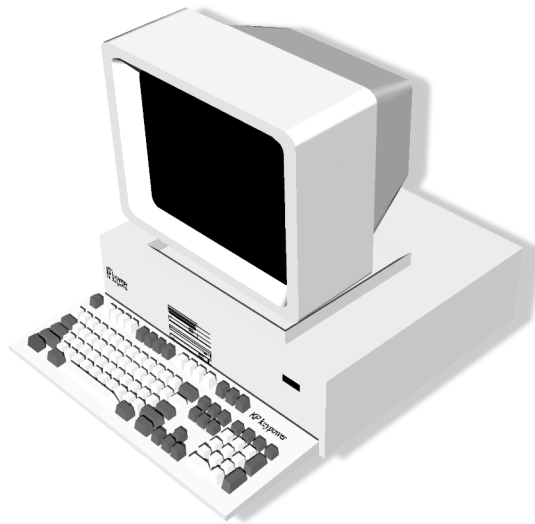


Tech Prep Information Technology Course of Study June, 1999



Prepared by:



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MIAMI VALLEY TECH PREP CONSORTIUM PHILOSOPHY AND GOALS

The Miami Valley Tech Prep consortium, a partnership among business, industry, labor, secondary and higher education, facilitates systemic educational change that prepares students for successful lives with technology-based careers, enabling industry to compete in a global economic community.

The goals of the Miami Valley Tech Prep Consortium are:

1. To provide early career exploration and a seamless educational path that includes occupational and applied academic instruction in secondary school through an associate degree program with expanded/enhanced competencies beyond current secondary school and associate degree programs.
2. To expand the enrollment of Tech Prep students to better serve Ohio's labor market needs.
3. To ensure that teaching and learning reflect the needs of all students.
4. To maximize the opportunities afforded by relevant initiatives, resources, and participating partners.

MIAMI VALLEY TECH PREP CONSORTIUM INFORMATION TECHNOLOGIES PROGRAM PHILOSOPHY AND GOALS

The Environmental Technologies Tech Prep program prepares young people for careers in a variety of occupations. Students learn the relationships among math, science, communications, and technology as a result of applied instruction. Experiential learning, a rigorous program of applied, college prep academics, and broad based preparation in environmental technologies combine to prepare students to succeed in college or entry level employment.

The goals of the program are to foster development of the following occupational, academic, and employability competencies through classroom and laboratory instruction and work-based experiences in order to prepare students to enter and advance in a changing global workplace.

Communications	Basic Economics
Science	General Administrative Functions
Mathematics	Management and Supervision
Computer Applications	Drinking Water/Wastewater Treatment
Technology	Customer Relations
Teamwork	Hardware
Employability Skills	Application Programming and Design
Professionalism	Networks
Professional and Ethical Standards	Operating Systems
Project Management	Problem Analysis
Statistical Analysis	Technical Documentation
Psychology of Stress	Environmental Science
Equipment & Maintenance Procedures	Environmental Laws and Regulations
Physics Concepts	Environmental Safety
Emergency Response	Soil Science
Sampling Methods	Bio-Chemical Technology
Environmental Assessments	Hydrogeology
Pollution Control	Hazardous Waste and Materials Management
Solid Waste Management	Self Contained Underwater Breathing (SCUBA)

Tech Prep Pupil Evaluation Policy

While there is no formal testing requirement for admission to the Tech Prep Information Technologies program, it is strongly recommended that only juniors who have passed all five parts of the Ohio Ninth Grade Proficiency Test be enrolled. The Information Technologies program offers challenging academics and little opportunity for remedial instruction.

Formative assessments reflect the philosophy of Tech Prep instruction; that is, hands on, applied assessments are preferred over traditional means of assessment. Students frequently demonstrate their learning. Paper and pencil tests are the exception, not the rule. After teachers judge student performance, they are able to more accurately adjust instruction to meet student's needs.

Summative assessments may be performance based or take the form of traditional assessment. For example, all juniors take the COMPASS (college placement test) in the fall of their junior year to establish an achievement benchmark. Students take the COMPASS again in the fall of their senior year and again in spring of their senior year (if necessary). The goal is that 80% of all students will pass the COMPASS and will require no remediation upon admission to college. When students are eligible for college credit for a high school class, they must take the college's written test for that class. Information Technologies Tech Prep students may receive up to 10 college credits upon successful completion of a final exam.

Students who successfully complete the high school portion of the program with a grade point average of 2.25 or higher are eligible for the Sinclair Tech Prep Scholarship. Currently, those students receive a \$1,000 scholarship for each year of their two0year Associates Degree program.

April, 1998

KEY

GRADE LEVEL

12 = by the end of grade 12

AD = by the end of the Associate Degree

DEPTH

I = Introduce (applies to at least 3 or 25% of the competency builders)

R = Reinforce or add depth (after introducing or proficiency)

P = Proficient (achievement of the competency **without** supervision)

*Items in 10 point-*italicized* text should be taught at Associate Degree level.

Unit 1: Information Technology Basics

Competency 1.1: Demonstrate basic knowledge of the history of information technology (ISS, NS, PSD, IM = P)

Competency Builders:

- 1.1.1 Demonstrate knowledge of significant advances in the development of computer hardware and software given reference materials with 100 % accuracy
- 1.1.2 Demonstrate knowledge of major milestones in the development of information technology given reference materials with 100 % accuracy
- 1.1.3 Demonstrate knowledge of major individuals and their contributions to the information technology field given reference materials with 100 % accuracy
- 1.1.4 Demonstrate knowledge of the speed with which computer technology has evolved (i.e., evolution time line) given reference materials with 100 % accuracy
- 1.1.5 Demonstrate knowledge of the role of data transmission in media, signaling techniques, transmission, and impairments given reference materials with 100 % accuracy

Competency 1.2: Demonstrate knowledge of the impact of information technology on society (ISS, PSD = I, NS = IR, IM = P)

Competency Builders:

- 1.2.1 Demonstrate knowledge of how both PCs and larger computer systems impact people and are used in business/industry/government and other institutions given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.2 Demonstrate knowledge of the impact of computers on career pathways in business/industry (e.g., how computers have eliminated and created jobs) given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.3 Demonstrate knowledge of the psychological and health risks associated with computers given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.4 Demonstrate knowledge of security risks and associated safeguards given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.5 Demonstrate knowledge of the possible effects of natural disasters on computers given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.6 Demonstrate knowledge of international telecommunications standards and trends given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.7 Demonstrate knowledge of the impact of computers on access to information and information exchange worldwide given reference materials with 100 % accuracy
(NS, PSD)

- 1.2.8 Identify issues and trends affecting computers and information privacy given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.9 Demonstrate knowledge of ethical issues that have surfaced in the information age given reference materials with 100 % accuracy
(NS, PSD)
- 1.2.10 Demonstrate knowledge of how information technology affects the natural environment (e.g., disposal of equipment, energy use, use of natural resources) given reference materials with 100 % accuracy
(NS, PSD)

Competency 1.3: Demonstrate knowledge of the hardware components associated with information systems (ISS, NS, PSD, IM = P)

Competency Builders:

- 1.3.1 Identify the three main classifications of computers (i.e., micro-, mid-range, and mainframes) given reference manuals with 100% accuracy
- 1.3.2 Identify the elements of the information processing cycle (i.e., input, process, output, and storage) given reference manuals with 100% accuracy
- 1.3.3 Identify major hardware components and their functions given reference manuals with 100% accuracy
- 1.3.4 Identify types of computer storage devices given reference manuals with 100% accuracy
- 1.3.5 Identify types of processing (e.g., batch, interactive, event-driven, object-oriented) given reference manuals with 100% accuracy
- 1.3.6 Identify major operating system fundamentals and components given reference manuals with 100% accuracy
- 1.3.7 Identify the role the binary system in information systems given reference manuals with 100% accuracy
- 1.3.8 Demonstrate knowledge of number systems and internal data representation given reference manuals with 100% accuracy
- 1.3.9 Identify the hardware associated with telecommunications functions given reference manuals with 100% accuracy
- 1.3.10 Access needed information using company and manufacturers' references (e.g., procedural manuals, documentation, standards, work flowcharts) given reference manuals with 100% accuracy

Competency 1.4: Demonstrate knowledge of the classes of software associated with information systems (ISS, NS, PSD = P)

Competency Builders:

- 1.4.1 Demonstrate knowledge of the key functions of systems software given reference materials with 100% accuracy
- 1.4.2 Demonstrate knowledge of widely used software applications (e.g., word processing, database management, spreadsheet development) given reference materials with 100% accuracy
- 1.4.3 Demonstrate knowledge of the range of languages used in software development given reference materials with 100% accuracy
- 1.4.4 Demonstrate knowledge of how data is organized in software development given reference materials with 100% accuracy
- 1.4.5 Identify new and emerging classes of software given reference materials with 100% accuracy

Competency 1.5: Identify career opportunities in information systems (ISS, NS, PSD, IM = P)

Competency Builders:

- 1.5.1 Identify entry-level positions given occupational material with 100% accuracy
- 1.5.2 Identify possible career pathways given occupational material with 100% accuracy
- 1.5.3 Identify types of programmer/analyst positions available and the nature of each given occupational material with 100% accuracy
- 1.5.4 Identify types of administration/management positions available and the nature of each given occupational material with 100% accuracy
- 1.5.5 Identify present and future employment opportunities (by geographic location) given occupational material with 100% accuracy
- 1.5.6 Research job opportunities given occupational material with 100% accuracy
- 1.5.7 Compare salary ranges and benefit packages given occupational material with 100% accuracy
- 1.5.8 Compile occupational profile given occupational material with 100% accuracy
- 1.5.9 Identify certification issues within a particular career path given occupational material with 100% accuracy
- 1.5.10 Identify education and training requirements for selected career pathway given occupational material with 100% accuracy
- 1.5.11 Design a career ladder for own career in information technology (i.e., personal goal-setting) given occupational material with 100% accuracy
- 1.5.12 Design a time line for own career advancement in the information technology field given occupational material with 100% accuracy
- 1.5.13 Identify professional organizations in the area of information technology given occupational material with 100% accuracy
- 1.5.14 Identify benefits derived from membership in specific professional organizations given occupational material with 100% accuracy

Competency 1.6: Explore the future of information technologies (ISS, NS, PSD, IM = P)

Competency Builders:

- 1.6.1 Identify new technologies relevant to information technology given occupational material with 100% accuracy
- 1.6.2 Measure increases in productivity realized by the implementation of information systems given occupational material with 100% accuracy
- 1.6.3 Assess the importance of new technologies to future developments and to the future knowledge worker productivity given occupational material with 100% accuracy
- 1.6.4 Identify new and emerging drivers and inhibitors of information technology change given occupational material with 100% accuracy

Unit 2: Computer Applications

Competency 2.1: Create documents using word processing software (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.1.1 Demonstrate proficiency in keyboarding skills according to standards set by instructor
- 2.1.2 Retrieve existing documents given disk with 100% accuracy
- 2.1.3 Create documents (e.g., letters, memos, reports) using existing forms and templates with 95% accuracy
- 2.1.4 Safeguard documents using name and save functions with 100% accuracy
- 2.1.5 Format text using basic formatting functions (e.g., page setup, tabs, bullets, page numbers, font enhancements, cut and paste) with 100% accuracy
- 2.1.6 Check documents using print preview functions with 100% accuracy
- 2.1.7 Locate/replace text using search and replace functions with 100% accuracy
- 2.1.8 Create new word processing forms, style sheets, and templates with 100% accuracy given template
- 2.1.9 Employ word processing utility tools (e.g., spell checker, grammar checker, thesaurus) given direction with 100% accuracy
- 2.1.10 Create tables using table functions (e.g., setup, formatting, editing) given instruction with 100% accuracy
- 2.1.11 Create columns using column functions (e.g., setup, formatting, editing) given instruction with 100% accuracy
- 2.1.12 Create outlines given document with 100% accuracy
- 2.1.13 Create footnotes and endnotes given document with 100% accuracy
- 2.1.14 Create macros given instruction with 100% accuracy
- 2.1.15 Run macros given document with 100% accuracy
- 2.1.16 Assemble documents using merge functions (e.g., merge address files with letters and envelopes) given instruction with 100% accuracy
- 2.1.17 Format text using advanced formatting features (e.g., headers/footers/dropped caps, indexing) given document with 100% accuracy
- 2.1.18 Print materials using print functions (e.g., number of copies, duplexing or one-sided, selected pages or whole document) given document with 100% accuracy
- 2.1.19 Verify accuracy of output given document with 100% accuracy
- 2.1.20 Edit documents given document with 100% accuracy
- 2.1.21 Access needed information using word processing help screens given instruction with 100% accuracy

Competency 2.2: Create relational databases (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.2.1 Design a simple database in accordance with written and/or oral specifications with 100% accuracy
- 2.2.2 Create a database table given information with 100% accuracy

For the following objectives, students are given appropriate hardware, software and user manuals, and should achieve a level of competence set by a classroom checklist.

- 2.2.3 Edit the design of a database table
- 2.2.4 Edit the content of a database table (e.g., add, delete, and modify records)
- 2.2.5 Search a table to locate records
- 2.2.6 Sort data in a single field
- 2.2.7 Enter data using a form
- 2.2.8 Create/modify a form
- 2.2.9 Perform single- and multiple-table queries (e.g., create, run, save)
- 2.2.10 Create calculated fields
- 2.2.11 Generate customized reports for database files
- 2.2.12 Process data using database functions (e.g., structure, format, attributes, relationships, and keys)
- 2.2.13 Locate/replace data using search and replace functions
- 2.2.14 Print forms, reports, and results of queries
- 2.2.15 Verify accuracy of output
- 2.2.16 Sort data using multiple-field sorts
- 2.2.17 Add/remove filters
- 2.2.18 Create multiple criteria expressions
- 2.2.19 Create adjoined files
- 2.2.20 Index files
- 2.2.21 Create subforms
- 2.2.22 Group data in reports
- 2.2.23 Create graphs
- 2.2.24 Alter the appearance of a form by adding objects or properties
- 2.2.25 Identify the relationship between database components
- 2.2.26 Design a database to meet the needs of an actual situation or business problem
- 2.2.27 Evaluate database design and functionality

Competency 2.3: Create spreadsheets (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.3.1 Design a spreadsheet in accordance with written and/or oral specifications with 100% accuracy
- 2.3.2 Create spreadsheets given data with 100% accuracy

For the following objectives, students are given appropriate hardware, software and user manuals, and should achieve a level of competence set by a classroom checklist.

- 2.3.3 Retrieve existing spreadsheets
- 2.3.4 Check spreadsheets using print preview functions
- 2.3.5 Format spreadsheets using basic formatting functions (e.g., page setup)
- 2.3.6 Perform calculations using simple formulas
- 2.3.7 Edit spreadsheets
- 2.3.8 Create charts and graphs from spreadsheets
- 2.3.9 Group worksheets
- 2.3.10 Delete within spreadsheets
- 2.3.11 Move/copy within spreadsheets

- 2.3.12 Input/process data using spreadsheet functions
- 2.3.13 Improve spreadsheet display using enhancement features
- 2.3.14 Protect data using spreadsheet protection features
- 2.3.15 Record macros
- 2.3.16 Run macros
- 2.3.17 Troubleshoot spreadsheet problems
- 2.3.18 Resolve function errors as needed
- 2.3.19 Apply advanced spreadsheet formulas
- 2.3.20 Create spreadsheet solutions to business problems
- 2.3.21 Make "*what if* " business decisions using spreadsheets as a tool
- 2.3.22 Save spreadsheets
- 2.3.23 Access needed information using online help features
- 2.3.24 Print spreadsheets

Competency 2.4: Perform desktop publishing functions (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.4.1 Prepare publications using desktop publishing software given application with 90% accuracy
- 2.4.2 Format new desktop publishing files given instruction with 90% accuracy

For the following objectives, students are given appropriate hardware, software and user manuals, and should achieve a level of competence set by a classroom checklist.

- 2.4.3 Enter information directly into document
- 2.4.4 Place preformatted text into document
- 2.4.5 Place graphics in document
- 2.4.6 Employ draw boxes
- 2.4.7 Create graphics files using clip art
- 2.4.8 Import scanned files
- 2.4.9 Enhance publications using different fonts, styles, attributes, justification, etc.
- 2.4.10 Enhance publications using paint/draw functions
- 2.4.11 Create two-sided documents
- 2.4.12 Perform editing functions
- 2.4.13 Set up master pages
- 2.4.14 Output desktop publishing files

Competency 2.5: Create presentations using presentation graphics software (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.5.1 Identify hardware items that support presentation software (e.g., scanners, digital cameras, printers, and projection systems) given information with 90% accuracy
- 2.5.2 Compare/contrast various presentation software packages given information with 90% accuracy
- 2.5.3 Create computer presentation and handouts in accordance with basic principles of graphics design and visual communication given information with 90% accuracy

For the following objectives, students are given appropriate hardware, software and user manuals, and should achieve a level of competence set by a classroom checklist.

- 2.5.4 Edit presentations
- 2.5.5 Copy from one presentation to another
- 2.5.6 Print a single slide, an entire presentation, an outline, and notes
- 2.5.7 Insert clip art in a slide
- 2.5.8 Create word art objects
- 2.5.9 Insert word art objects
- 2.5.10 Create/modify a graph on a slide
- 2.5.11 Add a template to a presentation
- 2.5.12 Remove a template from a presentation
- 2.5.13 Create graphics documents using drawing and painting software programs
- 2.5.14 Add transitions to slide shows
- 2.5.15 Run slide shows manually and automatically
- 2.5.16 Save slide show presentations

Competency 2.6: Integrate computer applications (ISS, NS, PSD, IM = P)

Competency Builders:

- 2.6.1 Analyze problems requiring solutions involving the integration of computer applications given information with 90% accuracy
- 2.6.2 Select appropriate productivity tool for solving specific problem given information with 90% accuracy
- 2.6.3 Select *source* application and *destination* application given information with 90% accuracy

For the following objectives, students are given appropriate hardware, software and user manuals, and should achieve a level of competence set by a classroom checklist.

- 2.6.4 Move/copy information between integrated applications
- 2.6.5 Link objects between applications
- 2.6.6 Embed information in applications

Unit 3: Data Communications

Competency 3.1: Demonstrate knowledge of basic data communications components and trends (ISS, NS, PSD, IM = P)

Competency Builders:

- 3.1.1 Demonstrate knowledge of key communications procedures
- 3.1.2 Demonstrate knowledge of the uses of data communication equipment
- 3.1.3 Demonstrate knowledge of types of communications media
- 3.1.4 Demonstrate knowledge of data transmission codes and protocols
- 3.1.5 Distinguish between local area networks and wide-area networks
- 3.1.6 Identify data communication trends
- 3.1.7 Identify major current issues in data communications

Competency 3.2: Access information using electronic sources (ISS, NS, PSD, IM = P)

Competency Builders:

- 3.2.1 Demonstrate knowledge of how to conduct searches using electronic sources (e.g., selection of search terms)
- 3.2.2 Access information using telecommunications software
- 3.2.3 Access information using teleconferencing/video conferencing techniques
- 3.2.4 Access information using CD-ROM technology
- 3.2.5 Demonstrate knowledge of the uses of virtual reality as an information source
- 3.2.6 Access information using a public information retrieval service
- 3.2.7 Evaluate the quality and usability of electronic information
- 3.2.8 Download information

Competency 3.3: Demonstrate proficiency with electronic mail

Competency Builders:

- 3.3.1 Demonstrate knowledge of the basic purposes of e-mail systems
- 3.3.2 Demonstrate knowledge of basic e-mail features and options
- 3.3.3 Demonstrate knowledge of security issues and guidelines for legal usage of e-mail
- 3.3.4 Demonstrate knowledge of contamination protection strategies for e-mail
- 3.3.5 Identify available e-mail systems and the characteristics/features of each
- 3.3.6 Access e-mail system using login and password functions
- 3.3.7 Access e-mail messages received
- 3.3.8 Access e-mail attachments
- 3.3.9 Demonstrate knowledge of e-mail etiquette
- 3.3.10 Create e-mail messages in accordance with established business standards (e.g., grammar, word usage, spelling, sentence structure, clarity, e-mail etiquette)
- 3.3.11 Send e-mail messages
- 3.3.12 Assign priority levels to messages
- 3.3.13 Create distribution lists
- 3.3.14 Employ e-mail options such as "reply requested" and "out-of-office reply"
- 3.3.15 Reply to e-mail messages
- 3.3.16 Forward e-mail messages
- 3.3.17 Attach documents to messages

- 3.3.18 Create folders for organizing messages and documents
- 3.3.19 Save e-mail messages/attachments
- 3.3.20 Delete e-mail messages
- 3.3.21 Print e-mail messages/attachments
- 3.3.22 Access needed information using e-mail help facilities and tools

Unit 4: Programming Theory

Competency 4.1: Demonstrate knowledge of programming language concepts (ISS, PSD = P)

Competency Builders:

- 4.1.1 Demonstrate knowledge of the concept of physical representation of digitized information (e.g., data, text, image, voice) given information with 90% accuracy
- 4.1.2 Demonstrate knowledge of the hardware-software connection given information with 90% accuracy
- 4.1.3 Demonstrate knowledge of the concepts of data and procedural representation given information with 90% accuracy
- 4.1.4 Analyze programming languages given information with 85% accuracy
- 4.1.5 Demonstrate knowledge of the function and operation of compilers and interpreters given information with 85% accuracy
- 4.1.6 Demonstrate knowledge of the basic principles for analyzing a programming language given information with 85% accuracy
- 4.1.7 Demonstrate knowledge of the basics of structured, object-oriented, and event-driven programming given information with 90% accuracy
- 4.1.8 Demonstrate knowledge of how a programming language can support multitasking and exception-handling given instruction with 90% accuracy
- 4.1.9 Demonstrate knowledge of current key programming languages and the environment they are used in (e.g., C, C⁺⁺, Visual Basic, Java, RPG, COBOL, Assembler) given information with 90% accuracy

Competency 4.2: Apply the process of algorithm and structured code development (ISS, PSD = P)

Competency Builders:

- 4.2.1 State a problem identifying desired outputs for given inputs given outline with 100% accuracy
- 4.2.2 Provide an overview of problem to be solved given outline with 100% accuracy
- 4.2.3 Describe the fundamental data types and their operations given information with 90% accuracy
- 4.2.4 Design program logic using both graphical and pseudocode techniques given information with 90% accuracy
- 4.2.5 Translate data structures and program design into code in a programming language given instruction with 100% accuracy
- 4.2.6 Perform mathematical calculations using operators given instruction with 100% accuracy

Competency 4.3: Demonstrate knowledge of the stages of program development (ISS, PSD = P)

Competency Builders:

- 4.3.1 Identify the use of program design tools given information with 90% accuracy
- 4.3.2 Demonstrate knowledge of structured/modular programming given information with 90% accuracy
- 4.3.3 Demonstrate knowledge of the information system (IS) life cycle given outline with 90% accuracy
- 4.3.4 Demonstrate knowledge of the characteristics and uses of batch processing given outline with 85% accuracy
- 4.3.5 Demonstrate knowledge of the characteristics and uses of interactive processing given outline with 85% accuracy
- 4.3.6 Demonstrate knowledge of the characteristics and uses of event-driven, object-oriented processing given information with 90% accuracy

Competency 4.4: Demonstrate knowledge of technical documentation associated with software development (ISS, PSD = P)

Competency Builders:

