differences between centralized and client/server computing. 3. Define the client/server networking environment. 4. Pass an examination identifying the various NOS available on the market and their advantages.	**Career Ready Practice:** 1, 2, 4, 12 **CTE Anchor:** Communications: 2.3, 2.5 Technology: 4.1, 4.3, 4.5

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(5 hours)		Technical Knowledge and Skills: 10.5 **CTE Pathway:** B1.1, B2.1, B2.2, B2.3, B3.1, B3.2, B3.7
X. NETWORK TRANSMISSION Understand the fundamentals of transmitting across networks. (6 hours)	1. Describe WAN transmission, connections, and components. 2. Describe the base concepts associated with WANs. 3. Understand the differences between analog, distal, and packet switching WAN technologies. 4. Identify the uses, benefits, and drawbacks of advanced WAN technologies. 5. Explain how Digital Data Services (DDS) work. 6. Identify T1, T2, and T3 lines available for network transmission. 7. Pass an examination identifying network transmission options.	**Career Ready Practice:** 1, 2, 4, 10, 12 **CTE Anchor:** Communications: 2.3, 2.5 Technology: 4.1, 4.3, 4.5 Technical Knowledge and Skills: 10.5 **CTE Pathway:** B1.1, B2.1, B2.2, B2.3, B3.1, B3.2, B3.7, B4.9, B5.2, B6.3
Y. NETWORK MANAGEMENT Demonstrate the ability to manage and troubleshoot a network.	1. Describe the benefits of network management and planning. 2. Understand the necessity for network standards, policies and procedures, and documentation. 3. Explain how to troubleshoot network problems using a structures approach. 4. Explain the importance of establishing upgrade guidelines. 5. Prepare a contact list, equipment list, network map, server configuration, network hardware configuration, and user administration. 6. Use a performance monitor. 7. Use a time-domain reflectormeter (TDR) to test for breaks in a cable. 8. Use a cable tester to test a cable for defects, monitor network collisions, and monitor network congestion. 9. Pass an examination identifying network management techniques.	**Career Ready Practice:** 1, 2, 4, 10, 12 **CTE Anchor:** Communications: 2.3, 2.5 Technology: 4.1, 4.3, 4.5 Technical Knowledge and Skills: 10.5

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(15 hours)		**CTE Pathway:** B1.1, B2.1, B2.2, B2.3, B3.1, B3.2, B3.7, B4.9, B5.2, B6.3
Z. NETWORK FAULT TOLERANCE Understand the various hard disk protection and recovery options in a network. (10 hours)	1. Describe the advantages and disadvantages of disk mirroring. 2. Explain disk duplexing. 3. Describe disk striping with and without parity. 4. Describe tape back up and disk volume set creation. 5. Pass an examination on the various hard disk protection options for a network server.	**Career Ready Practice:** 1, 2, 4, 10, 11, 12 **CTE Anchor:** Communications: 2.3, 2.5 Technology: 4.1, 4.2, 4.3, 4.5 Technical Knowledge and Skills: 10.5, 10.12, 10.13 **CTE Pathway:** B1.1, B1.2, B1.4, B1.6, B3.1, B3.7
AA. THE INTERNET Understand how to use the Internet for networking. (10 hours)	1. Describe the Internet and its resources available to a network administrator. 2. Explain how to access resources on the Internet. 3. Understand Internet addressing methods. 4. Make and use an Internet connection. 5. Explain a Uniform Resource Locator (URL). 6. Explain a Domain Name System (DNS). 7. Explain an Internet Service Provider (ISP). 8. Describe Hyper Text Markup Language (HTML). 9. Explain Hyper Text Transfer Protocol (HTTP). 10. Explain a search engine. 11. Explain a proxy server.	**Career Ready Practice:** 1, 2, 4, 10, 11, 12 **CTE Anchor:** Communications: 2.3, 2.5 Technology: 4.1, 4.2, 4.3, 4.5 Technical Knowledge and Skills: 10.5, 10.12, 10.13 **CTE Pathway:** B1.1, B1.2, B1.4, B1.6, B3.1, B3.7

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTBOOKS

Keitner, JoAnne. Networking Fundamentals: Study Guide (2nd ed.). Goodheart-Willcox Co., 2012.