- 4.4.1 Secure needed information using appropriate reference materials given direction with 100% accuracy
- 4.4.2 Analyze specifications given direction with 100% accuracy
- 4.4.3 Identify constraints given direction with 100% accuracy
- 4.4.4 Identify input and output (I/O) requirements given direction with 100% accuracy
- 4.4.5 Prepare logic using a program flowchart given direction with 100% accuracy

Unit 5: Applied Programming Languages (OPTIONAL)

Each competency must be addressed in at least two of the following language types:

- Structural/Procedural (e.g., Basic, C, Visual Basic, RPG, COBOL)
- Object-Oriented (e.g., Java, C++)
- Scripting/Control (e.g., JLL, Perl)
- Data Description (e.g., IOL, SQL)
- Machine Level (e.g., Assembly)
- Mark-up (e.g., HTML, SML, SGML)

Competency 5.1: Apply computational and logical operations (ISS, PSD = P)

Competency Builders:

- 5.1.1 Develop programs that use arithmetic operations given direction with 100% accuracy
- 5.1.2 Develop programs that use relational operators and compound conditions given direction with 100% accuracy
- 5.1.3 Develop programs that use control breaks given direction with 100% accuracy
- 5.1.4 Develop programs that use subtotals and final totals given direction with 100% accuracy

Competency 5.2: Apply techniques for building applications (ISS = I, PSD = P)

Competency Builders:

- 5.2.1 Demonstrate knowledge of development environment (ISS) given information with 90% accuracy
- 5.2.2 Use editors (ISS) given direction with 100% accuracy
- 5.2.3 Compile or interpret applications into runnable form (ISS) given direction with 100% accuracy
- 5.2.4 Run application (ISS) given specifications with 100% accuracy

Competency 5.3: Apply language specific programming techniques (ISS = I, PSD = P)

Competency Builders:

- 5.3.1 Develop programs using desired language (ISS) given instruction with 100% accuracy
- 5.3.2 Incorporate the use of sort routines (ISS) given direction with 100% accuracy
- 5.3.3 Develop programs designed to create, update, and delete records (ISS) given instruction with 100% accuracy
- 5.3.4 Develop programs using menus (ISS) given instruction with 100% accuracy
- 5.3.5 Develop programs that require user input (ISS) given direction with 100% accuracy
- 5.3.6 Demonstrate knowledge of key constructs and commands specific to the language (ISS) given information with 100% accuracy
- 5.3.7 Compile program (ISS) given direction with 100% accuracy
- 5.3.8 Test program (ISS) given direction with 100% accuracy
- 5.3.9 Correct errors (ISS) given direction with 100% accuracy

Competency 5.4: Debug programs (ISS = I, PSD = P)

Competency Builders:

- 5.4.1 Test/run program (ISS) given direction with 100% accuracy
- 5.4.2 Correct syntax errors (ISS) given direction with 100% accuracy
- 5.4.3 Debug compiler errors (ISS) given direction with 100% accuracy
- 5.4.4 Correct common run-time errors (ISS) given direction with 100% accuracy
- 5.4.5 Debug complex logic errors (ISS) given direction with 100% accuracy
- 5.4.6 Maintain legacy applications (ISS) given direction with 100% accuracy

Unit 6: Computer User Support

Competency 6.1: Analyze technical support needed (ISS, NS, PSD = I)

Competency Builders:

- 6.1.1 Identify support requirements, given a hypothetical business with 90% accuracy ((ISS, NS, PSD)
- 6.1.2 Apply information and data analysis techniques given a hypothetical business with 90% accuracy (NS)
- 6.1.3 Identify skill level needs given a hypothetical business with 90% accuracy (ISS, NS, PSD)
- 6.1.4 Define scope of work to meet customer needs given a hypothetical business with 90% accuracy (ISS, NS, PSD)
- 6.1.5 Identify resources and risks given a hypothetical business with 90% accuracy (NS, PSD)
- 6.1.6 Evaluate present data and system configuration given a hypothetical business with 90% accuracy (NS)
- 6.1.7 Formulate a support plan given a hypothetical business with 90% accuracy (NS, PSD)
- 6.1.8 Communicate and document technical support provided given a hypothetical business with 90% accuracy (NS)

Competency 6.2: Perform customer service (NS, PSD = I)

Competency Builders:

- 6.2.1 Provide high-level technical support given a hypothetical business with 90% accuracy (NS)
- 6.2.2 Respond to user questions given a hypothetical business with 90% accuracy (NS, PSD)
- 6.2.3 Provide troubleshooting for hardware/software given a hypothetical business with 90% accuracy (NS, PSD)
- 6.2.4 Track information within the system given a hypothetical business with 90% accuracy (NS)
- 6.2.5 Perform system-tuning functions given a hypothetical business with 90% accuracy (NS, PSD)
- 6.2.6 Diagnose problems within system given a hypothetical business with 90% accuracy (NS, PSD)
- 6.2.7 Perform technical functions required by customer/user given a hypothetical business with 90% accuracy (NS, PSD)
- 6.2.8 Employ technical and computer tools to perform task in the most cost-effective manner given a hypothetical business with 90% accuracy (NS)
- 6.2.9 Manage working relationships with customer within support boundaries given a hypothetical business with 90% accuracy (PSD)
- 6.2.10 Balance resources against customer needs given a hypothetical business with 90% accuracy
- 6.2.11 Manage multiple customer requirements given a hypothetical business with 90%

- 6.2.12 accuracy (PSD)
Establish liaison communication with all users given a hypothetical business with 90% accuracy

Competency 6.3: Provide support and training

Competency Builders:

- 6.3.1 Operate help desk given a hypothetical business with 90% accuracy
6.3.2 Employ desktop productivity tools given a hypothetical business with 90% accuracy
6.3.3 Support computer users given a hypothetical business with 90% accuracy
6.3.4 Train computer users given a hypothetical business with 90% accuracy
6.3.5 Manage user accounts given a hypothetical business with 90% accuracy
6.3.6 Maintain documentation given a hypothetical business with 90% accuracy
6.3.7 Prepare status reports given a hypothetical business with 90% accuracy
6.3.8 Maintain training manuals given a hypothetical business with 90% accuracy

Unit 7: Software Systems Management

Competency 7.1: Install/configure software programs (ISS, NS, PSD, IM = P)

Competency Builders:

- 7.1.1 Identify hardware requirements (e.g., processor, memory, disk space, communications, printers, monitors) given software system requirements with 100% accuracy
- 7.1.2 Determine compatibility of hardware and software given information with 100% accuracy
- 7.1.3 Install given application/system software on various platforms in accordance with manufacturer's procedures with 100% accuracy
- 7.1.4 Access needed help using manufacturers' technical help lines or Internet sites given direction with 100% accuracy
- 7.1.5 Disable/uninstall software that may interfere with installation of new software given direction with 100% accuracy
- 7.1.6 Verify conformance to licensing agreement given information with 100% accuracy
- 7.1.7 Differentiate between procedures for an upgrade and for a new installation given information with 100% accuracy
- 7.1.8 Differentiate between stand-alone and network installation procedures given direction with 80% accuracy
- 7.1.9 Select appropriate installation options (e.g., default, customized) given direction with 90% accuracy
- 7.1.10 Configure software to appropriate operating system settings given direction with 100% accuracy
- 7.1.11 Troubleshoot unexpected results given information with 100% accuracy
- 7.1.12 Formulate new installation procedure if needed given direction with 100% accuracy
- 7.1.13 Customize software to meet user preferences given direction with 100% accuracy
- 7.1.14 Document step-by-step installation and configuration procedures given direction with 100% accuracy
- 7.1.15 Verify software installation and operation given direction with 100% accuracy
- 7.1.16 Convert data files if required given direction with 100% accuracy
- 7.1.17 Configure macros, tools, and packages to accomplish simple organizational and personal tasks given direction with 100% accuracy

Competency 7.2: Perform configuration management activities (PSD = I)

Competency Builders:

- 7.2.1 Demonstrate knowledge of identification and control functions (PSD) given software requirements with 90% accuracy
- 7.2.2 Demonstrate knowledge of version management and interface control given software requirements with 90% accuracy
- 7.2.3 Select appropriate tools for configuration management (PSD) given software requirements with 90% accuracy

- 7.2.4 Determine standards to be applied (e.g., international, industry, military) (PSD) given direction with 90% accuracy
- 7.2.5 Specify baseline and software life-cycle phases given direction with 90% accuracy
- 7.2.6 Assess the impact of changes that affect interfaces given simulated user requirements with 90% accuracy

Competency 7.3: Evaluate application software packages (ISS, PSD, IM = I)

Competency Builders:

- 7.3.1 Perform work flow analysis to determine user needs (ISS, PSD) given user specifications with 90% accuracy
- 7.3.2 Compare/contrast ease of learning, use, and interfacing for different software packages (ISS, PSD) given software documentation with 90% accuracy
- 7.3.3 Compare/contrast performance and features of different software packages (e.g., speed of retrieval, copying, saving, speller, thesaurus, moving, sorting) (ISS, PSD) given software documentation with 90% accuracy
- 7.3.4 Compare/contrast ease of technical support for different software packages (PSD) given software documentation with 90% accuracy
- 7.3.5 Compare/contrast clarity of documentation for different software packages (PSD) given software documentation with 90% accuracy
- 7.3.6 Compare/contrast licensing agreements for different software packages (ISS, PSD) given software documentation with 90% accuracy
- 7.3.7 Document results of the software evaluation (ISS) given format requirements with 90% accuracy
- 7.3.8 Perform a software configuration audit given configuration requirements with 90% accuracy
- 7.3.9 Perform a physical configuration audit given configuration requirements with 90% accuracy
- 7.3.10 Evaluate appropriateness of software for specific projects (ISS) given project requirements with 90% accuracy
- 7.3.11 Prepare a cost-benefit analysis for a software package (ISS) given template with 90% accuracy
- 7.3.12 Develop a method for evaluation given requirements with 90% accuracy
- 7.3.13 Test the functionality of proposed software configuration given requirements with 90% accuracy

Unit 8: Internet

Competency 8.1: Demonstrate basic knowledge of the Internet

Competency Builders:

- 8.1.1 Identify the key characteristics of the Internet given reference manuals with 90% accuracy
- 8.1.2 Demonstrate knowledge of the ownership/administration of the Internet given reference manuals with 90% accuracy
- 8.1.3 Trace the development of Internet technology given reference manuals with 90% accuracy
- 8.1.4 Identify current issues related to the Internet given reference manuals with 90% accuracy
- 8.1.5 Identify services and tools offered on the Internet given reference manuals with 90% accuracy
- 8.1.6 Identify the specific strengths, weaknesses, and special features of available search engines given reference manuals with 90% accuracy
- 8.1.7 Demonstrate knowledge of bookmarks and their functions given reference manuals with 90% accuracy
- 8.1.8 Demonstrate knowledge of accepted Internet etiquette (netiquette) given reference manuals with 90% accuracy
- 8.1.9 Identify current uses and applications of the Internet given reference manuals with 90% accuracy

Competency 8.2: Demonstrate advanced knowledge of the Internet (ISS, NS, PSD, IM = I)

Competency Builders:

- 8.2.1 Demonstrate knowledge of the Transmission Control Protocol/Internet Protocol (TCP/IP) given access to the Internet according to the instructor's checklist (ISS, NS, PSD, IM)
- 8.2.2 Demonstrate knowledge of the Domain Name Server given access to the Internet according to the instructor's checklist (DNS) (ISS, NS, PSD, IM)
- 8.2.3 Demonstrate knowledge of Simple Network Management Protocol given access to the Internet according to the instructor's checklist (SNMP)
- 8.2.4 Demonstrate knowledge of Bootstrap Protocol (BOOTP) and Dynamic Host Configuration Protocol given access to the Internet according to the instructor's checklist (DHCP)
- 8.2.5 Demonstrate knowledge of the Address Resolution Protocol given access to the Internet according to the instructor's checklist (ARP)
- 8.2.6 Demonstrate knowledge of IP forwarding, encapsulation, and fragmentation given access to the Internet according to the instructor's checklist

- 8.2.7 Demonstrate knowledge of Internet security issues given access to the Internet according to the instructor's checklist (ISS, NS, PSD, IM)
- 8.2.8 Identify available Internet security systems given access to the Internet according to the instructor's checklist

Competency 8.3: Access the Internet (ISS, NS, PSD, IM = PR)

Competency Builders:

- 8.3.1 Connect to the Internet given access to the Internet according to the instructor's checklist
- 8.3.2 Test Internet connection given access to the Internet according to the instructor's checklist
- 8.3.3 Demonstrate knowledge of the components of Internet software given access to the Internet according to the instructor's checklist
- 8.3.4 Install Internet software given access to the Internet according to the instructor's checklist
- 8.3.5 Explore browser features given access to the Internet according to the instructor's checklist
- 8.3.6 Download free software upgrades and shareware from the Internet given access to the Internet according to the instructor's checklist
- 8.3.7 Unpack files using compression software given access to the Internet according to the instructor's checklist
- 8.3.8 Demonstrate acute awareness of virus protection techniques given access to the Internet according to the instructor's checklist

Competency 8.4: Utilize Internet services (ISS, NS, PSD, IM = PR)

Competency Builders:

- 8.4.1 Access business and technical information using the Internet given access to the Internet according to the instructor's checklist
- 8.4.2 Select search engine(s) to use given access to the Internet according to the instructor's checklist
- 8.4.3 Select appropriate search procedures and approaches given access to the Internet according to the instructor's checklist
- 8.4.4 Locate information using search engine(s) and Boolean logic given access to the Internet according to the instructor's checklist
- 8.4.5 Navigate web sites using software functions (e.g., Forward, Back, Go To, Bookmarks) given access to the Internet according to the instructor's checklist
- 8.4.6 Evaluate Internet resources (e.g., accuracy of information) given access to the Internet according to the instructor's checklist
- 8.4.7 Access library catalogs on the Internet given access to the Internet according to the instructor's checklist
- 8.4.8 Access commercial, government, and education resources given access to the Internet according to the instructor's checklist
- 8.4.9 Bookmark web addresses (URLs) given access to the Internet according to the instructor's checklist
- 8.4.10 Download files from FTP archives given access to the Internet according to the

- instructor's checklist
- 8.4.11 Communicate via e-mail using the Internet given access to the Internet according to the instructor's checklist
 - 8.4.12 Subscribe to mailing lists given access to the Internet according to the instructor's checklist
 - 8.4.13 Participate in newsgroups given access to the Internet according to the instructor's checklist
 - 8.4.14 Retrieve online tools given access to the Internet according to the instructor's checklist
 - 8.4.15 Download/convert Internet programming files given access to the Internet according to the instructor's checklist
 - 8.4.16 Install/configure web browser given access to the Internet according to the instructor's checklist
 - 8.4.17 Explore the multimedia capabilities of the World Wide Web given access to the Internet according to the instructor's checklist
 - 8.4.18 Add plug-ins and helpers to the web browser given access to the Internet according to the instructor's checklist
 - 8.4.19 Explore collaboration tools given access to the Internet according to the instructor's checklist
 - 8.4.20 Participate in online audio and video conferencing given access to the Internet according to the instructor's checklist
 - 8.4.21 Archive files given access to the Internet according to the instructor's checklist
 - 8.4.22 Compile a collection of business sites (e.g., finance and investment) given access to the Internet according to the instructor's checklist
 - 8.4.23 Explore electronic commerce given access to the Internet according to the instructor's checklist

Unit 9: Web Page Design

Competency 9.1: Demonstrate knowledge of web page basics (ISS, NS, IM = P, NS = I)

Competency Builders:

- 9.1.1 Differentiate between a client and a server given hardware/software reference with 90% accuracy
- 9.1.2 Demonstrate knowledge of the role of browsers in reading files on the World Wide Web (text-only, hypertext) given hardware/software reference with 90% accuracy
- 9.1.3 Identify how different browsers affect the look of a web page given hardware/software reference with 90% accuracy
- 9.1.4 Compare/contrast the features and functions of software editors available for designing web pages given hardware/software reference with 90% accuracy
- 9.1.5 Demonstrate knowledge of how bandwidths affect data transmission and on-screen image given hardware/software reference with 90% accuracy
- 9.1.6 Demonstrate knowledge of the characteristics and uses of plug-ins given hardware/software reference with 90% accuracy
- 9.1.7 Compare the advantages and disadvantages of running your own server vs. using a server provider given hardware/software reference with 90% accuracy

Competency 9.2: Demonstrate knowledge of Internet programming basics (ISS = I, PSD, IM = P)

Competency Builders:

- 9.2.1 Recognize the importance of Internet programming standards given access to the Internet according to the instructor's checklist
- 9.2.2 Demonstrate knowledge of standard Internet programming coding given access to the Internet according to the instructor's checklist
- 9.2.3 Demonstrate knowledge of special Internet programming feature codes (tags) given access to the Internet according to the instructor's checklist
- 9.2.4 Differentiate between various versions of Internet programming given access to the Internet according to the instructor's checklist
- 9.2.5 Demonstrate knowledge of how to use standard word processing and page layout programs to produce an Internet application given access to the Internet according to the instructor's checklist
- 9.2.6 Identify authoring programs specifically designed for Internet programming production (e.g., Adobe PageMill, Corel Xara, Microsoft FrontPage) given access to the Internet according to the instructor's checklist
- 9.2.7 Locate free Internet programming authoring programs on the Internet given access to the Internet according to the instructor's checklist
- 9.2.8 Compare/contrast features, strengths, and weaknesses of different authoring programs given access to the Internet according to the instructor's checklist
- 9.2.9 Identify cross-platform issues given access to the Internet according to the instructor's checklist
- 9.2.10 Keep up-to-date with new and emerging trends related to Internet programming given access to the Internet according to the instructor's checklist

Competency 10.3: Apply knowledge of basic web programming (ISS, IM = I, PSD = P)

Competency Builders:

- 10.3.1 Demonstrate knowledge of the purpose of web content delivery enablers (e.g., CGI, API, SSI) given reference material with 90% accuracy
- 10.3.2 Demonstrate knowledge of how to interface client/server given reference material with 90% accuracy
- 10.3.3 Demonstrate knowledge of client-side processing and its given reference material with 90% accuracy advantages/disadvantages
- 10.3.4 Identify security issues related to client-side processing given reference material with 90% accuracy
- 10.3.5 Identify standard scripting languages (e.g., JavaScript, Visual Basic Script, ActiveX) given reference material with 90% accuracy
- 10.3.6 Demonstrate knowledge of the uses and advantages/disadvantages of various scripting languages given reference material with 90% accuracy
- 10.3.7 Demonstrate knowledge of how to use a scripting language to program a site given reference material with 90% accuracy
- 10.3.8 Demonstrate knowledge of how to use advanced communication protocols given reference material with 90% accuracy

Competency 10.4: Apply knowledge of web hosting (ISS = I)

Competency Builders:

- 10.4.1 Compare the advantages and disadvantages of running your own server vs. using a server provider given reference material with 90% accuracy
- 10.4.2 Identify hardware requirements for a server given reference material with 90% accuracy
- 10.4.3 Identify server software options given reference material with 90% accuracy
- 10.4.4 Evaluate server providers given reference material with 90% accuracy
- 10.4.5 Establish a domain name given reference material with 90% accuracy
- 10.4.6 Comply with TCP/IP (Transfer Control Protocol/Internet Protocol) given reference material with 90% accuracy
- 10.4.7 Upload files to the server given reference material with 90% accuracy
- 10.4.8 Publicize the site (e.g., submit announcements to major search engines) given reference material with 90% accuracy
- 10.4.9 Collect/analyze usage statistics given reference material with 90% accuracy

Competency 10.5: Create/maintain a basic Internet programming document (PSD = P)

Competency Builders:

- 10.5.1 Open up a workspace to create a new Internet programming document given access to web software programs with 90% accuracy
- 10.5.2 Create the basic Internet programming structure for a web page using a text editor given access to web software programs with 90% accuracy
- 10.5.3 Demonstrate knowledge of the advantages of creating short multiple web pages rather than a single, long web page given access to web software programs with 90% accuracy
- 10.5.4 Determine logical points to split information into multiple web pages given access

- 10.5.5 to web software programs with 90% accuracy
- 10.5.5 Create a template file using a text editor given access to web software programs with 90% accuracy
- 10.5.6 Make appropriate changes to template file to create individual pages given access to web software programs with 90% accuracy
- 10.5.7 Insert nondisplayed comments into Internet programming files given access to web software programs with 90% accuracy
- 10.5.8 Display document within a web browser given access to web software programs with 90% accuracy
- 10.5.9 Make text modifications using a text editor given access to web software programs with 90% accuracy
- 10.5.10 Place different-level headings within document using appropriate Internet programming tags given access to web software programs with 90% accuracy
- 10.5.11 Insert paragraph breaks into the text of document using appropriate Internet programming tag given access to web software programs with 90% accuracy
- 10.5.12 Manipulate text cut and paste functions given access to web software programs with 90% accuracy
- 10.5.13 Insert a stylized footer at the bottom of a page given access to web software programs with 90% accuracy
- 10.5.14 Format text given access to web software programs with 90% accuracy
- 10.5.15 Create lists given access to web software programs with 90% accuracy
- 10.5.16 Add graphics/images given access to web software programs with 90% accuracy
- 10.5.17 Add animation given access to web software programs with 90% accuracy

Competency 10.6: Format page layout (ISS = I, PSD, IM = P)

Competency Builders:

- 10.6.1 Demonstrate knowledge of Internet programming codes for formatting page layout given access to web software programs with 90% accuracy
- 10.6.2 Create a solid color background given access to web software programs with 90% accuracy
- 10.6.3 Calculate the hexadecimal code for a color value given access to web software programs with 90% accuracy
- 10.6.4 Change the color of text and hypertext link items given access to web software programs with 90% accuracy
- 10.6.5 Create a textured background using a graphic file given access to web software programs with 90% accuracy
- 10.6.6 Create various types of hard rule lines for page dividers (e.g., different thicknesses and widths, with and without 3-D shading) given access to web software programs with 90% accuracy
- 10.6.7 Create a table with rows and columns of text in a gridded display given access to web software programs with 90% accuracy
- 10.6.8 Create a layout scheme integrating text and pictures given access to web software programs with 90% accuracy
- 10.6.9 Create an invisible table with side-by-side columns given access to web software programs with 90% accuracy
- 10.6.10 Create a table that has different colored cells given access to web software

- 10.6.11 programs with 90% accuracy
Demonstrate knowledge of interface design given access to web software programs with 90% accuracy
- 10.6.12 Display interlaced images given access to web software programs with 90% accuracy
- 10.6.13 Organize information using frames given access to web software programs with 90% accuracy

Competency 10.7: Add audio and video to a web page (ISS, PSD, IM = I)

Competency Builders:

- 10.7.1 Demonstrate knowledge of how to deliver audio and video signals in real time (streaming) given access to web software programs with 90% accuracy (PSD, IM)
- 10.7.2 Demonstrate knowledge of audio sweetening techniques given access to web software programs with 90% accuracy (PSD, IM)
- 10.7.3 Demonstrate knowledge of audio and video compression techniques given access to web software programs with 90% accuracy (PSD, IM)
- 10.7.4 Add audio and video to a web page using Internet programming codes given access to web software programs with 90% accuracy
- 10.7.5 Establish network administration procedures for audio and video given access to web software programs with 90% accuracy

Competency 10.8: Link documents (ISS = I, PSD, IM = P)

Competency Builders:

- 10.8.1 Identify the function of URLs (Uniform Resource Locators) given access to web software programs with 90% accuracy
- 10.8.2 Recognize the structure of a URL given access to web software programs with 90% accuracy
- 10.8.3 Copy URLs from a web browser to an Internet programming text document given access to web software programs with 90% accuracy
- 10.8.4 Write an Internet programming anchor to link to another document in the same directory as the first document given access to web software programs with 90% accuracy
- 10.8.5 Write an Internet programming anchor to link to another document in a different directory from the first document given access to web software programs with 90% accuracy
- 10.8.6 Write an Internet programming anchor to link to another web document on the Internet given access to web software programs with 90% accuracy
- 10.8.7 Write an Internet programming anchor to link to files given access to web software programs with 90% accuracy
- 10.8.8 Write an Internet programming anchor that links to another section of the same document given access to web software programs with 90% accuracy
- 10.8.9 Incorporate a graphic that acts as a hyperlink to another document given access to web software programs with 90% accuracy
- 10.8.10 Identify the significance of a file called *index.html* on a web server given access to web software programs with 90% accuracy

- 10.8.11 Create a hypertext link that will send an e-mail message given access to web software programs with 90% accuracy
- 10.8.12 Differentiate between client-side image mapping and server-side image mapping given access to web software programs with 90% accuracy
- 10.8.13 Create an inline image that has different portions hyperlinked to other given access to web software programs with 90% accuracy web pages, pictures, and other sites on the Internet given access to web software programs with 90% accuracy
- 10.8.14 Create hyperlinks for the use of plug-ins given access to web software programs with 90% accuracy

Unit 11: Interactive Multimedia Production (OPTIONAL)

Competency/Terminal Performance Objectives:

11.1 Demonstrate knowledge of interactive media (P)

Competency Builders/PPO:

- 11.1.1 Demonstrate knowledge of interactive media components given various components with 100% accuracy
- 11.1.2 Identify the major characteristics of interactive media presentations given various presentations with 100% accuracy
- 11.1.3 Identify the important historical developments leading to contemporary interactive media according to class handout(s) and discussion with 90% accuracy
- 11.1.4 Demonstrate knowledge of various interactive media industry genres given class handout(s) with 90% accuracy
- 11.1.5 Perform critical review of various interactive media end products given the products with 90% accuracy
- 11.1.6 Identify rights, responsibilities, and controls related to various interactive media according to class handout(s) and discussion with 90% accuracy
- 11.1.7 Interpret intellectual property laws relative to interactive media according to class handout(s) and discussion with 90% accuracy
- 11.1.8 Analyze the social and cultural implications of interactive media according to class handout(s) and discussion with 90% accuracy
- 11.1.9 Identify key criticisms of interactive media according to class handout(s) and discussion with 90% accuracy
- 11.1.10 Identify possible markets for interactive media (e.g., sales and marketing, interactive advertising, K-12 education, corporate training, corporate communications, distance learning, news, entertainment) according to class handout(s) and discussion with 90% accuracy
- 11.1.11 Identify specific uses of interactive media in each potential market according to class handout(s) and discussion with 90% accuracy
- 11.1.12 Identify future trends in interactive media according to class handout(s) and discussion with 90% accuracy

Competency 11.2: Produce interactive media as a member of a development team (P)

Competency Builders:

- 11.2.1 Define the role of individual team members given a team project with 100% accuracy
- 11.2.2 Develop a conceptual model for the interactive media project given the project requirements with 100% accuracy
- 11.2.3 Select appropriate hardware tools given the project requirements with 100% accuracy
- 11.2.4 Select appropriate software tools given the project requirements with 100% accuracy
- 11.2.5 Select the media elements (e.g., sound, video, graphics, text, animation) to be used given the project requirements with 100% accuracy

- 11.2.6 Integrate media elements given the project requirements with 100% accuracy
- 11.2.7 Select the publication process to be used given the project requirements with 100% accuracy
- 11.2.8 Select the distribution method to be used given the project requirements with 100% accuracy
- 11.2.9 Justify decisions made given the project requirements with 100% accuracy

Competency 11.3: Pursue interactive media career opportunities (P)

Competency Builders:

- 11.3.1 Identify potential career areas in interactive media given access to research materials with 90% accuracy
- 11.3.2 Identify components of portfolio according to handout(s) with 100% accuracy
- 11.3.3 Establish criteria for portfolio components given the components with 95% accuracy
- 11.3.4 Select appropriate materials/projects for inclusion in portfolio given a portfolio requirement with 100% accuracy

Competency 11.4: Develop project concept proposal (P)

Competency Builders:

- 11.4.1 Determine purpose of the interactive media project given specific project outcome requirements with 95% accuracy
- 11.4.2 Determine the target audience given the project and outcome requirements with 95% accuracy
- 11.4.3 Determine objectives audience given the project and outcome requirements with 95% accuracy
- 11.4.4 Research the content audience given the project and outcome requirements with 95% accuracy
- 11.4.5 Develop a design brief audience given the project and outcome requirements with 95% accuracy
- 11.4.6 Select appropriate message design (e.g., instructional, informational, entertainment) audience given the project and outcome requirements with 95% accuracy
- 11.4.7 Determine the setting where the message will be used audience given the project and outcome requirements with 95% accuracy
- 11.4.8 Determine the interactive media elements to be used audience given the project and outcome requirements with 95% accuracy
- 11.4.9 Determine degree of interactivity desired audience given the project and outcome requirements with 95% accuracy
- 11.4.10 Identify available media and content sources audience given the project and outcome requirements with 100% accuracy
- 11.4.11 Decide whether to produce or acquire content (graphics, animation, audio, video, simulations, virtual environments) audience given the project and outcome requirements with 100% accuracy

- 11.4.12 Develop time line for completion audience given the project and outcome requirements with 100% accuracy
- 11.4.13 Develop project budget audience given the project and outcome requirements with 100% accuracy
- 11.4.14 Write proposal based on the project requirements with 100% accuracy

Competency 11.5: Meet client needs (P)

Competency Builders:

- 11.5.1 Determine client's needs and expected outcomes given the clients requests with 90% accuracy
- 11.5.2 Prepare cost estimate for client given the clients requests and expectation with 95% accuracy
- 11.5.3 Obtain client approvals throughout project given the project and expected outcomes with 100% accuracy

Competency 11.6: Develop storyboards to communicate ideas (P)

Competency Builders:

- 11.6.1 Make preliminary sketches showing placement of images and text on screen given a topic to communicate with 100% accuracy
- 11.6.2 Show placement of buttons/navigational graphics given a topic to communicate with 100% accuracy
- 11.6.3 Provide information on color schemes given a topic to communicate with 100% accuracy
- 11.6.4 Provide information on lighting given a topic to communicate with 100% accuracy
- 11.6.5 Provide a sample screen given a topic to communicate with 100% accuracy

Competency 11.7: Develop flowchart/navigational blueprints (P)

Competency Builders:

- 11.7.1 Develop flowcharts with radial branching given a topic/project with 100% accuracy
- 11.7.2 Develop flowcharts with linear branching given a topic/project with 100% accuracy
- 11.7.3 Develop flowcharts with linking/nonlinear branching given a topic/project with 100% accuracy

Competency 11.8: Write scripts (P)

Competency Builders:

- 11.8.1 Describe music to be used given a topic/project with 100% accuracy
- 11.8.2 Describe video (still and motion) given a topic/project with 100% accuracy

- 11.8.3 Describe special effects (video and audio) given a topic/project with 100% accuracy
- 11.8.4 Write narration and actor lines given a topic/project with 100% accuracy
- 11.8.5 Describe scenes given a topic/project with 100% accuracy

Competency 11.9: Combine media elements to produce an interactive multimedia project (I)

Competency Builders:

- 11.9.1 Apply visual design skills given a project and instructions with 90% accuracy (IM)
- 11.9.2 Generate text for multi-image presentations (e.g., title slides, charts, graphs) given a project and instructions with 90% accuracy (IM)
- 11.9.3 Create 2-D computer graphics given a project and instructions with 90% accuracy (IM)
- 11.9.4 Create 3-D computer graphics given a project and instructions with 90% accuracy (IM)
- 11.9.5 Create computer animation given a project and instructions with 90% accuracy (IM)
- 11.9.6 Enhance interactive media presentation using a photographic process given a project and instructions with 90% accuracy (IM)
- 11.9.7 Integrate the use of photographic special effects into interactive media given a project and instructions with 90% accuracy presentations (IM)
- 11.9.8 Digitize photographic images for interactive media given a project and instructions with 90% accuracy (IM)
- 11.9.9 Alter digitized images using an image manipulation program given a project and instructions with 90% accuracy (IM)
- 11.9.10 Integrate photographically derived images with hand-drawn graphic images given a project and instructions with 90% accuracy (IM)
- 11.9.11 Acquire talent, if necessary given a project and instructions with 100% accuracy
- 11.9.12 Coordinate work with the acquired talent given a project and instructions with 90% accuracy
- 11.9.13 Create video footage given a project and instructions with 90% accuracy (IM)
- 11.9.14 Digitize/edit video footage using computer video-editing software given a project and instructions with 90% accuracy (IM)
- 11.9.15 Record sound track, including narration, voice-overs, sound effects, and music given a project and instructions with 90% accuracy (IM)
- 11.9.16 Integrate sound with visuals given a project and instructions with 90% accuracy (IM)
- 11.9.17 Build in hotspots and interactive links given a project and instructions with 90% accuracy (IM)
- 11.9.18 Synthesize available interactive media technologies into a unified presentation using appropriate authoring software given a project and instructions with 90% accuracy (IM)

Competency 11.10: Create interactive media applications (I)

Competency Builders:

- 11.10.1 Produce an interactive media presentation (e.g., web-based, local) given instructions with 85% accuracy
- 11.10.2 Produce computer-generated video) given instructions with 85% accuracy
- 11.10.3 Produce a kiosk) given instructions with 85% accuracy
- 11.10.4 Utilize video conferencing) given instructions with 85% accuracy
- 11.10.5 Demonstrate computer-to-computer collaboration) given instructions with 85% accuracy

Competency 11.11: Maintain interactive media equipment (P)

Competency Builders:

- 11.11.1 Demonstrate knowledge of proper care and handling procedures for interactive media equipment given equipment and instructions with 100% accuracy
- 11.11.2 Perform pre-and post-production routines for presentations given equipment and instructions with 100% accuracy
- 11.11.3 Analyze equipment performance against industry standards given equipment and standards with 100% accuracy
- 11.11.4 Troubleshoot simple equipment problems given equipment and instructions with 100% accuracy

Competency 11.12: Test/evaluate the functionality and content of the project (I)

Competency Builders:

- 11.12.1 Test product given product and instructions with 85% accuracy
- 11.12.2 Debug product given product and instructions with 85% accuracy

Unit 12: Hardware Design, Operation, and Maintenance

Competency 12.1: Demonstrate knowledge of hardware standards (NS = P)

Competency Builders:

- 12.1.1 Identify standard-setting bodies
- 12.1.2 Identify OSI, IEEE, ISO, and ITU-T (formerly CCITT) standards
- 12.1.2 Demonstrate knowledge of the importance of conformance and use of operating system APIs (rather than direct manipulation of hardware)

Competency 12.2: Analyze the computer site environment (NS = P)

Competency Builders:

- 12.2.1 Identify environmental requirements, conditions, and limitations
- 12.2.2 Identify power requirements and power supplies
- 12.2.3 Identify ergonomic issues
- 12.2.4 Identify structural capacities
- 12.2.5 Identify electrical wiring codes

Competency 12.3: Demonstrate knowledge of computer architecture and processor types (ISS, PSD, IM = I, NS = P)

Competency Builders:

- 12.3.1 Given access to hardware & software demonstrate knowledge of microcomputer architecture and processors (ISS) with 85% accuracy
- 12.3.2 Given access to hardware & software Compare/contrast the features of different microcomputer processors (ISS) with 85% accuracy
- 12.3.3 Given access to hardware & software Demonstrate knowledge of minicomputer architecture and processors (ISS) with 85% accuracy
- 12.3.4 Given access to hardware & software Demonstrate knowledge of mainframe architecture and processors (ISS) with 85% accuracy
- 12.3.5 Given access to hardware & software Identify internal box components (ISS) with 85% accuracy
- 12.3.6 Compare/contrast system bus structures (e.g., ISA, EISA, MCA, PCI, USB) (ISS) with 85% accuracy
- 12.3.7 Given access to hardware & software Evaluate architecture alternatives (ISS) with 85% accuracy

Competency 12.4: Demonstrate basic knowledge of computer system architecture (ISS, NS, PSD = I)

Competency Builders:

- 12.4.1 Given access to hardware & software interpret terminology and acronyms related to computer systems architecture (PSD) with 85% accuracy
- 12.4.2 Given access to hardware & software identify the input, process, output and storage hardware required in a system (PSD) with 85% accuracy
- 12.4.3 Given access to hardware & software identify the basic organization of CPU architecture (e.g., Von Neumann, block diagram, data paths, control path, functional units, instruction cycles) (PSD) with 85% accuracy
- 12.4.4 Given access to hardware & software demonstrate knowledge of multiprocessor architectures (e.g., single multiprocessing and distributed processing, stack, array, vector, multiprocessor, hypercube, client server, supercomputers) (PSD) with 85% accuracy
- 12.4.5 Given access to hardware & software demonstrate knowledge of fundamentals of instruction-set types and architectures, including registers and RISC addressing modes (PSD) with 85% accuracy
- 12.4.6 Given access to hardware & software demonstrate knowledge of data-structure machine representations, including signed integers, character strings, stacks, records, and linked lists (PSD) with 85% accuracy
- 12.4.7 Given access to hardware & software demonstrate knowledge of the principles and operation of volatile and nonvolatile memory (PSD) with 85% accuracy
- 12.4.8 Given access to hardware & software demonstrate knowledge of the principles and operation of advanced memory techniques (PSD) with 85% accuracy
- 12.4.9 Given access to hardware & software demonstrate knowledge of standard input/output devices and systems (PSD) with 85% accuracy
- 12.4.10 Given access to hardware & software demonstrate knowledge of the I/O subsystem with 85% accuracy
- 12.4.11 Given access to hardware & software demonstrate knowledge of machine-language instruction encoding (PSD) with 85% accuracy
- 12.4.12 Given access to hardware & software demonstrate knowledge of input/output techniques at the I/O driver level with 85% accuracy
- 12.4.13 Given access to hardware & software demonstrate knowledge of the principles and operation of addresses and interrupt processing (e.g., CICS) (PSD) with 85% accuracy
- 12.4.14 Given access to hardware & software identify low-level algorithms for conversion and data manipulation with 85% accuracy
- 12.4.15 Given access to hardware & software demonstrate knowledge of assembly-language-level parameter-passing techniques with 85% accuracy
- 12.4.16 Given access to hardware & software demonstrate knowledge of priorities and interrupts (PSD) with 85% accuracy
- 12.4.17 Given access to hardware & software demonstrate knowledge of direct-memory-access data-handling system(s) with 85% accuracy
- 12.4.18 Given access to hardware & software define functions of advanced memory techniques (e.g., virtual, pipeline, cache) (PSD) with 85% accuracy
- 12.4.19 Given access to hardware & software demonstrate knowledge of how commands handle tasks in operating systems (PSD) with 85% accuracy

- 12.4.20 Given access to hardware & software identify the purpose of operating system utilities (PSD) with 85% accuracy
- 12.4.21 Given access to hardware & software identify the hardware components of a digital computer (PSD) with 85% accuracy
- 12.4.22 Given access to hardware & software demonstrate knowledge of instruction set design with 85% accuracy
- 12.4.23 Given access to hardware & software demonstrate knowledge of the issues, principles, and essential building blocks in designing a processor with 85% accuracy
- 12.4.24 Given access to hardware & software identify cost-performance issues and design trade-offs in building a computer system with 85% accuracy

Competency 12.5: Demonstrate knowledge of CPU components (ISS, NS = I)

Competency Builders:

- 12.5.1 Given access to hardware & software demonstrate knowledge of chip configuration and structure (ISS, NS) with 85% accuracy
- 12.5.2 Given access to hardware & software identify the functions of internal components (ISS, NS) with 85% accuracy
- 12.5.3 Given access to hardware & software demonstrate knowledge of the characteristics and operation of motherboards (ISS, NS) with 85% accuracy
- 12.5.4 Given access to hardware & software demonstrate knowledge of the characteristics and operation of co-processor boards (e.g., math, graphics, fax, modems, voice) (ISS, NS) with 85% accuracy
- 12.5.5 Given access to hardware & software demonstrate knowledge of the characteristics and operation of controller cards with 85% accuracy
- 12.5.6 Given access to hardware & software demonstrate knowledge of the characteristics and operation of network interface cards with 85% accuracy
- 12.5.7 Given access to hardware & software demonstrate knowledge of the characteristics and operation of the PCMCIA bus (PC Card and CardBus) with 85% accuracy
- 12.5.8 Given access to hardware & software demonstrate knowledge of logic elements and switching theory, including minimization concepts and implementation of functions with 85% accuracy
- 12.5.9 Given access to hardware & software demonstrate knowledge of propagation delays and hazards with 85% accuracy
- 12.5.10 Given access to hardware & software demonstrate knowledge of the characteristics and operation of multiplexers, demultiplexers, decoders, encoders, adders, subtractors, comparators, shift registers and counters with 85% accuracy
- 12.5.11 Given access to hardware & software differentiate between ROM, PROM, EPROM, EEPROM, RAM with 85% accuracy
- 12.5.12 Given access to hardware & software differentiate between synchronous and asynchronous circuits with 85% accuracy

Competency 12.6: Demonstrate a basic knowledge of connectivity devices (ISS = I, NS = P)

Competency Builders:

- 12.6.1 Given access to hardware & software demonstrate knowledge of the characteristics and operation of baluns with 85% accuracy
- 12.6.2 Given access to hardware & software demonstrate knowledge of the characteristics and operation of multiplexers, modems, CODECS, DSU (ISS) with 85% accuracy
- 12.6.3 Given access to hardware & software demonstrate knowledge of the characteristics and operation of switches, gateways, bridges, routers, brouters, and repeaters (ISS) with 85% accuracy
- 12.6.4 Given access to hardware & software demonstrate knowledge of the characteristics and operation of test equipment (e.g., protocol analyzers) with 85% accuracy

Competency 12.7: Explain operation of microprocessor systems

Competency Builders:

- 12.7.1 *Demonstrate knowledge of the essential components of microprocessor and the functions of each*
- 12.7.2 *Demonstrate knowledge of the principles and operation of bus concepts (e.g., VESA, EISA)*
- 12.7.3 *Demonstrate knowledge of the principles and operation of different types of memory circuits*
- 12.7.4 *Demonstrate knowledge of operating systems (e.g., UNIX, Windows, Windows NT, MVS)*
- 12.7.5 *Demonstrate knowledge of microprocessor instruction sets*
- 12.7.6 *Demonstrate knowledge of the principles and operation of microprocessor machine code*
- 12.7.7 *Demonstrate knowledge of types of input and output devices and peripherals*
- 12.7.8 *Demonstrate knowledge of the principles and operation of storage devices*
- 12.7.9 *Connect input and output ports to peripherals*
- 12.7.10 *Demonstrate knowledge of central processing unit building blocks and their uses*

Competency 12.8: Demonstrate knowledge of peripheral equipment (PSD, IM = I)

Competency Builders:

- 12.8.1 *Demonstrate knowledge of peripheral I/O and interrupts*
- 12.8.2 *Demonstrate knowledge of I/O control methods*
- 12.8.3 *Demonstrate knowledge of external storage concepts, physical organization, and drives*
- 12.8.4 *Demonstrate knowledge of the characteristics and functions of optical auxiliary storage*
- 12.8.5 *Demonstrate knowledge of storage space allocation hierarchies*
- 12.8.6 *Demonstrate knowledge of main memory organization, bus operations, and cycle times for selection and addressing*
- 12.8.7 *Demonstrate knowledge of the characteristics and functions of read/write and cache memory*
- 12.8.8 *Demonstrate knowledge of the characteristics and functions of virtual memory*
- 12.8.9 *Identify interfaces between computers and other devices*
- 12.8.10 *Define printer types and related interface controllers*
- 12.8.11 *Demonstrate knowledge of the operation of typical magnetic tape equipment and interface controllers*
- 12.8.12 *Demonstrate knowledge of disk equipment and related interface controllers*
- 12.8.13 *Define environmental requirements for peripherals and media*

Competency 12.9: Design computer systems

Competency Builders:

- 12.9.1 *Develop detailed design and interface specifications*
- 12.9.2 *Design human factor interface*
- 12.9.3 *Identify system platform, components, and dependencies*
- 12.9.4 *Break down subsystems*
- 12.9.5 *Develop physical data model*
- 12.9.6 *Participate in peer and formal design reviews (including validation)*
- 12.9.7 *Identify maintenance requirements*
- 12.9.8 *Create prototypes*
- 12.9.9 *Review/critique user documentation*
- 12.9.10 *Write/document code*
- 12.9.11 *Perform unit testing*
- 12.9.12 *Analyze errors*
- 12.9.13 *Resolve errors*
- 12.9.14 *Integrate subsystems*
- 12.9.15 *Update detailed design and interface specifications*
- 12.9.16 *Participate in peer code review*
- 12.9.17 *Demonstrate knowledge of how to specify major subsystems and interfaces*
- 12.9.18 *Demonstrate knowledge of how to select design methodology*
- 12.9.19 *Demonstrate knowledge of how to select design tools*
- 12.9.20 *Demonstrate knowledge of how to develop models (e.g., business, physical interface, logical data)*
- 12.9.21 *Demonstrate knowledge of how to validate architecture and models*

Competency 12.10: Install computer system (e.g., monitor, keyboard, disk drive, and printer) (ISS, IM = I, PSD = P)

Competency Builders:

- 12.10.1 *Given access to hardware & software identify primary PC components and the functions of each (ISS) with 85% accuracy*
- 12.10.2 *Given access to hardware & software demonstrate knowledge of how hardware components interact and how conflicts arise (ISS) with 85% accuracy*
- 12.10.3 *Given access to hardware & software access needed information using manufacturers' references (e.g., procedural manuals, documentation, standards, work flowcharts) (ISS) with 85% accuracy*
- 12.10.4 *Given access to hardware & software secure supplies and resources with 85% accuracy*
- 12.10.5 *Given access to hardware & software respond to error messages and symptoms of hardware failures with 85% accuracy*
- 12.10.6 *Given access to hardware & software install boards to support peripherals with 85% accuracy*
- 12.10.7 *Given access to hardware & software connect peripherals to CPU with 85% accuracy*
- 12.10.8 *Given access to hardware & software employ appropriate safety precautions when working with PCs (ISS) with 85% accuracy*
- 12.10.9 *Given access to hardware & software configure system with 85% accuracy*
- 12.10.10 *Given access to hardware & software verify system operation with 85% accuracy*

- 12.10.11 Given access to hardware & software document system installation activities with 85% accuracy
- 12.10.12 Given access to hardware & software backup system configuration with 85% accuracy
- 12.10.13 Given access to hardware & software test all applications with 85% accuracy

Competency 12.11: Troubleshoot computer systems (ISS, PSD, IM = I)

Competency Builders:

- 12.11.1 Given access to hardware & software identify priorities and interrupts at system level
- 12.11.2 Given access to hardware & software demonstrate the use of volatile and nonvolatile memory
- 12.11.3 Given access to hardware & software repair/replace volatile and nonvolatile memory
- 12.11.4 Given access to hardware & software test system using diagnostic tools/software
- 12.11.5 Given access to hardware & software identify problems in the operating system and related hardware (ISS)
- 12.11.6 Given access to hardware & software differentiate between hardware and software failure (ISS)
- 12.11.7 Given access to hardware & software update flash memory (BIOS)
- 12.11.8 Given access to hardware & software optimize hard drive (ISS)
- 12.11.9 Given access to hardware & software gather information on problem from user (ISS)
- 12.11.10 Given access to hardware & software conduct appropriate diagnostic tests (ISS)
- 12.11.11 Given access to hardware & software repair/replace malfunctioning hardware
- 12.11.12 Given access to hardware & software reinstall software as needed
- 12.11.13 Given access to hardware & software recover data and/or files
- 12.11.14 Given access to hardware & software restore system to normal operating standards

Unit 13: **Operating Systems**

Competency 13.1: Describe system components (ISS, NS, PSD = P)

Competency Builders:

- 13.1.1 Demonstrate knowledge of central processing unit (CPU) control and architecture given textbook outline with 90% accuracy
- 13.1.2 Demonstrate knowledge of operating system architecture types given textbook outline with 90% accuracy
- 13.1.3 Identify operating system goals given textbook outline with 90% accuracy
- 13.1.4 Demonstrate knowledge of operating system structuring methods, layered models, and the object-server model given textbook outline with 90% accuracy
- 13.1.5 Differentiate between microcomputer, minicomputer, and mainframe operating systems given textbook outline with 90% accuracy
- 13.1.6 Demonstrate knowledge of network operating systems given textbook outline with 90% accuracy
- 13.1.7 Define the role of memory management in an operating system given textbook outline with 90% accuracy
- 13.1.8 Demonstrate knowledge of the basics of process management given textbook outline with 90% accuracy
- 13.1.9 Demonstrate knowledge of the commands used to handle tasks in operating systems given textbook outline with 90% accuracy
- 13.1.10 Demonstrate knowledge of the system utilities used for file management given textbook outline with 90% accuracy
- 13.1.11 Differentiate between a compiler and an interpreter given textbook outline with 90% accuracy
- 13.1.12 Demonstrate knowledge of interface theory in an operating system given textbook outline with 90% accuracy

Competency 13.2: Demonstrate knowledge of computer memory (ISS, NS, PSD = I)

Competency Builders:

- 13.2.1 Differentiate between memory types for PCs, mainframes, minicomputers, and networks (ISS, PSD) given textbook outline with 90% accuracy
- 13.2.2 Differentiate between the functions of extended memory, expanded memory, and cache memory (ISS, PSD) given textbook outline with 90% accuracy
- 13.2.3 Demonstrate knowledge of the role of the relationship between memory and software applications (ISS, PSD) given textbook outline with 90% accuracy
- 13.2.4 Demonstrate knowledge of memory management functions (e.g., contiguous allocation, paging, segmentation, virtual memory) (ISS, PSD) given textbook outline with 90% accuracy
- 13.2.5 Demonstrate knowledge of the role of physical memory and registers (ISS) given textbook outline with 90% accuracy
- 13.2.6 Demonstrate knowledge of the role of overlays, swapping, partitions (ISS, PSD) given textbook outline with 90% accuracy

- 13.2.7 Demonstrate knowledge of the role of pages and segments (ISS) given textbook outline with 90% accuracy
- 13.2.8 Demonstrate knowledge of the role of free lists, layout, servers, interrupts, recovery from failures (ISS) given textbook outline with 90% accuracy

Competency 13.3: Demonstrate knowledge of auxiliary storage (ISS, NS = I, PSD = P)

Competency Builders:

- 13.3.1 Demonstrate knowledge of operational characteristics of storage media (ISS, NS) given media description with 100% accuracy
- 13.3.2 Identify capacities of storage media (ISS, NS) given media type with 100% accuracy
- 13.3.3 Demonstrate knowledge of retrieval methods for storage media (ISS, NS) given media type with 100% accuracy
- 13.3.4 Differentiate between files and directories (ISS, NS) given a listing of files with 100% accuracy
- 13.3.5 Differentiate between types of storage devices (e.g., disk, tape, CD-ROM) (ISS, NS) given textbook description with 100% accuracy
- 13.3.6 Demonstrate knowledge of mirroring and RAID concepts given textbook description with 90% accuracy
- 13.3.7 Select storage management software to accommodate storage needs given system requirements with 90% accuracy
- 13.3.8 Select auxiliary storage media given appropriate media devices with 100% accuracy
- 13.3.9 Demonstrate knowledge of compression techniques (e.g., data, image, video, audio) given appropriate media devices with 100% accuracy

Competency 13.4: Maintain security requirements (ISS, NS, PSD = I)

Competency Builders:

- 13.4.1 Implement security procedures in accordance with business ethics (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.2 Ensure compliance with security rules, regulations, and codes (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.3 Maximize threat reduction given realistic scenario with 90% accuracy
- 13.4.4 Assess exposure to security issues given realistic scenario with 90% accuracy
- 13.4.5 Implement countermeasures given realistic scenario with 90% accuracy
- 13.4.6 Maintain confidentiality (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.7 Load virus detection and protection software (ISS, PSD) given appropriate software with 100% accuracy
- 13.4.8 Identify sources of virus infections (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.9 Remove viruses (ISS, PSD) given appropriate software with 100% accuracy
- 13.4.10 Report viruses in compliance with company standards given realistic scenario with 90% accuracy
- 13.4.11 Implement backup and recovery procedures (ISS, PSD) given realistic scenario with 90% accuracy

- 13.4.12 Demonstrate knowledge of potential internal and external threats to security (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.13 Follow disaster plan (ISS, PSD) given realistic scenario with 90% accuracy
- 13.4.14 Provide for user authentication (e.g., assign passwords, access level) given realistic scenario with 90% accuracy
- 13.4.15 Demonstrate knowledge of virus protection strategy given realistic scenario with 90% accuracy
- 13.4.16 Document security procedures given realistic scenario with 90% accuracy

Competency 13.5: Operate system (ISS, NS = I, PSD = IR)

Competency Builders:

- 13.5.1 Apply basic commands of operating system software (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.2 Apply appropriate file and disk management techniques (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.3 Employ desktop operating skills (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.4 Handle materials and equipment in a responsible manner (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.5 Secure needed supplies and resources (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.6 Access needed information using appropriate reference materials (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.7 Review automated scheduling software (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.8 Identify data requirements (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.9 Follow power-up and log-on procedures (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.10 Interact with/respond to system messages using console device (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.11 Run applications/jobs in accordance with processing procedures (ISS, NS, PSD) given teacher instruction with 100% accuracy
- 13.5.12 Identify scheduling priority in programming given teacher instruction with 100% accuracy
- 13.5.13 Develop audit trails given teacher instruction with 100% accuracy
- 13.5.14 Build system software command structures using operating system macro facilities for computer systems given teacher instruction with 100% accuracy
- 13.5.15 Follow log-off and power-down procedure(s) (ISS, NS, PSD) given teacher instruction with 100% accuracy

Competency 13.6: Maintain system (ISS, NS, PSD = I)

Competency Builders:

- 13.6.1 Access needed information using appropriate reference materials (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.2 Handle materials and equipment in a responsible manner (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.3 Monitor system status and performance (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.4 Run diagnostics (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.5 Respond to system messages (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.6 Document computer system malfunction(s) (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.7 Document software malfunction(s) (ISS, NS) given teacher instruction with 100% accuracy
- 13.6.8 Fix recoverable problems given teacher instruction with 100% accuracy
- 13.6.9 Perform preventive maintenance procedures on computer and peripheral devices given teacher instruction with 100% accuracy
- 13.6.10 Install software packages given teacher instruction with 100% accuracy
- 13.6.11 Restore system given teacher instruction with 100% accuracy
- 13.6.12 Optimize windows environment to maximize performance of desktop resources given teacher instruction with 100% accuracy
- 13.6.13 Review automated scheduling software given teacher instruction with 100% accuracy
- 13.6.14 Create and use logical files given teacher instruction with 100% accuracy
- 13.6.15 Create a query to extract information from a file given teacher instruction with 100% accuracy
- 13.6.16 Create a query to extract information from multiple files given teacher instruction with 100% accuracy
- 13.6.17 Create reports from queries given teacher instruction with 100% accuracy
- 13.6.18 Develop a display screen for use with a high-level language program given teacher instruction with 100% accuracy

Competency 13.7: Perform standard computer backup procedures (ISS, PSD = P, IM = I)

Competency Builders:

- 13.7.1 Recognize the need for regular backup procedures (NS) given teacher instruction with 100% accuracy
- 13.7.2 Develop backup process (NS) given teacher instruction with 100% accuracy
- 13.7.3 Load backup software given teacher instruction with 100% accuracy
- 13.7.4 Perform restore operation using backup software given teacher instruction with 100% accuracy
- 13.7.5 Load compression drive backup software given teacher instruction with 100% accuracy
- 13.7.6 Perform restore operation using compression drive backup software given teacher instruction with 100% accuracy

- 13.7.7 Identify battery backup equipment (NS) given teacher instruction with 100% accuracy
- 13.7.8 Maintain battery backup system given teacher instruction with 100% accuracy
- 13.7.9 Install surge suppression protection given teacher instruction with 100% accuracy

Competency 13.8: Provide support and training (NS, PSD = IR)

Competency Builders:

- 13.8.1 Operate help desk (NS, PSD) given teacher instruction with 90% accuracy
- 13.8.2 Employ desktop productivity tools (NS, PSD) given teacher instruction with 100% accuracy
- 13.8.3 Support computer users (NS, PSD) given teacher instruction with 90% accuracy
- 13.8.4 Train computer users (NS, PSD) given teacher instruction with 90% accuracy
- 13.8.5 Support Network Operating Center (NOC) (NS, PSD) given teacher instruction with 90% accuracy

Competency 13.9: Employ computer system interfaces (ISS, PSD = I, NS = P)

Competency Builders:

- 13.9.1 Define hardware-software interface issues for a computer system (ISS) given teacher instruction with 90% accuracy
- 13.9.2 Identify standards and issues related to I/O programming and design of I/O interfaces given teacher instruction with 90% accuracy
- 13.9.3 Interface peripheral devices/controllers in the computer system (e.g., software and hardware interrupts, exceptions, Direct Memory Addressing [DMA], bus structures) given teacher instruction with 90% accuracy
- 13.9.4 Apply concepts of privileged instructions and protected mode programming given teacher instruction with 90% accuracy
- 13.9.5 Configure peripheral device drivers (e.g., disk, display, printer, modem, keyboard, mouse, network) (ISS) given device requirements with 100% accuracy
- 13.9.6 Apply advanced I/O concepts (e.g., disk caching, data compression, extended memory, magnetic disk/CD-ROM storage and formats) given teacher instruction with 90% accuracy
- 13.9.7 Identify CPU modes of operations (ISS) given teacher instruction with 100% accuracy
- 13.9.8 Allocate disk space, non-sharable resources, and I/O devices given teacher instruction with 90% accuracy

Competency 13.10: Demonstrate knowledge of advanced operating system concepts and mechanisms

Competency Builders:

- 13.10.1 Identify techniques and language primitives for process synchronization
- 13.10.2 Identify techniques and algorithms for deadlock-handling and distributed mutual exclusion
- 13.10.3 Identify techniques and distributed algorithms for fault-tolerance and concurrency control

- 13.10.4 Demonstrate knowledge of concepts of distributed time and space
- 13.10.5 Identify correctness proofs for concurrent systems
- 13.10.6 Demonstrate knowledge of how to create, compile and test a control language program

Unit 14: Networking

Competency 14.1: Demonstrate knowledge of basic network classifications and topologies

Competency Builders:

- 14.1.1 Interpret basic networking terminology given resource material with 85% accuracy
- 14.1.2 Differentiate between LANs, MANs and WANs given resource material with 85% accuracy
- 14.1.3 Demonstrate knowledge of how to turn LANs into MANs and WANs given resource material with 85% accuracy
- 14.1.4 Identify the basic point-to-point network topologies (e.g., star, ring, tree, network, irregular) given resource material with 85% accuracy
- 14.1.5 Demonstrate knowledge of packet-switching techniques given resource material with 85% accuracy
- 14.1.6 Identify the basic broadcast topologies (e.g., star ring, bus) given resource material with 85% accuracy
- 14.1.7 Demonstrate knowledge of the characteristics of connection-oriented and connectionless networks given resource material with 85% accuracy
- 14.1.8 Identify standard high-speed networks (e.g., broadband, ISDN, SMDS, ATM, FDDI) given resource material with 85% accuracy
- 14.1.9 Identify emerging networks (e.g., ATM; ISDN; satellite nets; optic nets; integrated voice, data, and video) given resource material with 85% accuracy

Competency 14.2: Demonstrate knowledge of local-area network (LAN) trends and issues

Competency Builders:

- 14.2.1 Demonstrate knowledge of the reasons for installing a network given resource material with 85% accuracy
- 14.2.2 Trace the evolution of networks given resource material with 85% accuracy
- 14.2.3 Analyze current trends and developments in LANs given resource material with 85% accuracy

Competency 14.3: Demonstrate knowledge of common network computing platforms

Competency Builders:

- 14.3.1 Differentiate between personal computers and workstations given resource material with 85% accuracy (ISS)
- 14.3.2 Identify the basic features of standard microprocessors (e.g., Intel family, RISC, Cyrix) given resource material with 85% accuracy (ISS)
- 14.3.3 Identify standard memory types (e.g., RAM, ROM, PROM, EPROM, EEPROM) given resource material with 85% accuracy (ISS)
- 14.3.4 Identify standard input/output devices (e.g., ISA, EISA, Micro Channel, PCI, universal serial bus, drive controllers, SCSI and SCSI 2, PCMCIA, firewire) given resource material with 85% accuracy (ISS)
- 14.3.5 Identify the basic features of standard operating systems (e.g., Windows 3.1, 95, 98, CE, Workgroups, NT; OS/2; Macintosh OS; Solaris) given resource material with 85% accuracy (ISS)
- 14.3.6 Identify the basic features of standard workstation processors given resource material with 85% accuracy
- 14.3.7 Identify standard CPU architectures for mid-range computers given resource material with 85% accuracy
- 14.3.8 Identify standard operating system software for mid-range computers given resource material with 85% accuracy (ISS)
- 14.3.9 Identify basic mainframe capabilities given resource material with 85% accuracy (ISS)
- 14.3.10 Identify basic mainframe attributes (e.g., size, system capacity, processor speeds, fault tolerance, security, transaction processing) given resource material with 85% accuracy (ISS)
- 14.3.11 Identify common mainframe vendors (e.g., IBM, Amdahl, Hitachi Data Systems, Digital) given resource material with 85% accuracy (ISS)

Competency 14.4: Demonstrate knowledge of LAN physical media

Competency Builders:

- 14.4.1 Differentiate between baseband and broadband transmission given resource material with 85% accuracy (ISS)
- 14.4.2 Demonstrate knowledge of Manchester encoding given resource material with 85% accuracy
- 14.4.3 Identify the criteria used in making cable selection decisions (e.g., physical properties, transmission technologies, transmission span, bandwidth, topology, security, noise immunity, installation considerations, cost) given resource material with 85% accuracy
- 14.4.4 Demonstrate knowledge of cable types (e.g., coaxial, twisted-pair, optical fibers) given resource material with 85% accuracy (ISS)
- 14.4.5 Compare/contrast a cable types given resource material with 85% accuracy
- 14.4.6 Demonstrate knowledge of types of cable connectors and grounding techniques given resource material with 85% accuracy
- 14.4.7 Demonstrate knowledge of typical cable applications given resource material with 85% accuracy

- 14.4.8 Demonstrate knowledge of cable standards (e.g., ANSI, EIA/TIA-568, EIA/TIA-569, TWSS, NEC) given resource material with 85% accuracy
- 14.4.9 Identify the advantages and disadvantages of LAN cabling systems given resource material with 85% accuracy
- 14.4.10 Demonstrate knowledge of LAN system physical layouts given resource material with 85% accuracy
- 14.4.11 Demonstrate knowledge of how to conduct cable installation site survey given resource material with 85% accuracy
- 14.4.12 Demonstrate knowledge of how to estimate cable and components required based on installation site survey results given resource material with 85% accuracy
- 14.4.13 Demonstrate knowledge of checks that need to be made prior to installing cable given resource material with 85% accuracy
- 14.4.14 Demonstrate knowledge of the documentation and labeling needed when installing cable given resource material with 85% accuracy
- 14.4.15 Demonstrate knowledge of accepted methods for installing cable given resource material with 85% accuracy
- 14.4.16 Demonstrate knowledge of typical problems associated with cable installation given resource material with 85% accuracy
- 14.4.17 Demonstrate knowledge of cable testing and tolerance levels given resource material with 85% accuracy
- 14.4.18 Demonstrate knowledge of possible sources of interference and methods for overcoming each given resource material with 85% accuracy
- 14.4.19 Demonstrate knowledge of basic cabling schemes and alternatives given resource material with 85% accuracy

Competency 14.5: Demonstrate knowledge of network connectivity basics

Competency Builders:

- 14.5.1 Demonstrate knowledge of the characteristics and functions of point-to-point channels, switched, and meshed network given resource material with 85% accuracy (ISS)
- 14.5.2 Demonstrate knowledge of the characteristics and functions of broadcast channels given resource material with 85% accuracy (ISS)
- 14.5.3 Identify software used to connect networking devices given resource material with 85% accuracy (ISS)
- 14.5.4 Demonstrate knowledge of types of interoperability (e.g., peer-to-peer, peer-to-host) given resource material with 85% accuracy (ISS)
- 14.5.5 Demonstrate knowledge of Internet, Intranet, and Extranet usage and connectivity given resource material with 85% accuracy (ISS)

Competency 14.6: Differentiate processes, services, and protocols

Competency Builders:

- 14.6.1 Demonstrate knowledge of protocol concepts (e.g., converters, basic layering concepts, peer communication, routing, stacks/suites) given resource material with 85% accuracy (NS)
- 14.6.2 Differentiate between a process and a protocol given resource material with 85% accuracy (NS)
- 14.6.3 Demonstrate knowledge of standard types of cooperative processes (e.g., peer-to-peer, client server, master-slave) given resource material with 85% accuracy (NS)
- 14.6.4 Identify the advantages and disadvantages of standard protocols given resource material with 85% accuracy (NS)
- 14.6.5 Demonstrate knowledge of the purposes of, and procedures for, encapsulation and decapsulation given resource material with 85% accuracy (NS)
- 14.6.6 Demonstrate knowledge of network address protocols (e.g., frame, packet, process) given resource material with 85% accuracy (NS)

Competency 14.7: Demonstrate knowledge of the Open Systems Interconnection (OSI) standard (ISO Standard 7498)

Competency Builders:

- 14.7.1 Identify the benefits of using a layered network model given resource material with 85% accuracy (NS)
- 14.7.2 Identify the seven layers at which decisions must be made according to the OSI standard given resource material with 85% accuracy (NS)
- 14.7.3 Demonstrate knowledge of OSI stack positions and their relationship to one another given resource material with 85% accuracy (NS)
- 14.7.4 Demonstrate knowledge of the decisions to be made in the OSI physical layer (Layer 1) given resource material with 85% accuracy (NS)
- 14.7.5 Demonstrate knowledge of the decisions to be made in the OSI data link layer (Layer 2) given resource material with 85% accuracy (NS)
- 14.7.6 Demonstrate knowledge of the decisions to be made in the OSI network layer (Layer 3) given resource material with 85% accuracy (NS)
- 14.7.7 Demonstrate knowledge of the decisions to be made in the OSI transport layer (Layer 4) given resource material with 85% accuracy (NS)
- 14.7.8 Differentiate between how OSI Layers 1-4 and Layers 5-7 given resource material with 85% accuracy (NS)
- 14.7.9 Demonstrate knowledge of the decisions to be made in the OSI session layer (Layer 5) given resource material with 85% accuracy (NS)

- 14.7.10 Demonstrate knowledge of the decisions to be made in the OSI presentation layer (Layer 6) given resource material with 85% accuracy (NS)
- 14.7.11 Demonstrate knowledge of the decisions to be made in the OSI application layer (Layer 7) given resource material with 85% accuracy (NS)

Competency 14.8: Demonstrate knowledge of communication standards for networks

Competency Builders:

- 14.8.1 Demonstrate knowledge of digital data communication techniques and standards, including asynchronous and synchronous transmission, error detection and correction codes, and physical interfaces (e.g., RS-232, RS-422) given resource material with 85% accuracy (NS)
- 14.8.2 Identify software standards for subnet, presentation layers, and file servers given resource material with 85% accuracy (NS)
- 14.8.3 Demonstrate knowledge of data-transmission basics given resource material with 85% accuracy (NS)
- 14.8.4 Demonstrate knowledge of data-encoding basics given resource material with 85% accuracy (NS)
- 14.8.5 Demonstrate knowledge of the binary numbering system given resource material with 85% accuracy (NS)
- 14.8.6 Demonstrate knowledge of the hexadecimal system given resource material with 85% accuracy (NS)
- 14.8.7 Convert binary numbers to decimal equivalents and vice versa given resource material with 85% accuracy (NS)
- 14.8.8 Demonstrate knowledge of the ASCII representation of characters given resource material with 85% accuracy (NS)
- 14.8.9 Demonstrate knowledge of the EBCDIC representation of characters given resource material with 85% accuracy (NS)
- 14.8.10 Convert ASCII characters to EBCDIC equivalents and vice versa given resource material with 85% accuracy (NS)

Unit 15: Network Architectures

Competency 15.1: Demonstrate knowledge of the basics of network architecture

Competency Builders:

- 15.1.1 Demonstrate knowledge of the characteristics and uses of network components (e.g., hub, switches, routers, firewall) given resource material with 85% accuracy
- 15.1.2 Identify LAN transmission methods (e.g., bus, pure ring, star ring topologies) given resource material with 85% accuracy
- 15.1.3 Demonstrate knowledge of broadband and baseband transmission methods and standards given resource material with 85% accuracy
- 15.1.4 Demonstrate knowledge of LAN transmission logic given resource material with 85% accuracy
- 15.1.5 Identify LAN transmission media (e.g., twisted pair, fiber-optic cable, wireless) given resource material with 85% accuracy
- 15.1.6 Demonstrate knowledge of LAN medium-access protocols (e.g., CSMA/CD, token bus, token ring, FDDI) given resource material with 85% accuracy
- 15.1.7 Identify the components of, and relationships within, the OSI 8802 (IEEE 802) protocol suite given resource material with 85% accuracy
- 15.1.8 Demonstrate knowledge of LAN protocol issues with medium-access control and data communications protocol given resource material with 85% accuracy
- 15.1.9 Identify LAN performance factors (signal attenuation, signal propagation delay) given resource material with 85% accuracy
- 15.1.10 Compare/contrast various frame formats for LANs given resource material with 85% accuracy
- 15.1.11 Demonstrate knowledge of frame types (e.g., SNS<802.3, 802.5) given resource material with 85% accuracy
- 15.1.12 Demonstrate a basic knowledge of OSI modelling given resource material with 85% accuracy
- 15.1.13 Differentiate between a physical and logical topology given resource material with 85% accuracy

Competency 15.2: Demonstrate knowledge of the basics of Ethernet technology

Competency Builders:

- 15.2.1 Demonstrate knowledge of available Ethernet topology given resource material with 85% accuracy
- 15.2.2 Demonstrate knowledge of the Ethernet media-access algorithm given resource material with 85% accuracy
- 15.2.3 Demonstrate knowledge of basic Ethernet configurations (e.g., simple, hub, hubs and bridges, server, switch) given resource material with 85% accuracy
- 15.2.4 Evaluate the advantages and disadvantages of an Ethernet network given resource material with 85% accuracy

Competency 15.3: Demonstrate knowledge of the basics of token ring technology

Competency Builders:

- 15.3.1 Demonstrate knowledge of the characteristics of a token ring network given resource material with 85% accuracy
- 15.3.2 Demonstrate knowledge of token ring information-flow/media-access control given resource material with 85% accuracy
- 15.3.3 Demonstrate knowledge of the token ring send algorithm given resource material with 85% accuracy
- 15.3.4 Identify token ring configurations (simple, IBM host) given resource material with 85% accuracy
- 15.3.5 Evaluate the advantages and disadvantages of a token ring network given resource material with 85% accuracy

Competency 15.4: Demonstrate knowledge of the basics of token bus, Fiber Distributed-Data Interface (FDDI), and wireless LAN technology

Competency Builders:

- 15.4.1 Identify token bus configuration given resource material with 85% accuracy
- 15.4.2 Evaluate token bus advantages and disadvantages given resource material with 85% accuracy
- 15.4.3 Demonstrate knowledge of Fiber Distributed-Data Interface (FDDI) technology given resource material with 85% accuracy
- 15.4.4 Identify the key components of wireless LAN technology (e.g., spread-spectrum radio, infrared light, narrow-band radio) given resource material with 85% accuracy
- 15.4.5 Evaluate the advantages and disadvantages of a wireless LAN given resource material with 85% accuracy

Competency 15.5: Demonstrate knowledge of the TCP/IP protocol

Competency Builders:

- 15.5.1 Demonstrate knowledge of the basics of TCP/IP layers, components, and functions given resource material with 85% accuracy (NS)
- 15.5.2 Identify how the TCP layers relate to the OSI model given resource material with 85% accuracy (NS)
- 15.5.3 Demonstrate knowledge of the TCP and IP delivery service given resource material with 85% accuracy (NS)
- 15.5.4 Identify TCP/IP applications and services (e.g., rlogin, SMTP, telnet, FTP, Domain, NFS) given resource material with 85% accuracy (NS)
- 15.5.5 Demonstrate knowledge of TCP/IP protocol details (e.g., Internet addresses, dotted decimal notation, ARP, RARP, IP datagram format, routing IP datagrams, TCP segment format) given resource material with 85% accuracy (NS)
- 15.5.6 Identify the services provided by the major TCP/IP applications given resource material with 85% accuracy (NS)

Competency 15.6: Demonstrate knowledge of basic communication protocols

Competency Builders:

- 15.6.1 Demonstrate knowledge of ARPANET, MILNET and NSFnet and their relationship to the Internet given resource material with 85% accuracy
- 15.6.2 Demonstrate knowledge of how names and addresses are determined for LANs given resource material with 85% accuracy
- 15.6.3 Identify components of a Class B Internet address in dotted decimal form given resource material with 85% accuracy
- 15.6.4 Demonstrate knowledge of the form of a hierarchical Internet name given resource material with 85% accuracy
- 15.6.5 Differentiate between an ordinary and gateway node given resource material with 85% accuracy
- 15.6.6 Demonstrate knowledge of the IPX/SPX protocol and how it works together with TCP/IP given resource material with 85% accuracy
- 15.6.7 Identify the basics of the ARP/RARP protocol given resource material with 85% accuracy
- 15.6.8 Identify the contents of the Address Resolution Protocol (ARP) cache given resource material with 85% accuracy
- 15.6.9 Identify the basics of the DNS, HTTP, telnet, and FTP protocols given resource material with 85% accuracy
- 15.6.10 Identify the basics of the Simple Network Management Protocol (SNMP) given resource material with 85% accuracy
- 15.6.11 Compare/contrast SNMP functions to the OSI model given resource material with 85% accuracy
- 15.6.12 Identify the basics of the PAP and CHAP protocols given resource material with 85% accuracy
- 15.6.13 Identify the basics of MAC layer protocols given resource material with 85% accuracy
- 15.6.14 Identify the levels at which networking can occur given resource material with 85% accuracy
- 15.6.15 Differentiate between architectures (e.g., ISO, SNA, DNA) given resource material with 85% accuracy

Competency 15.7: Install basic system architectures using current Windows operating system software

Competency Builders:

- 15.7.1 Configure a client desktop for network communications in Windows given resource material with 85% accuracy
- 15.7.2 Share files between two computers on a network using Windows given resource material with 85% accuracy
- 15.7.3 Design a system to direct cable-connect two computers using Windows given resource material with 85% accuracy
- 15.7.4 Expand PC memory given resource material with 85% accuracy

Unit 16: Network Operating Systems

Competency 16.1: Demonstrate knowledge of the general characteristics of network operating systems

Competency Builders:

- 16.1.1 Given handout, identify the purposes of a network operating system (NOS) with 85% accuracy (NS, PSD).
- 16.1.2 Given student textbook, differentiate between network operating systems and data distribution systems with 85% accuracy (NS, PSD).
- 16.1.3 Given student textbook, identify how the four components of a network operating system (i.e., server platform, network services software, network redirection software, communications software) support network operations with 85% accuracy (NS, PSD).
- 16.1.4 Given handout, define the criteria used to evaluate network operating systems with 85% accuracy (NS, PSD).
- 16.1.5 Given student textbook, identify how protocols are supported with 85% accuracy (NS, PSD).
- 16.1.6 Given handout, identify licensing requirements with 100% accuracy (NS, PSD).
- 16.1.7 Given handout, demonstrate knowledge of the characteristics of the client/server models with 85% accuracy (NS, PSD).
- 16.1.8 Given handout, analyze the advantages and disadvantages of the client/server model with 85% accuracy (NS, PSD).
- 16.1.9 Given student textbook, demonstrate knowledge of a typical program function call with 100% accuracy (NS, PSD).
- 16.1.10 Given student textbook, identify the properties of open systems with 85% accuracy (NS, PSD).
- 16.1.11 Given student textbook, demonstrate knowledge of LAN connectivity issues with 85% accuracy (NS, PSD).

Competency 16.2: Demonstrate knowledge of network operating systems (i.e., Novell NetWare, Windows NT, LINUX, UNIX, IBM Network, AppleTalk)

Competency Builders:

- 16.2.1 Given student textbook, identify network architecture with 100% accuracy (NS, PSD).
- 16.2.2 Given student textbook, differentiate between network systems and OSI 85% accuracy (NS, PSD).
- 16.2.3 Given handout, identify capabilities of network systems with 85% accuracy (NS, PSD).
- 16.2.4 Given periodicals, demonstrate knowledge of network support systems with 85% accuracy (NS, PSD).
- 16.2.5 Given student textbook, demonstrate knowledge of protocols with 85% accuracy (NS, PSD).
- 16.2.6 Given student textbook, identify network models with 100% accuracy (NS, PSD).
- 16.2.7 Given periodicals, identify unique network tools with 85% accuracy (NS, PSD).

16.2.8 Given student textbook, demonstrate knowledge of network software with 85% accuracy (NS, PSD).

Competency 16.3: Install network system

Competency Builders:

- 16.3.1 Given NOS, create domain trusts with 100% accuracy (ISS, NS).
- 16.3.2 Given NOS, maintain domain controllers with 100% accuracy (ISS, NS).
- 16.3.3 Given client/server network, make policy changes with 100% accuracy (ISS, NS).
- 16.3.4 Given client/server network, employ policy templates with 100% accuracy (ISS, NS).
- 16.3.5 Given client/server network, create user accounts, groups, and login scripts with 100% accuracy (ISS, NS).
- 16.3.6 Given client/server network, control access to files and directories with 100% accuracy (ISS, NS).
- 16.3.7 Given NOS, establish shared network resources with 100% accuracy (ISS, NS).
- 16.3.8 Given NOS, configure network domain accounts and profiles with 100% accuracy (ISS, NS).
- 16.3.9 Given NOS, implement system policies with 100% accuracy (ISS, NS).
- 16.3.10 Given NOS, create roaming user profiles with 100% accuracy (ISS, NS).
- 16.3.11 Given NOS, troubleshoot network performance with 100% accuracy (ISS, NS).

Unit 17: Wide-Area Networks

Competency 17.1: Demonstrate knowledge of basic telecommunications and the interconnection of networks

Competency Builders:

- 17.1.1 Given student textbook, demonstrate knowledge of WAN technology (e.g., subrate facilities, dataphone, digital service, multiplexers, time division multiplexing, modems, RS-232) with 85% accuracy.
- 17.1.2 Given student textbook, demonstrate knowledge of the different types of WAN connections with 85% accuracy.
- 17.1.3 Given student textbook, demonstrate knowledge of point-to-point (PPP) interconnection with 85% accuracy.
- 17.1.4 Given web access, identify basic telecommunications services (e.g., satellite, circuit switching, packet switching, wireless) with 85% accuracy.
- 17.1.5 Given web access, differentiate between local exchange carriers (LECs) and interexchange carriers (IXCs or IECs) with 85% accuracy.
- 17.1.6 Given web access, define local access and transport areas (LATAs) with 85% accuracy.
- 17.1.7 Given periodicals, identify long-distance carriers and their services with 85% accuracy.
- 17.1.8 Given periodicals, identify packet carriers and their services with 85% accuracy.
- 17.1.9 Given periodicals, identify the role of telecommunications tariffs with 85% accuracy.

Competency 17.2: Assess user needs for a wide-area network (WAN)

Competency Builders:

- 17.2.1 Given LAN analyzer, determine availability from LAN to meet requirements of WAN with 100% accuracy.
- 17.2.2 Given site specifications, determine the speed needed between sites to access applications with 100% accuracy.
- 17.2.3 Given site specifications, determine the subsets needed on the WAN with 100% accuracy.
- 17.2.4 Given LAN analyzer, evaluate transmission options with 100% accuracy.

Competency 17.3: Design WAN systems

Competency Builders:

- 17.3.1 Given student textbook, demonstrate knowledge of electronic communication (e.g., LAN, Internets, remote database access, EDI) with 85% accuracy.
- 17.3.2 Given student textbook, demonstrate knowledge of basic telephony (analog vs. digital signals) with 85% accuracy.
- 17.3.3 Given student textbook, demonstrate knowledge of the conversion of analog speech to digital with 85% accuracy.
- 17.3.4 Given web access, investigate emerging technologies with 85% accuracy.

- 17.3.5 Given student textbook, relate voice, data concepts, and video to wide-area networks with 85% accuracy.
- 17.3.6 Given handout, select primary and backup data circuits with 100% accuracy.
- 17.3.7 Given site specifications, evaluate analog and digital transmission for cost, performance, and reliability with 85% accuracy.
- 17.3.8 Given LAN/WAN configurations, create firewalls between trusted network and WAN with 100% accuracy.
- 17.3.9 Given LAN/WAN configurations, establish a Virtual Private Network (VPN) to form the infrastructure of the WAN with 100% accuracy.
- 17.3.10 Given site specifications, determine routers needed to connect LAN with 100% accuracy.
- 17.3.11 Given local ISP, interconnect LANs using WAN services with 100% accuracy.
- 17.3.12 Given site specifications, incorporate cost-savings approaches, including frame-relay ATM and voice/video/data compression with 85% accuracy.

Unit 18: Information Systems (IS) Theory

Competency 18.1: Demonstrate a basic knowledge of systems theory and quality concepts (ISS, NS, PSD = I)

Competency Builders:

- 18.1.1 Demonstrate knowledge of the underlying concepts of the information systems discipline (ISS, NS) given teacher instruction with 85% accuracy
- 18.1.2 Compare/contrast data, information, and knowledge (ISS, NS) given teacher instruction with 85% accuracy
- 18.1.3 Demonstrate knowledge of methods for achieving productivity in knowledge work (NS) given teacher instruction with 85% accuracy
- 18.1.4 Apply general systems theory to the analysis and development of an information system (NS) given teacher instruction with 85% accuracy
- 18.1.5 Identify the properties of open systems (NS) given teacher instruction with 85% accuracy
- 18.1.6 Define the relationship between system components (ISS, NS) given teacher instruction with 85% accuracy
- 18.1.7 Characterize the role of data representation, both non-numeric and numeric (e.g., integers, reals, errors) (ISS, NS) given teacher instruction with 85% accuracy
- 18.1.8 Identify procedures for formal problem solving (NS) given teacher instruction with 85% accuracy
- 18.1.9 Demonstrate knowledge of the fundamental concept of information theory and organizational system processes (ISS, NS) given teacher instruction with 85% accuracy
- 18.1.10 Identify the essential properties of information systems (NS) given teacher instruction with 85% accuracy
- 18.1.11 Differentiate between the role of information systems within a company and their role in a global environment (NS) given teacher instruction with 85% accuracy

Competency 18.2: Identify system infrastructure (NS, PSD = I)

Competency Builders:

- 18.2.1 Select a systems development model given teacher instruction with 85% accuracy
- 18.2.2 Demonstrate knowledge of the components of the system infrastructure (e.g., hardware, communications, database, site) given teacher instruction with 85% accuracy
- 18.2.3 Identify the relationship of users and suppliers to the system given teacher instruction with 85% accuracy
- 18.2.4 Identify the objectives of system given teacher instruction with 85% accuracy
- 18.2.5 Identify the process for selecting software products and processes given teacher instruction with 85% accuracy
- 18.2.6 Identify the development cycle given teacher instruction with 85% accuracy
- 18.2.7 Outline the system controls given teacher instruction with 85% accuracy

Competency 18.3: Select systems development approach

Competency Builders:

- 18.3.1 Summarize application planning, development, and risk management for information system
- 18.3.2 Identify potential problems in system implementation
- 18.3.3 Determine whether prototyping system is feasible
- 18.3.4 Develop a plan using data-oriented techniques
- 18.3.5 Employ object-oriented development techniques
- 18.3.6 Employ process-oriented development techniques
- 18.3.7 Evaluate systems engineering considerations
- 18.3.9 Determine software design process, from specification to implementation
- 18.3.10 Appraise software process and product life-cycle models
- 18.3.11 Assess software design methods and tools

Competency 18.4: Compare/contrast individual and collaborative knowledge work

Competency Builders:

- 18.4.1 Identify stakeholders in a given IS context
- 18.4.2 Identify desired group and team behavior in an IS context
- 18.4.3 Demonstrate knowledge of how to apply team methods to empower coworkers
- 18.4.4 Measure empowerment and effectiveness
- 18.4.5 Identify knowledge-building and knowledge-maintaining tasks
- 18.4.6 Differentiate between individual and group technology
- 18.4.7 Demonstrate knowledge of the characteristics and attributes of knowledge work for both individual and group technology
- 18.4.8 Demonstrate knowledge of group support technology for common knowledge requirements
- 18.4.9 Identify work modifications necessitated by working in groups (e.g., additional processing)
- 18.4.10 Evaluate success of work
- 18.4.11 Demonstrate knowledge of the information analysis process
- 18.4.12 Demonstrate knowledge of information technology solutions

Competency 18.5: Plan strategies for implementing system (NS, PSD = I)

Competency Builders:

- 18.5.1 Identify data requirements through questioning of individuals and groups given a written situation with 90% accuracy
- 18.5.2 Determine information requirements through analysis of individual and group tasks given a written situation with 90% accuracy
- 18.5.3 Identify information technology requirements for given worksite given a written situation with 90% accuracy
- 18.5.4 Identify computer hardware given a written situation with 90% accuracy
- 18.5.5 Specify the data structures to be implemented given a written situation with 90% accuracy
- 18.5.6 Select overall implementation strategy (e.g., top-down, bottom up; teams vs. individual) given a written situation with 90% accuracy

- 18.5.7 Analyze the interaction of the operating system and hardware architecture given a written situation with 90% accuracy
- 18.5.8 Determine the database management system to be implemented given a written situation with 90% accuracy
- 18.5.9 Establish ownership of data and system given a written situation with 90% accuracy
- 18.5.10 Determine methods for providing computing support for the end user given a written situation with 90% accuracy
- 18.5.11 Plan measures to ensure system integrity given a written situation with 90% accuracy

Competency 18.6: Facilitate measures of achievement

Competency Builders:

- 18.6.1 Evaluate potential systems solutions against criteria for success
- 18.6.2 Apply continuous improvement methodologies
- 18.6.3 Identify quality standards to be documented (e.g., ISO, Baldrige)
- 18.6.4 Identify the competitive advantage achieved through IS
- 18.6.5 Specify measurements to be taken
- 18.6.6 Assign responsibility for documentation

Unit 19: Information System Analysis and Design (NOT CORE)

Competency 19.1: Demonstrate knowledge of the role of systems analysts (ISS, PSD = I)

Competency Builders:

- 19.1.1 Identify the functions of systems analysts (ISS) given a textbook instruction with 80% accuracy
- 19.1.2 Identify the skills required for systems analysts (ISS) given a textbook instruction with 80% accuracy

Competency 19.2: Initiate a system project (PSD = I)

Competency Builders:

- 19.2.1 Identify the phases in a system project given a textbook instruction with 80% accuracy
- 19.2.2 Select basic fact-gathering techniques to be used given a textbook instruction with 80% accuracy
- 19.2.3 Define the scope of the systems project given a textbook instruction with 80% accuracy
- 19.2.4 Conduct a preliminary investigation given a textbook instruction with 80% accuracy

Competency 19.3: Perform a detailed system investigation and analysis

Competency Builders:

- 19.3.1 *Identify time, technology and resource constraints*
- 19.3.2 *Determine investigation techniques to be used*
- 19.3.3 *Record facts gathered through system investigation*
- 19.3.4 *Perform appropriate diagnostic tests*
- 19.3.5 *Investigate system alerts*
- 19.3.6 *Research technical alternatives*
- 19.3.7 *Evaluate technical alternatives*

Competency 19.4: Design an information system (PSD = I)

Competency Builders:

- 19.4.1 Execute the steps in system design given a textbook instruction with 80% accuracy
- 19.4.2 Design system output, system input, files, and processing given a textbook instruction with 80% accuracy
- 19.4.3 Analyze the interaction of the operating system and hardware architecture given a textbook instruction with 80% accuracy
- 19.4.4 Justify the communications selections for the system (e.g., single PCs, LANs and/or WANs) given a textbook instruction with 80% accuracy
- 19.4.5 Present system design to management given a textbook instruction with 80% accuracy

Competency 19.5: Develop the information system

Competency Builders:

- 19.5.1 *Execute tasks involved in system development*
- 19.5.2 *Identify the system components and their relationships*
- 19.5.3 *Specify the workflow system*
- 19.5.4 *Employ techniques to enhance the creative design process*
- 19.5.5 *Develop programming specifications*
- 19.5.6 *Program the system*
- 19.5.7 *Test the system*
- 19.5.8 *Document the system*

Competency 19.6: Evaluate applications within the information system

Competency Builders:

- 19.6.1 *Design a framework for evaluating information system functions*
- 19.6.2 *Design a framework for evaluating individual applications*
- 19.6.3 *Compare the capabilities of an application with the requirements it is intended to meet*
- 19.6.4 *Identify alternative outcomes of the application verification process*
- 19.6.5 *Evaluate the results and the probabilities of errors in application software*
- 19.6.6 *Modify inputs, outputs, and processing to refine an application*
- 19.6.7 *Recommend new features or enhancements to existing tools*

Competency 19.7: Develop IS implementation plan

Competency Builders:

- 19.7.1 *Analyze the effect of IS on the organizational structure*
- 19.7.2 *Depict the interaction between IS and continuous improvement*
- 19.7.3 *Specify the teamwork, leadership, and empowerment strategies to be used*
- 19.7.4 *Determine consensus-building process to be used*
- 19.7.5 *Convert existing files*
- 19.7.6 *Determine the system conversion method to be used*
- 19.7.7 *Document system implementation plans*

Competency 19.8: Perform management functions related to the planned change

Competency Builders:

- 19.8.1 *Schedule system change according to risk*
- 19.8.2 *Secure needed approvals for change*
- 19.8.3 *Document contingency plans*
- 19.8.4 *Formulate a time line for the implementation of change*
- 19.8.5 *Coordinate activities among work groups*
- 19.8.6 *Perform regression tests*
- 19.8.7 *Document testing results*
- 19.8.8 *Initiate problem correction*

Unit 20: System Installation and Maintenance

Competency 20.1: Apply knowledge of the life cycle of an information system

Competency Builders:

- 20.1.1 Research the concept of information system life cycles given access to research material with 90% accuracy
- 20.1.2 Identify criteria for deciding between acquisition of software packages and custom development of software given the criteria and software options with 90% accuracy

Competency 20.2: Install system

Competency Builders:

- 20.2.1 Develop a detailed training, conversion, and installation plan for an information system application given instructions and application with 100% accuracy (NS)
- 20.2.2 Design networked solutions given instructions and application with 100% accuracy (NS)
- 20.2.3 Install DBMS on the server given instructions and application with 100% accuracy (NS)
- 20.2.4 Install appropriate operating system and telecommunications hardware and software given instructions and application with 100% accuracy (NS)
- 20.2.5 Identify system requirements for various types of installations given instructions and application with 100% accuracy (NS)
- 20.2.6 Evaluate installation requirements given instructions and application with 100% accuracy (NS)
- 20.2.7 Install information system application program in accordance with requirements given instructions and application with 100% accuracy (NS)
- 20.2.8 Evaluate processes and outcomes given instructions and application with 100% accuracy (NS)
- 20.2.9 Customize a general-purpose software package to provide specific functionality beyond the default settings given instructions and application with 100% accuracy (NS)
- 20.2.10 Add capability to a software system by recording macros and storing them in the systems library given instructions and application with 100% accuracy (NS)
- 20.2.11 Access needed technical information using software help facilities given instructions and application with 100% accuracy (NS)
- 20.2.12 Operate server applications given instructions and application with 100% accuracy (NS)
- 20.2.13 Ensure that all multi-user aspects of the application function are operational given instructions and application with 100% accuracy (NS)
- 20.2.14 Operate coupled application systems given instructions and application with 100% accuracy (NS)

Competency 20.3: Perform software configuration and loading

Competency Builders:

- 20.3.1 Develop program and system specifications given instructions and software with 100% accuracy (NS)
- 20.3.2 Load software with minimum disruption of process flow given instructions and software with 100% accuracy (NS)
- 20.3.3 Convert data given instructions, software and data with 100% accuracy (NS)
- 20.3.4 Resolve compatibility issues given instructions and software with 100% accuracy (NS)
- 20.3.5 Configure software appropriately for system and user application given instructions and software with 100% accuracy (NS)
- 20.3.6 Perform software coding given instructions and software with 100% accuracy (NS)
- 20.3.7 Participate in application and system development reviews given instructions and software with 100% accuracy (NS)
- 20.3.8 Evaluate emerging technologies and their potential effect on information system software given instructions and software with 100% accuracy (NS)
- 20.3.9 Assemble necessary components to implement information system design given instructions and software with 100% accuracy (NS)

Competency 20.4: Monitor the information system

Competency Builders:

- 20.4.1 Conduct post-implementation evaluation given the implementation plan with 90% accuracy (NS)
- 20.4.2 Identify abnormal system performance given the implementation plan with 100% accuracy (NS)
- 20.4.3 Determine required service levels given the implementation plan with 100% accuracy (NS)
- 20.4.4 Monitor multiple technologies given the implementation plan with 100% accuracy (NS)
- 20.4.5 Recognize system alerts given the implementation plan with 100% accuracy (NS)
- 20.4.6 Recognize security problems given the implementation plan with 100% accuracy (NS)
- 20.4.7 Recognize environmental problems given the implementation plan and environment with 90% accuracy (NS)
- 20.4.8 Perform remote monitoring given the implementation plan with 90% accuracy (NS)