Reid, Allan, and Jim Lorenz. Networking for Home and Small Businesses: CCNA Discovery Learning Guide. Cisco Press, 2008.

Reid, Allen, and Jim Lorenzo. Working at a Small to Medium Business or ISP CCNA Discovery Learning Guide. Cisco Press, 2008.

Roberts, Richard M. Networking Fundamentals . (2nd ed). Goodheart-Willcox Co., 2011.

Roberts, Richards. Laboratory Manual Networking Fundamentals (2nd ed). Goodheart-Willcox Company, 2011. Print.

RESOURCES

Employer Advisory Board members

CTE MODEL CURRICULUM STANDARDS
Fashion and Interior Design Industry Sector
http://www.cde.ca.gov/ci/ct/sf/documents/edchildfamily.pdf

CISCO Systems http://www.cisco.com/

CompTIA http://www.comptia.org/home.aspx

Institute of Electrical and Electronics Engineers (IEEE) http://www.ieee.org/index.html

IEEE Communications Society http://www.comsoc.org/

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

A. Lecture and discussion

B. Multimedia presentations

C. Visual aids

D. Projects

E. Individualized instruction

EVALUATION

SECTION A – Orientation and Safety – Pass the safety test with 100% accuracy.

SECTION B – Introduction to Microcomputers – Pass all assignments and exams on introduction to microcomputers with a minimum score of 80% or higher.

SECTION C – Review of Microprocessors – Pass all assignments and exams on review of microprocessors with a minimum score of 80% or higher.

SECTION D – Data Bus – Pass all assignments and exams on data bus with a minimum score of 80% or higher.

SECTION E – Memory – Pass all assignments and exams on memory with a minimum score of 80% or higher.

SECTION F – Network Storage Devices – Pass all assignments and exams on network storage devices with a minimum score of 80% or higher.

SECTION G – Communication Ports – Pass all assignments and exams on communication ports with a minimum score of 80% or higher.

SECTION H – Input and Output Devices – Pass all assignments and exams on input and output devices with a minimum score of 80% or higher.

SECTION I – Communication with Other Computers – Pass all assignments and exams on communication with other computers with a minimum score of 80% or higher.

SECTION J – Portable Computers – Pass all assignments and exams on portable computers with a minimum score of 80% or higher.

SECTION K – Hardware Configuration – Pass all assignments and exams on hardware configuration with a minimum score of 80% or higher.

SECTION L – Operating Systems – Pass all assignments and exams on operating systems with a minimum score of 80% or higher.

SECTION M – MS Windows Operating System – Pass all assignments and exams on MS Windows operating system with a minimum score of 80% or higher.

SECTION N – Introduction to Computer Networking – Pass all assignments and exams on introduction to computer networking with a minimum score of 80% or higher.

SECTION O – OSI Model – Pass all assignments and exams on OSI model with a minimum score of 80% or higher.

SECTION P – IEEE Networking Specifications – Pass all assignments and exams on IEEE networking specifications with a minimum score of 80% or higher.

SECTION Q – Networking Architecture – Pass all assignments and exams on networking architecture with a minimum score of 80% or higher.

SECTION R – Design a Network Layout – Pass all assignments and exams on design a network layout with a minimum score of 80% or higher.

SECTION S – Networking Media – Pass all assignments and exams on networking media with a minimum score of 80% or higher.

SECTION T – Networking Interface Cards – Pass all assignments and exams on networking interface cards with a minimum score of 80% or higher.

SECTION U – Network Protocols – Pass all assignments and exams on network protocols with a minimum score of 80% or higher.

SECTION V – Network Operating System– Pass all assignments and exams on network operating system with a minimum score of 80% or higher.

SECTION W – Multi-Vendor Networks – Pass all assignments and exams on multi-vendor networks with a minimum score of 80% or higher.

SECTION X – Network Transmission – Pass all assignments and exams on network transmission with a minimum score of 80% or higher.

SECTION Y – Network Management – Pass all assignments and exams on network management with a minimum score of 80% or higher.

SECTION Z – Network Fault Tolerance – Pass all assignments and exams on network fault tolerance with a minimum score of 80% or higher.

SECTION AA – The Internet – Pass all assignments and exams on the internet with a minimum score of 80% or higher.

Statement for Civil Rights

All educational and vocational opportunities are offered without regard to race, color, national origin, gender, or physical disability.