Competency 20.5: Perform system maintenance

Competency Builders:

- 20.5.1 Demonstrate knowledge of the basic elements of computer maintenance given instructions with 100% accuracy
- 20.5.2 Identify available diagnostic tools used for system maintenance given handouts with 90% accuracy
- 20.5.3 Identify maintenance procedures and processes given instructions with 90%

- accuracy
- 20.5.4 Identify problems using diagnostic tools given a scenario with 90% accuracy
 - 20.5.5 Document solutions given the scenario with 100% accuracy
 - 20.5.6 Tear down a computer given a computer and instructions with 100% accuracy
 - 20.5.7 Identify (by name) new or replacement computer components needed given a scenario and documentation with 100% accuracy
 - 20.5.8 Install/replace computer components given components with 100% accuracy
 - 20.5.9 Reassemble a computer given computer, components and instructions with 100% accuracy
 - 20.5.10 Establish a preventive maintenance plan given instructions with 100% accuracy
 - 20.5.11 Perform preventive maintenance on computer components given instructions with 100% accuracy
 - 20.5.12 Create maintenance plan for regular integrity checks given instructions with 100% accuracy
 - 20.5.13 Evaluate maintenance processes given process and instructions with 100% accuracy
 - 20.5.14 Evaluate maintenance outcomes given process and instructions with 100% accuracy

Competency 20.6: Manage backup and recovery, both on- and off-site

Competency Builders:

- 20.6.1 Develop backup plan to be used by technical support group and users given instructions and a scenario with 90% accuracy
- 20.6.2 Develop recovery plan to be used by technical support group and users given instructions and a scenario with 90% accuracy
- 20.6.3 Implement backup procedures in accordance with a regular schedule users given instructions and a scenario with 90% accuracy
- 20.6.4 Implement recovery procedures as needed users given instructions and a scenario with 90% accuracy
- 20.6.5 Evaluate whether backup and recovery plans meet users' needs users given instructions and a scenario with 90% accuracy

Competency 20.7: Troubleshoot problems

Competency Builders:

(all builders for 20.7 are for NS only)

- 20.7.1 Demonstrate knowledge of basic troubleshooting steps given instructions with 100% accuracy
- 20.7.2 Detect problems given a scenario with 100% accuracy
- 20.7.3 Identify criticality of problem given instructions and a scenario with 100% accuracy
- 20.7.4 Perform appropriate analyses to identify problem cause given instructions and a scenario with 100% accuracy
- 20.7.5 Develop resolution plan given instructions and a scenario with 100% accuracy
- 20.7.6 Identify possible solutions given instructions and a scenario with 100% accuracy
- 20.7.7 Test identified solutions given instructions and a scenario with 100% accuracy
- 20.7.8 Select most appropriate solution given instructions and a scenario with 100% accuracy

- 20.7.9 Implement selected solution given instructions and a scenario with 100% accuracy
- 20.7.10 Minimize impact of problems on productivity (e.g., minimize downtime) given instructions and a scenario with 100% accuracy

Competency 20.8: Evaluate problem-solving processes and outcomes

Competency Builders: *(all builders for 20.8 are for NS only)*

- 20.8.1 Evaluate problem-solving outcomes to determine whether the problem was solved as intended given instructions and a realistic scenario with 90% accuracy
- 20.8.2 Evaluate whether the process was applied in an efficient and responsible manner given instructions and a realistic scenario with 90% accuracy
- 20.8.3 Assess the validity and usefulness of the outcomes given instructions and a realistic scenario with 90% accuracy
- 20.8.4 Determine needed follow-up actions given instructions and a realistic scenario with 90% accuracy

Competency 20.9: Perform software upgrades and fixes

Competency Builders:

- 20.9.1 Identify principles governing software acquisition and upgrades given instructions and software specifications with 100% accuracy
- 20.9.2 Analyze operational problems given instructions and scenario with 100% accuracy
- 20.9.3 Recommend solutions for operational problems given instructions and scenario with 100% accuracy
- 20.9.4 Upgrade software given instructions and software with 100% accuracy

Unit 21: Project Management

Competency/Terminal Performance Objective

21.1 Explain project management (I)

Competency Builders/Pupil Performance Objectives

- 21.1.1 Given a class project identify project purpose/goal according to class project handout.
- 21.1.2 Given a class project identify project objectives according to class project handout.
- 21.1.3 Given access to reference materials identify work breakdown structure (WBS) with 100% accuracy.
- 21.1.4 Given access to reference materials identify resource requirements with 100% accuracy.
- 21.1.5 Given access to reference materials define value engineering with 100% accuracy.

Competency/Terminal Performance Objective

21.2 Plan projects (I)

Competency Builders/Pupil Performance Objectives

- 21.2.1 Given a class project develop strategic plan (e.g., brainstorming) according to class project handout.
- 21.2.2 Given a class project estimate project costs so that estimate is within 10% of actual costs.
- 21.2.3 Given a class project prepare project plan according to class project handout.
- 21.2.4 Given a class project prepare scope of work according to class project handout.
- 21.2.5 Given a class project prepare project execution plan according to class project handout.
- 21.2.6 Given a class project apply responsibility assignment matrix (RAM) so that all members have responsibilities.
- 21.2.7 Given a class project apply time lines with milestones according to class project handout.
- 21.2.8 Given a class project apply network diagrams according to class project handout.
- 21.2.9 Given a class project apply critical path method (CPM) according to class project handout.
- 21.2.10 Given a class project apply project education and review techniques according to class project handout.
- 21.2.11 Given a class project apply software programs according to class project handout.
- 21.2.12 Given a class project apply budgetary constraints so that project stays within 10% of budget estimate.

Competency/Terminal Performance Objective

21.3 Implement projects (I)

Competency Builders/Pupil Performance Objectives

- 21.3.1 Given a class project monitor project (schedule cost/variance, objectives, critical path, milestones) according to class project handout.

- 21.3.2 Given a class project control project so that goals, timelines, and budgets are met.
- 21.3.3 Given a class project modify project so that goals, timelines, and budgets are met.

Competency/Terminal Performance Objective

- 21.4 Evaluate projects (I)

Competency Builders/Pupil Performance Objective

- 21.4.1 Given a completed class project analyze performance according to class project handout.
- 21.4.2 Given a completed class project close-out project evaluation according to class project handout.
- 21.4.3 Given a completed class project draw project management conclusions according to class project handout.
- 21.4.4 Given a completed class project identify “lessons learned” so that 10 lessons are identified.
- 21.4.5 Given a completed class project write project summary according to class project handout.

Unit 22: Communication

Competency 22.1: Apply communication skills (ISS, PR, IM = PR)

For each competency, students will meet standards on a teacher made rubric.

Competency Builders:

- 22.1.1 Guide communication activities using established rules for grammar, spelling, and sentence construction
- 22.1.2 Follow written and/or oral instructions
- 22.1.3 Apply creativity in oral and written communications
- 22.1.4 Proofread documents
- 22.1.5 Interpret oral, written, and nonverbal communications
- 22.1.6 Evaluate audience (e.g., specific interests, level of technical knowledge)
- 22.1.7 Adjust communication style to fit audience (e.g., use of jargon, level of technical details)
- 22.1.8 Determine means of communications appropriate for given situations (e.g., telephone, meeting, electronic mail, and written communication)
- 22.1.9 Reinforce intended message using nonverbal communication
- 22.1.10 Influence listeners' perceptions through precision planning
- 22.1.11 Practice active listening skills (e.g., paraphrasing)
- 22.1.12 Obtain needed information using questioning techniques
- 22.1.13 Adjust message and/or its delivery based on feedback from listeners (verbal and nonverbal)
- 22.1.14 Participate in group discussions and meetings
- 22.1.15 Assess/refine communication skills

Competency 22.2: Compose documents (ISS, NS, PSD IM = PR)

For each competency, students will meet standards on a teacher made rubric.

Competency Builders:

- 22.2 Demonstrate knowledge of the characteristics of different approaches to writing (e.g., direct, indirect, and persuasive)
- 22.2.1 Demonstrate knowledge of components of an effective message (e.g., clear, concise, complete, accurate, and courteous)
- 22.2.2 Evaluate audience
- 22.2.3 Gather information
- 22.2.4 Organize information
- 22.2.5 Develop outline
- 22.2.6 Draft document in accordance with established standards for communication
- 22.2.7 Verify spelling, grammar, and punctuation
- 22.2.8 Verify accuracy of content
- 22.2.9 Prepare final document

Competency 22.3: Demonstrate sensitivity in communicating with a diverse workforce (ISS, NS, PSD IM = P)

For each competency, students will meet standards on a teacher made rubric.

Competency Builders:

- 22.3.1 Identify factors (e.g., culture, ethnicity, equity, special/exceptional needs) that impact communication
- 22.3.2 Identify strategies for successful communication with a diverse workforce
- 22.3.3 Determine communication style appropriate for listeners(s)
- 22.3.4 Bridge communication styles
- 22.3.5 Establish guidelines for dealing with conflict

Competency 22.4: Deliver oral presentations (ISS, NS, PSD IM = P)

For each competency, students will meet standards on a teacher made rubric.

Competency Builders:

- 22.4.1 Prepare presentation and supporting materials (e.g., handouts, transparencies, electronic slide shows)
- 22.4.2 Practice presentation
- 22.4.3 Deliver presentation incorporating both verbal and nonverbal communication skills
- 22.4.4 Obtain feedback on the effectiveness of presentation

Competency 22.5: Build interpersonal skills with individuals and other team members (ISS, NS, PSD IM = P)

For each competency, students will meet standards on a teacher made rubric.

Competency Builders:

- 22.5.1 Analyze the interdependence of empathetic listening, synergy, and consensus building
- 22.5.2 Define roles within the group dynamics
- 22.5.3 Apply knowledge of group dynamics
- 22.5.4 Promote teamwork, leadership, and empowerment
- 22.5.5 Identify strategies for fostering creativity
- 22.5.6 Recognize the effect of influence, power, and politics on communication
- 22.5.7 Establish negotiation guidelines

Unit 23: Technical Writing and Documentation

Competency 23.1: Evaluate technical writing requirements (ISS, NS, PSD = IR, IM = I)

Competency Builders:

- 23.1.1 Define/prioritize communication needs (ISS, NS, PSD, IM)
- 23.1.2 Resolve conflicting requirements (ISS, NS, PSD, IM)
- 23.1.3 Specify project objectives (ISS, NS, PSD, IM)
- 23.1.4 Determine the size and specifics of the work to be completed (ISS, NS, PSD, IM)
- 23.1.5 Estimate time, materials, and capabilities needed to complete assignment (ISS, NS, PSD, IM)
- 23.1.6 Identify criteria for successful completion of project (ISS, NS, PSD, IM)
- 23.1.7 Evaluate strengths and weaknesses of completed project (ISS, NS, PSD, IM)

Competency/Terminal Performance Objective

- 23.2 When writing students will

Competency/Terminal Performance Objective

- 23.2.1 use context defined vocabulary words
PO-Write sentences using ten technical terms supplied by the teacher. Each sentence should include an accurate definition of the word used in the sentence.

- 23.2.2 use correct mechanics
PO-Write an essay with topic and length assigned by the teacher that contains no more than six mechanical errors or is at the 'B' level of the technical writing rubric.

- 23.2.3 demonstrate skill in technical reporting
PO-Write a technical report based on an engineering lab project using formatting and composing procedures developed by both the lab and language arts teachers. The technical data should be 100% accurate and the composition skills should be at the 'B' level of the technical writing rubric.

- 23.2.4 demonstrate organization with well-ordered paragraphs and sentence variety
PO-Write a process or an expository essay on an engineering topic assigned by the teacher. The essay should include an introductory paragraph listing the steps/topics to be developed and each paragraph thereafter should develop one of the steps/topics in correct order. The concluding paragraph should restate the steps/topic developed. Each paragraph should contain a minimum of one compound and one complex sentence.

- 23.2.5 demonstrate strong voice, clear thesis, and well developed ideas
PO-Write an essay on a topic of your choice within the field of engineering that contains no verbs in the passive voice and only four "to be" verbs. The content of the essay should be at least the 85% level of the classroom technical writing rubric.

- 23.2.6 use a word processor with graphics/desktop publishing capabilities

PO-Use a word processor to prepare for publication a lab research document that includes adequate white space, left justification, heading highlighters, charts, graphs, and diagrams.

23.2.7 define and improve personal writing style

PO-Compare an early writing assignment with a later writing assignment. Use a chart to tabulate differences in length and variety of sentences, types of verbs, and technical language.

Competency 23.2: Write technical reports (ISS, NS, PSD = IR, IM = I)

Competency Builders:

23.3 Determine audience (ISS, NS, PSD, IM)

23.3.1 Access needed information using standard references and sources (ISS, NS, PSD, IM)

23.3.2 Identify type of report needed (ISS, NS, PSD, IM)

23.3.3 Compile relevant data (ISS, NS, PSD, IM)

23.3.4 Organize data into charts and graphs (ISS, NS, PSD, IM)

23.3.5 Analyze data (ISS, NS, PSD, IM)

23.3.6 Draw conclusions from data analysis (ISS, NS, PSD, IM)

23.3.7 Outline report (ISS, NS, PSD, IM)

23.3.8 Draft report (ISS, NS, PSD, IM)

23.3.9 Edit report (e.g., check spelling, grammar, punctuation, sentence structure, accuracy of content) (ISS, NS, PSD, IM)

23.3.10 Review report with peers (ISS, NS, PSD, IM)

23.3.11 Revise report as needed based on peer feedback (ISS, NS, PSD, IM)

23.3.12 Proofread revised report (ISS, NS, PSD, IM)

23.3.13 Present reports (ISS, NS, PSD, IM)

Competency/Terminal Performance Objective

23.3.14 Given access to source materials students will

Competency/Terminal Performance Objectives

23.3.15 use a variety of materials to research information about Information Technologies, including materials from speeches and interviews and then develop the information into an integrated document that: identifies target audience source/subject matter experts, and prioritizes information.

PO-Write a research report with the topic related to the field of engineering. The bibliography should include a minimum of four printed sources (in a speech), two interviews, and two internet searches. The final document should be scored at the 85% level of a research rubric prepared by both the lab and a language arts teacher.

Competency 23.3: Conduct technical research (ISS, NS, PSD = IR, IM = I)

Competency Builders:

- 23.3.1 Identify target audience (ISS, NS, PSD, IM)
- 23.3.2 Define research questions (ISS, NS, PSD, IM)
- 23.3.3 Determine priorities for the information that should be gathered (ISS, NS, PSD, IM)
- 23.3.4 Identify potential sources of information (ISS, NS, PSD, IM)
- 23.3.5 Target audience/user group as a key information source (ISS, NS, PSD, IM)
- 23.3.6 Identify subject-matter experts (ISS, NS, PSD, IM)
- 23.3.7 Evaluate potential sources of information based on established criteria (e.g., affordability, relevance) (ISS, NS, PSD, IM)
- 23.3.8 Conduct interviews with selected human information sources (ISS, NS, PSD, IM)
- 23.3.9 Gather information from selected print and electronic sources (ISS, NS, PSD, IM)
- 23.3.10 Determine the accuracy and completeness of the information gathered (ISS, NS, PSD, IM)

Competency 23.4: Design technical documentation (ISS, NS, PSD IM = I)

Competency Builders:

- 23.4.1 Define purpose of documentation (ISS, NS, PSD, IM)
- 23.4.2 Specify standards for documentation, including critical success criteria (ISS, NS, PSD, IM)
- 23.4.3 Identify delivery options (ISS, NS, PSD, IM)
- 23.4.4 Evaluate cost-effectiveness of each delivery option (ISS, NS, PSD, IM)
- 23.4.5 Select tools appropriate for task purpose (ISS, NS, PSD, IM)
- 23.4.6 Plan information flow (ISS, NS, PSD, IM)
- 23.4.7 Select writing style and tone appropriate for given documentation (ISS, NS, PSD, IM)
- 23.4.8 Determine level of detail needed (ISS, NS, PSD, IM)
- 23.4.9 Identify visuals appropriate for given documentation (ISS, NS, PSD, IM)
- 23.4.10 Provide feedback on design to development team/individual (ISS, NS, PSD, IM)

Competency 23.5: Develop technical documentation (ISS, NS, PSD IM = I)

Competency Builders:

- 23.5.1 Determine audience (ISS, NS, PSD, IM)
- 23.5.2 Identify parameters (ISS, NS, PSD, IM)
- 23.5.3 Monitor development process (ISS, NS, PSD, IM)
- 23.5.4 Ask questions (ISS, NS, PSD, IM)
- 23.5.5 Interpret specifications or drawings for target audience (ISS, NS, PSD, IM)
- 23.5.6 Record process (ISS, NS, PSD, IM)
- 23.5.7 Record data (ISS, NS, PSD, IM)
- 23.5.8 Maintain test logs (ISS, NS, PSD, IM)
- 23.5.9 Compile cumulative reference/record (ISS, NS, PSD, IM)

- 23.5.10 Measure compliance with established parameters (ISS, NS, PSD, IM)
- 23.5.11 Verify the accuracy and validity of the information (ISS, NS, PSD, IM)
- 23.5.12 Select information relevant to and appropriate for the given documentation (ISS, NS, PSD, IM)
- 23.5.13 Organize/synthesize information (ISS, NS, PSD, IM)
- 23.5.14 Present content in a clear and concise way (ISS, NS, PSD, IM)
- 23.5.15 Translate technical terminology into understandable terms (ISS, NS, PSD, IM)
- 23.5.16 Employ presentation tools and techniques appropriate for the given documentation (ISS, NS, PSD, IM)
- 23.5.17 Obtain feedback on the information provided and its technical accuracy (ISS, NS, PSD, IM)
- 23.5.18 Draft procedures (ISS, NS, PSD, IM)
- 23.5.19 Test documentation (ISS, NS, PSD, IM)
- 23.5.20 Edit documentation for readability, grammar, and usage (ISS, NS, PSD, IM)
- 23.5.21 Publish documentation (ISS, NS, PSD, IM)
- 23.5.22 Maintain required logs (ISS, NS, PSD, IM)
- 23.5.23 Track expenses involved (ISS, NS, PSD, IM)

Unit 24: Customer Relations

Competency 24.1 Build customer relations (ISS, NS, PSD IM = P)

Competency Builders:

- 24.1 Given a hypothetical business situation identify organizations' products and services (including own strengths as a sales agent)
- 24.1.2 Given a hypothetical business situation recognize the importance of all customers to the business
- 24.1.3 Given a hypothetical business situation determine customers' individual needs
- 24.1.4 Given a hypothetical business situation project a professional business image (e.g., appearance, voice, grammar, word usage, enunciation, nonverbal communication)
- 24.1.5 Given a hypothetical business situation interact with customers and colleagues in a professional manner (e.g., prompt, friendly, courteous, respectful, helpful, knowledgeable, understandable)
- 24.1.6 Given a hypothetical business situation comply with established business protocols and company policies
- 24.1.7 Given a hypothetical business situation communicate company policies to customers
- 24.1.8 Given a hypothetical business situation handle merchandise returns in accordance with customer service policy
- 24.1.9 Given a hypothetical business situation handle customer complaints in accordance with customer service policy
- 24.1.10 Given a hypothetical business situation facilitate customer service through the maintenance of key information systems
- 24.1.11 Given a hypothetical business situation follow through on commitments made to customers (e.g., special orders, delivery specifications, new items)
- 24.1.12 Given a hypothetical business situation maintain customer base

Competency/Terminal Performance Objective:

- 24.1 Demonstrate positive relations with customers/clients (C)

Competency Builders/Pupil Performance Objectives:

- 24.1.1 Given a hypothetical business situation identify 5 reasons for the importance of customers to business.
- 24.1.2 Given a hypothetical business situation provide prompt and courteous service so that customers are waited on within 30 seconds of arrival and behavior meets the definition of courteous given in class handout on customer relations.
- 24.1.3 Given a hypothetical business situation resolve customer inquiries and complaints and/or refer customer to appropriate person according to class handout on customer relations.

Competency 24.2: Perform scheduling functions to meet customers needs (ISS, NS, PSD IM =

P)

Competency Builders:

- 24.2.1 Create calendars/schedules
- 24.2.2 Maintain appointment calendars
- 24.2.3 Process requests for appointments
- 24.2.4 Verify appointments
- 24.2.5 Notify customers of changes in schedule
- 24.2.6 Manage scheduling conflicts
- 24.2.7 Document results

Competency/Terminal Performance Objective:

- 24.2 Perform scheduling functions (C)

Competency/Pupil Performance Objective:

- 24.2.1 Given appropriate software or planner and appointments create a calendar/schedule with 85% accuracy.
- 24.2.2 Given data use Gantt charts so that questions can be answered with 85% accuracy.
- 24.2.2 Given appropriate software or planner and appointments maintain appointment calendars with 85% accuracy.
- 24.2.3 Given a hypothetical work situation process requests for appointments with 85% accuracy.
- 24.2.5 Given a hypothetical work situation verify appointments according to class handout on customer relations.

Unit 25: Economic and Business Concepts

Competency 25.1: Describe basic economic concepts

Competency Builders:

- 25.1.1 Given access to reference materials identify importance of economic resources with 85% accuracy.
- 25.1.2 Given access to reference materials explain concept of economic resources with 85% accuracy.
- 25.1.3 Given access to reference materials explain importance of economic resources with 85% accuracy.
- 25.1.4 Given access to reference materials explain concept of economic goods and services with 85% accuracy.
- 25.1.5 Given the definition of goods and services and a list of items differentiate between economic goods and services with 85% accuracy.
- 25.1.6 Given the definition of needs and wants and a list of items differentiate between needs and wants with 85% accuracy.
- 25.1.7 Given definitions and a business simulation explain concept of supply and demand with 85% accuracy.
- 25.1.8 Given definitions and a business simulation explain concept of price with 85% accuracy.
- 25.1.9 Given definitions and a business simulation explain how supply, demand, and price are related with 85% accuracy.
- 25.1.10 Given definitions and a business simulation explain concept of private enterprise and business ownership with 85% accuracy.
- 25.1.11 Given definitions and a business simulation explain concept of profit with 85% accuracy.
- 25.1.12 Given definitions and a business simulation explain concept of risk with 85% accuracy.
- 25.1.13 Given definitions and a business simulation explain concept of competition with 85% accuracy.
- 25.1.14 Given definitions and a business simulation explain relationship among risk, competition, and profit with 85% accuracy.
- 25.1.15 Given access to reference materials describe global economic and world markets with 85% accuracy.
- 25.1.16 Given access to reference materials describe economic cycles (e.g., unemployment, recession, inflation, budget deficits) with 85% accuracy.
- 25.1.17 Given access to reference materials describe economic arena's effect on business (e.g., financial, competitor indicators, industry) with 85% accuracy.

Competency 25.2: Describe economic systems (I)

Teacher's Note: This is an Ohio 9th grade proficiency test outcome for citizenship. It is likely taught as a major unit in middle school/early high school social studies.

Competency Builders:

- 25.2.1 Given access to reference materials describe free enterprise system so that 7 key traits are listed and 3 nations with free enterprise systems are identified.
- 25.2.2 Given access to reference materials describe relationship between government and business so that 5 elements of that relationship are accurately identified.
- 25.2.3 Given access to reference materials describe relationship between labor and management in three work settings.
- 25.2.4 Given access to reference materials compare types of economic systems so that students correctly identify the economic systems of 10 countries based on descriptions provided by the teacher.

Competency 25.3: Understand income statement data (I)

Competency Builders:

- 25.3.1 Given access to reference materials and an income statement identify revenue with 100% accuracy.
- 25.3.2 Given access to reference materials and an income statement identify overhead expenses with 100% accuracy.
- 25.3.3 Given access to reference materials and an income statement identify fixed expenses with 100% accuracy.
- 25.3.4 Given access to reference materials and an income statement identify direct labor with 100% accuracy.
- 25.3.5 Given access to reference materials and an income statement identify indirect labor with 100% accuracy.
- 25.3.6 Given access to reference materials and an income statement identify direct and indirect materials with 100% accuracy.
- 25.3.7 Given access to reference materials and an income statement identify general and administrative expenses with 100% accuracy.
- 25.3.8 Given access to reference materials and an income statement identify selling expenses with 100% accuracy.
- 25.3.9 Given access to reference materials and an income statement identify net income with 100% accuracy.

Competency 25.4: Explain equipment depreciation (I)

Competency Builders:

- 25.4.1 Given a definition, samples, and hypothetical situations explain straight line so that 3 situations that call for straight line are identified.
- 9.4.2 Given a definition, samples, and hypothetical situations explain sum of year's digits so that 3 situations that call for sum of last year's digits are identified.
- 9.4.3 Given a definition, samples, and hypothetical situations explain declining balance so that 3 situations that call for declining balance are identified.
- 9.4.4 Given a definition, samples, and hypothetical situations explain IRS strategies and apply the appropriate equipment depreciation strategy for 5 hypothetical situations.

Competency 25.5: Identify cost and profit influences (I)

Competency Builders:

- 25.5.1 Given access to reference materials and hypothetical situations explain importance of loss prevention in 5 situations.
- 25.5.2 Given access to reference materials and hypothetical situations explain importance of maximizing quality in 5 situations.
- 25.5.3 Given access to reference materials and hypothetical situations explain importance of maximizing productivity in 5 situations.
- 25.5.4 Given access to reference materials and hypothetical situations differentiate between specialized training and cross training in 3 situations.
- 25.5.5 Given access to reference materials explain labor, management, and government influences on cost /profit so that 3 influences of each group are listed.
- 25.5.6 Given access to reference materials explain cost/profit influences of retraining so that 3 influences are listed.
- 25.5.7 Given access to reference materials and hypothetical situations define impact of seasonal business cycles in 3 situations.

Competency 25.6: Describe economic indicators and trends (I)

Competency Builders:

- 25.6.1 Given access to reference materials define gross national product and gross domestic product with 100% accuracy.
- 25.6.2 Given access to reference materials define national debt with 100% accuracy.
- 25.6.3 Given access to reference materials define impact of interest rates so that 5 ramifications are identified.
- 25.6.4 Given access to reference materials define impact of government spending in 3 hypothetical situations with 85% accuracy.
- 25.6.5 Given access to reference materials define impact of seasonal business cycles in 3 hypothetical situations with 85% accuracy.
- 25.6.6 Given access to reference materials define impact of inflation, growth, recession, and unemployment in 3 hypothetical situations with 85% accuracy
- 25.6.7 Given access to reference materials define impact of national and world events in 3 hypothetical situations with 85% accuracy.
- 25.6.8 Given access to reference materials define impact of the growth of international trade in 3 hypothetical situations with 85% accuracy.

Competency 25.7: Explain international trade (I)

Competency Builders:

- 25.7.1 Given access to reference materials describe nature and importance of international trade with 85% accuracy
- 25.7.2 Given access to reference materials explain marketing in international trade with 85% accuracy
- 25.7.3 Given access to reference materials explain balance of trade concepts with 85% accuracy
- 25.7.4 Given access to reference materials describe impact of foreign investment with 85% accuracy
- 25.7.5 Given access to reference materials describe the influence of national debt with 85% accuracy
- 25.7.6 Given access to reference materials describe the effect of currency exchange rates on international trade with 85% accuracy

Competency 25.8: Explain basic business concepts (I)

Competency Builders:

- 25.8.1 Given access to reference materials identify functions of business with 100% accuracy.
- 25.8.2 Given access to reference materials explain role of management with 100% accuracy.
- 25.8.3 Given access to reference materials explain role of labor with 100% accuracy.
- 25.8.4 Given access to reference materials explain concept of service as a product with 100% accuracy.
- 25.8.5 Given access to reference materials explain role of administration with 100% accuracy.
- 25.8.6 Given access to reference materials explain role of operations with 100% accuracy.
- 25.8.7 Given access to reference materials identify role of company objectives with 100% accuracy.
- 25.8.8 Given access to reference materials identify importance of ethical business practices by giving 5 reasons for using ethical practices.
- 25.8.9 Given access to reference materials identify types of ownership with 100% accuracy.
- 25.8.10 Given access to reference materials identify components of a business plan with 100% accuracy.
- 25.8.11 Given access to reference materials calculate break even and payback with 100% accuracy.
- 25.8.12 Given access to reference materials explain role of depreciation in business decisions with 85% accuracy.
- 25.8.13 Given access to reference materials explain role of capital gains with 85% accuracy.
- 25.8.14 Given access to reference materials describe business reporting and information flow with 100% accuracy.
- 25.8.15 Given access to reference materials map interface of departmental functions with 100% accuracy.
- 25.8.16 Given access to reference materials describe business communication channels

- (e.g., formal, informal) with 100% accuracy.
- 25.8.17 Given access to reference materials explain basic total quality management (TQM/ISO) principles with 100% accuracy.
- 25.8.18 Given access to reference materials explain the effects of bankruptcy so that 5 effects are listed.

Competency 25.9: Explain legal concepts (I)

Competency Builders:

- 25.9.1 Given access to reference materials define legal terminology with 100% accuracy.
- 25.9.2 Given access to reference materials explain business law concepts with 100% accuracy.
- 25.9.3 Given access to reference materials and sample documents identify contracts and/or legal documents with 85% accuracy.
- 25.9.4 Given access to reference materials and hypothetical situations explain relationship of laws and regulations to company contracts, policies, and procedures with 85% accuracy.
- 25.9.5 Given access to reference materials identify laws relating to working conditions, wages and hours, civil rights, social security, disability, unemployment insurance, and exempt vs. nonexempt with 85% accuracy.

Competency 25.10: Explain role of marketing (I)

Competency Builders:

- 25.10.1 Given access to reference materials and hypothetical situations identify aspects of sound business image with 85% accuracy.
- 25.10.2 Given access to reference materials and hypothetical situations explain purposes of marketing with 85% accuracy.
- 25.10.3 Given access to reference materials and hypothetical situations describe functions of marketing with 85% accuracy.
- 25.10.4 Given access to reference materials and hypothetical situations describe effects of marketing with 85% accuracy.
- 25.10.5 Given access to reference materials and hypothetical situations identify target markets with 85% accuracy.
- 25.10.6 Given access to reference materials and hypothetical situations define sales potential with 85% accuracy.
- 25.10.7 Given access to reference materials and hypothetical situations explain pricing strategies with 85% accuracy.
- 25.10.8 Given access to reference materials and hypothetical situations differentiate among advertising campaigns listing 5 advantages of each campaign.
- 25.10.9 Given access to reference materials explain functions of advertising agencies with 85% accuracy.
- 25.10.10 Given access to reference materials and hypothetical situations describe sales

25.10.11

incentive programs so that 3 programs are described.
Given access to reference materials and hypothetical situations differentiate among types of marketing strategies (e.g. phone, mail, person) with 85% accuracy.

Unit 26: Financial Management Functions

Competency 26.1: Apply accounting principles (I)

Given an accounting simulation, apply accounting principles to a set of guidelines provided on a checklist:

Competency Builders:

- 26.1.1 Define accounting terminology
- 26.1.2 Define journals and ledgers
- 26.1.3 Identify basic accounting principles and applications
- 26.1.4 Identify computer accounting applications
- 26.1.5 Identify financial control procedures
- 26.1.6 Explain increases and decreases in accounts
- 26.1.7 Explain periodic reporting procedures
- 26.1.8 Prepare income statement
- 26.1.9 Prepare balance sheet columns
- 26.1.10 Prepare cash flow statement
- 26.1.11 Prepare change in equity statement
- 26.1.12 Interpret balance sheets
- 26.1.13 Interpret income statements

Competency 26.2: Provide financial statements to make personal decisions (I)

Given an accounting project, achieve a level of competence set by a checklist on preparing financial statements to make personal decisions:

Competency Builders:

- 26.2.1 Prepare balance sheet
- 26.2.2 Prepare income statement
- 26.2.3 Prepare cash-flow analysis
- 26.2.4 Prepare break-even analysis
- 26.2.5 Prepare budgets
- 26.2.5 Prepare comparative financial statements
- 26.2.6 Prepare cost and revenue analysis
- 26.2.7 Interpret financial statements
- 26.2.8 Prepare cash-flow analysis statements
- 26.2.9 Interpret cash-flow analysis statements

Competency/Terminal Performance Objective: Analyze cultural demographics of major world regions

Competency Builders/Pupil Performance Objectives:

Compare the major cultural groups of the United States and another country

Compare the major cultural groups of two foreign countries

Compare cultural groups within a foreign country
Identify major cultural groups of East Asia
Identify major cultural groups of the Asian Sub-continent
Identify major cultural groups of the Middle East
Identify major cultural groups of Sub-Saharan Africa
Identify cultural groups of Eastern Europe
Identify cultural groups of Western Europe
Identify major cultural groups of Latin America

Competency/Terminal Performance Objective: Analyze the impact of cultural environment on business

Competency Builders/Pupil Performance Objectives:

Identify social and cultural sectors that affect the conduct of business
Compare and contrast business practices in different cultures
Illustrate how culture influences business operations
Identify United States cultural attitudes and practices that could inhibit successful business operations in a foreign country
Analyze necessary modifications to American business practices for success in the global marketplace
Describe the steps to receive business visitors from specific countries
Describe negotiation tactics and decision-making processes of various cultures
Identify types of business relationships in various cultures
Compare business entertainment among people in various parts of the world

Competency/Terminal Performance Objective: Describe customs that impact international business

Competency Builders/Pupil Performance Objectives:

Identify cultural differences in food, dress, and social behaviors
Compare the use of calendars in different societies
Identify major holidays of various cultures and how they are celebrated
Assess the importance of gift giving in various cultures

Competency/Terminal Performance Objective: Demonstrate knowledge of estates, trusts, and wills

Competency Builders/Pupil Performance Objectives:

Explain information needed to administer an estate
Identify legal procedures of Testamentary Letters and Letters of Administration through probate
Demonstrate other legal procedures pertinent to estates
Explain court documents commonly filed in connection with estate administration
Identify tax returns for an estate
Explain differences and types of wills and trusts
Explain the differences between testate and intestate

Competency 26.3: Execute financial planning functions (I)

Given an accounting simulation, apply accounting principles to a set of guidelines provided on a checklist:

Competency Builders:

- 26.3.1 Identify risk management principles
- 26.3.2 Apply investment principles
- 26.3.3 Review estate plans
- 26.3.4 Prepare cash flow/income tax analysis

- 26.3.5 Review employee benefits
- 26.3.6 Develop retirement plans

Unit 27: International Business

Competency/Terminal Performance Objective:

27.2 Develop communication skills for an international audience (I)

Competency Builders/Pupil Performance Objectives:

- 27.2.1 Given access to reference materials identify the customs of the recipient that impact communication with 85% accuracy.
- 27.2.2 Given access to human, print, and electronic sources find answers to questions related to international communications with 85% accuracy.
- 27.2.3 Given access to reference materials and word processing equipment prepare documents in correct style for international communications according to classroom communications styles handout.

Competency/Terminal Performance Objective:

27.3 Analyze the cultural demographics of major world regions

Competency/Pupil Performance Objectives:

- 27.3.1 Given access to reference materials identify the major cultural groups of the United States with 85% accuracy.
- 27.3.2 Given access to reference materials compare/contrast cultural groups between countries so that 5 points of comparison are made.
- 27.3.3 Given access to reference materials compare/contrast cultural groups within a country so that 5 points of comparison are made.
- 27.3.4 Given access to reference materials identify the major cultural groups of East Asia with 85% accuracy.
- 27.3.5 Given access to reference materials identify the major cultural groups of the Asian sub-continent with 85% accuracy.
- 27.3.6 Given access to reference materials identify the major cultural groups of the Middle East with 85% accuracy.
- 27.3.7 Given access to reference materials identify the major cultural groups of Sub-Saharan Africa with 85% accuracy.
- 27.3.8 Given access to reference materials identify the major cultural groups of Eastern Europe with 85% accuracy.
- 27.3.9 Given access to reference materials identify the major cultural groups of Western Europe with 85% accuracy.
- 27.3.10 Given access to reference materials identify the major cultural groups of Latin America with 85% accuracy.

Competency/Terminal Performance Objective:

27.4 Identify cultural customs that may impact international business

Competency Builders/Pupil Performance Objectives:

- 27.4.1 Given access to reference materials, a list of customs and a list of cultures, identify

cultural differences in food, dress, and social behaviors so that students can match customs and cultures with 85% accuracy.

27.4.2 Given access to reference materials and a variety of calendars compare the use of calendars in different societies so that students compare cultures on 3 points of similarity/difference.

27.4.3 Given access to reference materials and a variety of calendars identify major holidays celebrated by different cultures and how they are celebrated with 85% accuracy.

27.4.4 Given access to case studies identify the importance of gift-giving in various cultures so that the customs of 3 cultures are identified and compared.

Competency/Terminal Performance Objective:

27.5 Analyze the impact of the cultural environment on business

Competencies/Pupil Performance Objectives:

27.5.1 Given case studies demonstrate knowledge of how culture influences business operations with 85% accuracy.

27.5.2 Given access to reference materials identify social and cultural sectors that affect the conduct of business with 85% accuracy.

27.5.3 Given case studies compare/contrast business practices in different cultures with 85% accuracy.

27.5.4 Given case studies compare/contrast negotiation tactics, decision making processes, types of business relationships and business entertainment practices in various parts of the world so that 3 points of comparison are made for each nation.

27.5.5 Given case studies identify 5 cultural attitudes and practices in the U.S. that could inhibit successful business operations in another country.

27.5.6 Given open ended hypothetical situations determine modifications to American business practices required for success in the global marketplace.

Unit 28: Management and Supervision

Competency/Terminal Performance Objective:

28.1 Maintain a safe working environment (P)

Competency Builders/Pupil Performance Objectives

- 28.1.1 Given access to reference materials describe an MSDS sheet with 85% accuracy.
- 28.1.2 During classroom and lab activities comply with HMIS material safety data sheets (MSDS) and OSHA regulations with 100% accuracy.
- 28.1.3 During classroom and lab activities comply with all MSDS regulations regarding hazardous materials with 100% accuracy.
- 28.1.4 During classroom and lab activities maintain clean work area by removing waste, keeping alleyways clear, cleaning tools, and preventing spills according to standards in classroom handout on workplace safety.
- 28.1.5 During classroom and lab activities minimize workplace causes of environmental burdening, pollutants, and poisoning according to standards in classroom handout on workplace safety.
- 28.1.6 Given access to reference materials describe pollution solution limits imposed by permits and regulations with 85% accuracy.
- 28.1.7 During classroom and lab activities comply with regulatory guidelines in handling, labeling, and disposal of solutions (e.g., fountain chemicals, inks, wash-up solutions, drum grounding) with 100% accuracy.
- 28.1.8 Given classroom equipment identify visual equipment controls (e.g., monitors, read outs) with 95% accuracy.
- 28.1.9 Given classroom equipment identify auditory equipment controls with 95% accuracy.
- 28.1.10 During classroom and lab activities comply with workplace safety rules and procedures with 100% accuracy.
- 28.1.11 During classroom and lab activities comply with personal safety rules and procedures with 100% accuracy.
- 28.1.12 During classroom and lab activities comply with applicable electrical, mechanical, hydraulic and pneumatic safety rules and procedures with 100% accuracy.
- 28.1.13 During classroom and lab activities recycle appropriate materials according to standards in classroom handout on workplace safety.
- 28.1.14 During classroom and lab activities use preventive maintenance checklists according to standards in classroom handout on workplace safety.
- 28.1.15 During classroom and lab activities identify location of control panels, shut-off valves, and fire extinguishers with 100% accuracy.

Competency/Terminal Performance Objective:

28.2 Maintain work flow (I)

Competency Builders/Pupil Performance Objectives:

- 28.2.1 Organize and prioritize work given a set of tasks to be completed within a prescribed period of time.
- 28.2.2 Apply time-management techniques given written tasks and a time period for completion.

- 28.2.3 Complete assigned tasks accurately in a timely manner given materials provided according to a specified timeline.
- 28.2.4 Coordinate with team members as needed given a simulated or actual situation according to specific teamwork guidelines.

Competency/Terminal Performance Objective:

28.3 Manage human resources (I)

Competency Builders/Pupil Performance Objectives:

- 28.3.1 Given a team assignment or real project, manage the following human resources activities according to a checklist:
- 28.3.2 Communicate performance expectations.
- 28.3.3 Counsel employees (e.g., career objectives).
- 28.3.4 Maintain performance records .
- 28.3.5 Adhere to company policies regarding discrimination and harassment.
- 28.3.6 Address employees regarding disciplinary action(s).
- 28.3.7 Recommend employees for promotion.
- 28.3.8 Explain procedure for handling grievances.
- 28.3.9 Evaluate employee performance.
- 28.3.10 Document personnel issues.
- 28.3.11 Dismiss employees.
- 28.3.12 Create and/or implement organizational charts.
- 28.3.13 Clarify company policies and procedures.
- 28.3.14 Establish office procedures.
- 28.3.15 Maintain office procedure manual(s).
- 28.3.16 Prepare managerial reports.
- 28.3.17 Maintain appropriate work environment.
- 28.3.18 Conduct tours.
- 28.3.19 Provide and/or coordinate training for new policies.
- 28.3.20 Communicate performance expectations.

Competency/Terminal Performance Objective:

28.4 Conduct staff/team meetings (I)

Competency Builders/Pupil Performance Objectives:

- 28.4.1 Given a real or simulated project, conduct staff/team meetings following a checklist of criteria.
- 28.4.2 Plan meeting.
- 28.4.3 Set agenda.
- 28.4.4 Set and schedule meeting.
- 28.4.5 Schedule meeting room.
- 28.4.6 Invite appropriate personnel.
- 28.4.7 Identify need for outside speakers.
- 28.4.8 Assign someone to take minutes.
- 28.4.9 Make introductions.

28.4.10

Invite questions and comments, and group participation.

28.4.11

Decide appropriate action, time frame, and accountability to tasks

Unit 29: Business Law, Ethics and Legal Issues

Competency/Terminal Performance Objective:

29.1 Illustrate legal concepts (I)

Competency Builders/Pupil Performance Objectives:

- 29.1.1 Given access to reference materials define basic legal terminology with 85% accuracy.
- 29.1.2 Given access to reference materials explain basic business law concepts with 85% accuracy.
- 29.1.3 Given access to reference materials describe contracts and/or legal documents with 85% accuracy.
- 29.1.4 Given access to reference materials, explain basic relationship of laws and regulations to company contracts, policies, and procedures with 85% accuracy.
- 29.1.5 Given access to reference materials explain basic laws relating to working conditions, wages and hours, civil rights, social security, disability, and unemployment with 85% accuracy.

Competency/Terminal Performance Objective:

29.2 Explain legal rights and responsibilities (I)

Competency Builders/Pupil Performance Objectives:

- 29.2.1 Given access to reference materials describe different types of laws with 85% accuracy.
- 29.2.2 Given access to reference materials identify rules of law affecting minors with 85% accuracy.
- 29.2.3 Given access to reference materials describe basic differences between crimes and torts with 85% accuracy.
- 29.2.4 Given access to reference materials describe basic differences between criminal and civil law with 85% accuracy.
- 29.2.5 Given access to reference materials describe basic differences between state and Federal court systems with 85% accuracy.
- 29.2.6 Given access to reference materials describe court system and how a case goes to trial with 85% accuracy.
- 29.2.7 Given access to reference materials explain the right to appeal with 85% accuracy.

Competency/Terminal Performance Objective:

29.3 Demonstrate knowledge of labor law (I)

Competency Builders/Pupil Performance Objectives:

- 29.3.1 Given access to reference materials describe rights and responsibilities of parties to an employment contract with 85% accuracy.
- 29.3.2 Given access to reference materials identify state and federal laws dealing with employment with 85% accuracy.
- 29.3.3 Given access to reference materials identify protections available to employees with 85% accuracy.
- 29.3.4 Given access to reference materials describe the role of unions in business with

85% accuracy.

Competency/Terminal Performance Objective:

29.4 Demonstrate knowledge of environmental law (I)

Competency Builders/Pupil Performance Objectives:

29.4.1 Given access to reference materials identify environmental agencies and regulations with 85% accuracy.

29.4.2 Given access to reference materials use those materials to identify 5 regulations that apply to a specified business.

29.4.3 Given access to reference materials explain reporting procedures for violations to appropriate agencies with 85% accuracy.

Competency/Terminal Performance Objective:

Demonstrate knowledge of contract law

Competency Builders/Pupil Performance Objectives:

Analyze elements of a contract for validity

Explain different types of contracts (oral, written, implied)

Differentiate between contracts that are transferable and contracts that are non-transferable

Identify means of discharging contracts

Describe means of discharging contracts

Describe remedies available for a breach of contract

Competency 29.5: Demonstrate knowledge of social, ethical, and legal issues in the information technology field

Competency Builders:

29.5.1 Given examples from history and hypothetical situations analyze the social implications of decisions made and actions taken as an information technology professional so that 3 results are identified as a result of each decision/action and each result is analyzed based on teacher made rubric. (PSD)

29.5.2 Given access to reference materials demonstrate knowledge of the ethical issues that face information technology professionals with 85% accuracy. (PSD)

29.5.3 Given access to reference materials demonstrate knowledge of the legal issues that face information technology professionals with 85% accuracy. (PSD)

Unit 30: Quality Assurance

Competency/Terminal Performance Objective:

30.1 Demonstrate knowledge of quality assurance (I & C)

Competency Builders/Pupil Performance Objectives:

- 30.1.1 Explain the historical evolution of quality assurance (e.g., Deming, ISO 9000) given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.2 Explain changes brought about by quality leaders in the world given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.3 Explain the ISO 9000 process given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.4 Define quality terms given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.5 Define quality functions given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.6 Identify features of quality planning given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.7 Describe control devices used in functional areas (e.g., SPC, equipment) given a work situation according to criteria in the class handout on quality assurance.
- 30.1.8 Explain the relationship among organizational structures, policies, procedures, and quality assurance given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.9 Explain importance of internal and external customers given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.1.10 Identify internal and external customers given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.11 Describe 5 successful efforts by industry to improve quality and/or reduce costs given access to research materials and the opportunity to interview workers.
- 30.1.12 Differentiate prevention and detection given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.1.13 Differentiate variable and attribute data given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.1.14 Identify types of control charts given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.1.15 Explain how statistical techniques are used to control quality (e.g., SPC, DOE, CR) given access to research materials and the opportunity to interview workers with 85% accuracy.

Competency/Terminal Performance Objective:

30.2 Demonstrate knowledge of quality cost implications (C)

Competency Builders/Pupil Performance Objectives:

- 30.2.1 Identify cost/quality objectives given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.2 Classify costs (i.e., direct and indirect, fixed and variable, methods and standards)

- given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.2.3 Classify quality costs (i.e., prevention, evaluation, pre-delivery, failure, post-delivery failure) given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.2.4 Define product liability given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.5 Interpret quality cost reports given a hypothetical situation so that 4 possible solutions and their consequences are identified.
- 30.2.6 Explain consumerism and liability prevention given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.7 Define safety terms of products given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.8 Identify safety responsibility within organizations given hypothetical situations on quality cost implications with 85% accuracy.
- 30.2.9 Define safety responsibility within an organization given access to research materials with the opportunity to interview workers with 85% accuracy.
- 30.2.10 Define contracts and torts given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.11 Differentiate express and implied warranty given a work situation so that two advantages and disadvantages are identified for each solution.
- 30.2.12 Explain how warranties are part of contract law given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.2.13 List five questions that would need answering in liability claims common to quality cost implications.

Competency/Terminal Performance Objective:

- 30.3 Demonstrate knowledge of engineering a quality product (I)

Competency Builders/Pupil Performance Objectives:

- 30.3.1 Associate customer satisfaction with product characteristics (e.g., usefulness, price, operation, life, reliability, safety, cost of operation) given a work situation so that two advantages and disadvantages are identified for each solution.
- 30.3.2 Define manufacturability given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.3 Identify steps in product design (e.g., brainstorming, thumbnail sketches, rendering) given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.4 Define reliability factors (e.g., cost, human, productibility) given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.5 Identify ways reliability is achieved (e.g., maintainability, good design, design simplification, design redundancy) given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.6 Explain the relationship of maintainability to reliability given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.3.7 Define failure given access to research materials and the opportunity to interview workers with 85% accuracy.

- 30.3.8 Explain the role of testing and reliability given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.3.9 Define value engineering given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.10 Define quality objectives given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.11 Identify cost components as they relate to quality objectives given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.3.12 Classify quality costs (i.e., preventive, evaluation, pre-delivery failures, post delivery, failures) to that two advantages and disadvantages are identified for each solution.
- 30.3.13 Describe predictive maintenance given access to research materials and the opportunity to interview workers with 85% accuracy.

Competency/Terminal Performance Objective:

- 30.4 Explain importance of interdepartmental relationships to quality assurance (I & ADC)

Competency Builders/Pupil Performance Objectives:

- 30.4.1 Explain the need for everyone's commitment in assuring quality given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.4.2 Explain the phrase "Everyone is a customer/supplier" given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.4.3 Define quality improvement team models given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.4.4 Explain the importance of top management's support of quality given a hypothetical situation so that 4 possible solutions and their consequences are identified.
- 30.4.5 Explain project selection given a hypothetical situation so that 4 solutions and their consequences are identified.
- 30.4.6 Explain project implementation given a hypothetical situation so that 4 solutions and their consequences are identified.
- 30.4.7 Explain continuing improvement given a hypothetical situation so that 4 solutions and their consequences are identified.
- 30.4.8 Describe future trend of experiment design given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.4.9 Describe future trend of predictive maintenance given access to research materials and the opportunity to interview workers with 85% accuracy.

Competency/Terminal Performance Objective:

- 30.5 Manipulate quality cost data (I)

Competency Builders/Pupil Performance Objectives:

- 30.5.1 Develop quality cost data given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.5.2 Translate cost reports given access to research materials and the opportunity to interview workers with 85% accuracy.

30.5.3 Graph quality cost data (e.g., pareto) given access to research materials with 85% accuracy.

Competency/Terminal Performance Objective:

30.6 Manipulate cost control data (I)

Competency Builders/Pupil Performance Objectives:

- 30.6.1 Develop cost control data given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.6.2 Analyze cost control reports given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.6.3 Provide cost control data given access to research materials with 85% accuracy.
- 30.6.4 Provide advice on “Make or Buy” decisions (including economical lost size decisions) given access to research materials with 85% accuracy.

Competency/Terminal Performance Objective:

30.7 Demonstrate knowledge of basic statistics (C)

Competency Builders/Pupil Performance Objectives:

- 30.7.1 Describe four methods of data collection given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.7.2 Collect data given a work situation according to the criteria in the class handout on basic statistics.
- 30.7.3 Organize data by flow chart given a work situation according to the criteria in the class handout on basic statistics.
- 30.7.4 Interpret data by cause and effect diagrams given a work situation according to the criteria in the class handout on basic statistics.
- 30.7.5 Define nominal, ordinal, interval, and ratio data given access to research materials and to the opportunity to interview workers with 85% accuracy.
- 30.7.6 Define mean, median, and mode given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.7.7 Explain significance of standard deviation given a hypothetical situation so that 4 possible solutions and their consequences are identified.
- 30.7.8 Explain normal distribution given a hypothetical situation so that 4 possible solutions and their consequences are identified.

Competency/Terminal Performance Objective:

30.8 Demonstrate knowledge of scattergrams (C)

Competency Builders/Pupil Performance Objectives:

- 30.8.1 Construct scattergrams given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.8.2 Interpret for positive, negative, or no correlation between X and Y variables given a hypothetical situation so that 4 possible solutions and their consequences are identified.
- 30.8.3 Test for significance between one and five percent given access to research

- 30.8.4 materials with 85% accuracy.
Explain regression analysis given access to research materials and the opportunity to interview workers with 85% accuracy.

Competency/Terminal Performance Objective:

- 30.9 Demonstrate knowledge of probability theory (C)

Competency Builders/Pupil Performance Objectives:

- 30.9.1 Define classical probability given access to research materials and the opportunity to interview workers with 85% accuracy.
30.9.2 Define empirical probability given access to research materials and the opportunity to interview with 85% accuracy.
30.9.3 Calculate probability for outcomes given a work situation according to criteria in the class handout on probability theory.

Competency/Terminal Performance Objective:

- 30.10 Use quality control charts (I)

Competency Builders/Pupil Performance Objectives:

- 30.10.1 Identify operational definitions for attribute criteria given access to research materials and the opportunity to interview workers with 85% accuracy.
30.10.2 Interpret histograms given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.3 Interpret scattergrams given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.4 Interpret NP charts given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.5 Interpret P charts given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.6 Interpret flow charts given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.7 Interpret cause-and-effect diagrams given a hypothetical situation so that 4 possible solutions and their consequences are identified.
30.10.8 Construct P (percentage defective) charts for attributes given a “hands on” work situation so that a consensus or compromise can be reached.
30.10.9 Plot control limits of P charts and data points given a “hands on” situation so that consensus and/or compromise can be reached.
30.10.10 Check chart for out-of-control conditions given a work situation with 100% accuracy.
30.10.11 Construct an NP (number defective) chart with control limits and data given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
30.10.12 Construct C (count of defects) and U (number of defects per unit) charts given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
30.10.13 Check data on C and U charts given a work situation according to criteria in the class handouts on quality control charts.

- 30.10.14 Construct flowchart given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.10.15 Construct cause-and-effect charts given access to research materials and the opportunity to interview workers with 85% accuracy.

Competency/Terminal Performance Objective:

- 30.11 Demonstrate knowledge of JIT (I)

Competency Builders/Pupil Performance Objectives:

- 30.11.1 Define just-in-time concept (JIT) given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.11.2 Describe various production methodologies (e.g., standard cycle times, routings, standard quantities, multiple-machine tending) given a case study with 85% accuracy.
- 30.11.3 Describe types of inventory control (e.g., Kanban) given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.11.4 Describe importance of flexibility given a hypothetical situation so that two advantages and disadvantages are identified for each solution.
- 30.11.5 Differentiate product layout, process layout, fixed layout, and cellular layout given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.11.6 Differentiate striate-line, U-shaped, S-shaped, convoluted and comb patterns given access to research materials and the opportunity to interview workers with 85% accuracy.
- 30.11.7 Describe two advantages and disadvantages of layout and patterns with a given solution for each in the JIT theory.
- 30.11.8 Explain the importance of product protection, identification and storage given a hypothetical situation so that 4 possible solutions and their consequences are identified.
- 30.11.9 List the four methods of identifying products (e.g., labels, bar codes, radio frequency systems and magnetic strip systems) given access to research with 85% accuracy.
- 30.11.10 Describe manual methods of storage and retrieval given a work situation according to criteria in the class handout on JIT.
- 30.11.11 Describe automated storage and retrieval systems (ASRS) given a work situation according to criteria in the class handout on JIT.
- 30.11.12 Describe automated guided vehicle moving systems (AGVS) given a work situation according to criteria in the class handout on JIT.

Competency/Terminal Performance Objective:

- 30.12 Apply JIT (I)

Competency Builders/Pupil Performance Objectives:

- 30.12.1 Maintain system for physical handling and movement of material in process and in-storage in a simulated classroom situation so that a consensus can be reached.
- 30.12.2 Monitor system of physical handling and movement of material in-process and in-storage given a work situation according to the criteria in the class handout on JIT.

- 30.12.3 Maintain system of physical handling and movement of finished products in a simulated classroom situation so that a consensus can be reached.
- 30.12.4 Monitor system of physical handling and movement of finished products given a work situation according to the criteria in the class handout on JIT.
- 30.12.5 Write requests for deviation from specifications given a work situation according to the criteria in the class handout on JIT.
- 30.12.6 Implement quality control and inspection standards and procedures given a work situation according to the criteria in the class handout on JIT.
- 30.12.7 Write engineering change notices and rejection reports given a work situation according to criteria in the class handout on JIT.
- 30.12.8 Monitor reports of discrepancy or rejects during production process given a work situation according to the criteria in the class handout on JIT.
- 30.12.9 Conduct quality tests under different environmental conditions given a work situation according to the criteria in the class handout on JIT.

Unit 31: Basic Electricity

Competency 31.1: Demonstrate an understanding of electrical fundamentals (NS = IR)

Competency Builders:

- 31.1.1 Identify electrical components and schematic symbols given equipment and schematic with 85% accuracy.
- 31.1.2 Demonstrate knowledge of the color codes and symbols used to identify electrical components/values given resistors and schematic with 100% accuracy.
- 31.1.3 Demonstrate knowledge of basic atomic structure and its relationship to electricity given explanation with 85% accuracy.
- 31.1.4 Demonstrate knowledge of the relationship between electrical and magnetic properties given textbook with 85% accuracy.
- 31.1.5 Demonstrate knowledge of the electrical and magnetic properties of a magnet given magnet with 100% accuracy.
- 31.1.6 Demonstrate knowledge of the photoelectric effect given photocell with 100% accuracy.
- 31.1.7 Demonstrate knowledge of the thermocouple and Peltier effects given thermocouple with 100% accuracy.
- 31.1.8 Demonstrate knowledge of electrical static charge and the role of friction given materials with 100% accuracy.
- 31.1.9 Follow electrostatic discharge (ESD) preventive procedures given outline of procedures with 100% accuracy.
- 31.1.10 Identify sources of electricity given textbook with 100% accuracy.
- 31.1.11 Demonstrate knowledge of the principles and operation of electrochemical supplies given supplies with 100% accuracy.
- 31.1.12 Demonstrate knowledge of the relationship of voltage, current, resistance, power, and energy given electrical circuit with 85% accuracy.
- 31.1.13 Apply Ohm's law given electrical circuit with 85% accuracy.
- 31.1.14 Apply Kirchhoff's laws given electrical circuit with 85% accuracy.
- 31.1.15 Apply power formulas given variables with 100% accuracy.
- 31.1.16 Solve electronic unit problems using metric units given equations with 100% accuracy.

Competency 31.2: Demonstrate knowledge of operating the various types of equipment used to test/measure DC circuits, AC circuits, solid-state devices, digital circuits, analog circuits, and microprocessors (ISS = I, NS = IR)

Competency Builders:

- 31.2.1 Demonstrate knowledge of the function and operation of an analog volt-ohm-meter (AVOM) given electronic circuit with 100% accuracy.
- 31.2.2 Demonstrate knowledge of the function and operation of a digital volt-ohm-meter (DVOM) given electronic circuit with 100% accuracy.
- 31.2.3 Demonstrate knowledge of the function and operation of a clamp-on amp meter given wires with 100% accuracy.

- 31.2.4 Demonstrate knowledge of the function and operation of oscilloscopes given electronic circuit with 100% accuracy.
- 31.2.5 Demonstrate knowledge of the function and operation of a logic probe and logic analyzer given digital circuit with 100% accuracy.
- 31.2.6 Demonstrate knowledge of the function and operation of a power monitor given equipment with 100% accuracy.
- 31.2.7 Demonstrate knowledge of the function and operation of a signal generator given oscilloscope with 100% accuracy.
- 31.2.8 Demonstrate knowledge of the function and operation of a spectrum analyzer given directions with 100% accuracy.
- 31.2.9 Demonstrate knowledge of the function and operation of an AC/DC hi-pot given directions with 100% accuracy.
- 31.2.10 Demonstrate knowledge of the function and operation of a time-domain reflectometer (TDR) given application with 100% accuracy.
- 31.2.11 Demonstrate knowledge of the function and operation of a megger given directions with 100% accuracy.
- 31.2.12 Demonstrate knowledge of the function and operation of a curve tracer/analogger given semiconductor with 100% accuracy.
- 31.2.13 Measure properties of circuits using electrical test/measurement equipment given circuits with 100% accuracy.
- 31.2.14 Troubleshoot a multicomponent electrical circuit using electrical test/measurement equipment given circuit with 100% accuracy.

Competency 31.3: Demonstrate proficiency in working with DC circuits

Competency Builders:

- 31.3.1 Compute conductance of conductors and insulators given resistance with 100% accuracy.
- 31.3.2 Measure resistance and current of conductors and insulators given circuit with 100% accuracy.
- 31.3.3 Measure properties of a DC circuit using an analog volt-ohm-meter (AVOM) and digital volt-ohm-meter (DVOM) given circuit with 100% accuracy.
- 31.3.4 Build series, parallel, and combination circuits given components with 100% accuracy.
- 31.3.5 Build bridge circuits given components with 100% accuracy.
- 31.3.6 Build voltage divider circuits given components with 100% accuracy. (loaded and unloaded)
- 31.3.7 Compute voltage divider circuits given components with 100% accuracy. (loaded and unloaded)
- 31.3.8 Demonstrate knowledge of maximum power transfer theory and impedance matching given circuit with 100% accuracy.
- 31.3.9 Demonstrate knowledge of the electromagnetic properties of circuits and devices given components with 100% accuracy.
- 31.3.10 Demonstrate knowledge of the physical and electrical characteristics of capacitors and inductors given formulas with 100% accuracy.
- 31.3.11 Define resistive-capacitive (RC) and resistive-inductive (RL) time constants (TC) given components with 100% accuracy.

- 31.3.12 Compute RC and RL time constants given formulas with 85% accuracy.
- 31.3.13 Demonstrate knowledge of transient and steady-state behavior of resistive-capacitive (RC) and inductive-capacitive (LC) circuits given formulas with 85% accuracy.
- 31.3.14 Operate power supplies for DC circuits given equipment with 100% accuracy.
- 31.3.15 Measure current, voltage, and resistance in DC circuits given equipment with 100% accuracy.
- 31.3.16 Build a simple DC generator given specifications with 100% accuracy.
- 31.3.17 Build a simple DC motor given parts with 100% accuracy.
- 31.3.18 Demonstrate knowledge of the principles of solid-state switching devices given components with 100% accuracy.
- 31.3.19 Solve algebraic problems to include exponential algebraic calculations given equations with 85% accuracy.
- 31.3.20 Demonstrate knowledge of the classes, voltage ratings and/or polarity of electronic components given components with 100% accuracy.
- 31.3.21 Build a simple DC circuit that employs a safety device given components with 100% accuracy. (e.g., fuse, circuit breaker)
- 31.3.22 Troubleshoot DC circuits using electrical test/measurement equipment given circuit with 100% accuracy.

Competency 31.4: Demonstrate proficiency in working with AC circuits

Competency Builders:

- 31.4.1 Analyze the properties of a steady-state AC signal given circuit with 100% accuracy.
- 31.4.2 Analyze the properties of a transient AC signal given circuit with 100% accuracy.
- 31.4.3 Demonstrate knowledge of the principles and operational characteristics of sinusoidal and non-sinusoidal wave forms given oscilloscope with 100% accuracy.
- 31.4.4 Demonstrate knowledge of AC sources given textbook with 85% accuracy.
- 31.4.5 Demonstrate knowledge of the principles and operational characteristics of capacitive circuits given circuit with 100% accuracy.
- 31.4.6 Operate capacitive circuits given equipment with 100% accuracy.
- 31.4.7 Demonstrate knowledge of the principles and operational characteristics of inductive circuits given circuit with 100% accuracy.
- 31.4.8 Operate inductive circuits given equipment with 100% accuracy.
- 31.4.9 Demonstrate knowledge of the principles and operation of transformers given circuit with 100% accuracy.
- 31.4.10 Operate AC circuits utilizing transformers given circuit with 100% accuracy.
- 31.4.11 Analyze AC circuits using Thevenin's and Norton's theorems given circuit with 85% accuracy.
- 31.4.12 Measure power in AC circuits given equipment with 100% accuracy.
- 31.4.13 Troubleshoot AC circuits using capacitor and inductor analyzers given components with 100% accuracy.
- 31.4.14 Determine RC and RL time constants using differentiators and integrators given circuit with 100% accuracy.
- 31.4.15 Demonstrate knowledge of the principles and operational characteristics of series and parallel resonant circuits given components with 100% accuracy.

- 31.4.16 Build series and parallel resonant circuits given components with 100% accuracy.
- 31.4.17 Demonstrate knowledge of the classes, voltage, ratings, and/or polarity of electronic components given components with 100% accuracy.
- 31.4.18 Build a simple AC circuit that employs a safety device given schematic with 100% accuracy. (e.g., fuse, circuit breaker)
- 31.4.19 Demonstrate knowledge of the principles and operational characteristics of frequency selective filter circuits given circuit with 100% accuracy.
- 31.4.20 Calculate gain (dB) using logarithmic tables or calculator/computer given equations with 100% accuracy.
- 31.4.21 Operate frequency selective filter circuits given components with 100% accuracy.
- 31.4.22 Operate polyphase circuits given equipment with 100% accuracy.
- 31.4.23 Demonstrate knowledge of basic motor theory and operation given textbook with 85% accuracy.
- 31.4.24 Demonstrate knowledge of basic generator theory and operation given equipment with 100% accuracy.
- 31.4.25 Operate power supplies for AC circuits given equipment with 100% accuracy.
- 31.4.26 Demonstrate knowledge of the principles and operation of various power conditioning systems given equipment with 100% accuracy. (e.g., isolation transformers, surge suppressors, uninterruptible power systems)
- 31.4.27 Demonstrate knowledge of the principles and operation of various safety grounding systems given textbook with 85% accuracy. (e.g., lightning arresters, ground electrostatic discharge, fault interrupters)
- 31.4.28 Demonstrate knowledge of both the steady-state and transient behavior of inductors in series and parallel circuits given circuit with 85% accuracy.
- 31.4.29 Demonstrate knowledge of both the steady-state and transient behavior of capacitance in series and parallel circuits given circuit with 85% accuracy.
- 31.4.30 Compare resistive-capacitive (RC) and resistive-inductive (RL) time constants (TC) given circuit with 100% accuracy.
- 31.4.31 Measure voltage, current, time, frequency (f), and phase relationships of AC sine wave signal given oscilloscope with 100% accuracy.
- 31.4.32 Demonstrate knowledge of the amplitude relationship to both frequency and phase for low- and high-pass circuits given oscilloscope with 100% accuracy.
- 31.4.33 Demonstrate knowledge of the resonance of inductive-capacitive (LC) circuits given components with 100% accuracy.
- 31.4.34 Calculate impedance match and maximum transfer of power given circuit with 100% accuracy.
- 31.4.35 Measure current, voltage, and resistance in AC circuits given components with 100% accuracy.
- 31.4.36 Demonstrate knowledge of simple AC generator action given equipment with 100% accuracy.
- 31.4.37 Demonstrate knowledge of simple AC motor action given motor with 100% accuracy.
- 31.4.38 Calculate power factor in AC circuits given measurements with 100% accuracy.
- 31.4.39 Demonstrate knowledge of power factor correction in reactive loads given circuit with 100% accuracy.
- 31.4.40 Demonstrate knowledge of the harmonics of sinusoidal voltage and current wave forms and their effects on power quality given waveforms with 100% accuracy.

- 31.4.41 Solve basic trigonometric problems given equations with 100% accuracy.
- 31.4.42 Calculate peak (PK), root mean square (RMS), and average values for sinusoidal wave forms given waveforms with 100% accuracy.
- 31.4.43 Troubleshoot AC circuits given circuits with 100% accuracy.

Unit 32: Fundamentals of Electronics Technology

Competency 32.1: Demonstrate proficiency in working with discrete solid-state devices

Competency Builders:

- 32.1.1 Demonstrate knowledge of the properties of semiconductor materials given textbook with 85% accuracy.
- 32.1.2 Demonstrate knowledge of the operating characteristics and applications of PN junctions given textbook with 85% accuracy.
- 32.1.3 Demonstrate knowledge of the function and operation of diode circuits given circuits with 100% accuracy.
- 32.1.4 Troubleshoot diode circuits given circuits with 100% accuracy.
- 32.1.5 Repair diode circuits given circuits with 100% accuracy.
- 32.1.6 Demonstrate knowledge of the operating characteristics and applications of bipolar transistors given circuits with 100% accuracy.
- 32.1.7 Demonstrate knowledge of the operating characteristics and applications of field effect transistors given circuits with 100% accuracy. (e.g., FET + s/MOSFET + s)
- 32.1.8 Demonstrate knowledge of the operating characteristics and applications of special diodes/transistors given components with 100% accuracy.
- 32.1.9 Demonstrate knowledge of the operating characteristics and applications of opto-electronic devices given circuits with 100% accuracy. (e.g., gate isolators, interrupt sensors, infrared sensors)
- 32.1.10 Demonstrate knowledge of the operating characteristics and applications of single-stage amplifiers given circuit with 100% accuracy.
- 32.1.11 Demonstrate knowledge of the operation of single-stage amplifiers given components with 100% accuracy.
- 32.1.12 Troubleshoot single-stage amplifiers given circuits with 100% accuracy.
- 32.1.13 Repair single-stage amplifiers given components with 100% accuracy.
- 32.1.14 Demonstrate knowledge of the function and operation of thyristor circuitry given components with 100% accuracy. (SCR, TRIAC, DIAC)
- 32.1.15 Troubleshoot thyristor circuitry given components with 100% accuracy. (SCR, TRIAC, DIAC)
- 32.1.16 Operate power supplies for solid-state devices given equipment with 100% accuracy.
- 32.1.17 Operate oscilloscopes for solid-state devices given circuit with 100% accuracy.
- 32.1.18 Operate function generators for solid-state devices given equipment with 100% accuracy.
- 32.1.19 Operate curve tracers given equipment with 100% accuracy.
- 32.1.20 Operate transistor testers given transistors with 100% accuracy.

Competency 32.2: Distinguish between analog and digital phenomena and circuits (NS = P)

Competency Builders:

- 32.2.1 Demonstrate knowledge of the analog and digital measurement techniques for physical parameters given equipment with 100% accuracy. (e.g., temperature, time, current, number of items coming down a production line)
- 32.2.2 Distinguish between an analog and a digital clock given clocks with 100% accuracy.
- 32.2.3 Demonstrate knowledge of the function and operation of the instruments used to measure analog signals given signals with 100% accuracy.
- 32.2.4 Demonstrate knowledge of the function and operation of the instruments used to measure analog digital signals given equipment with 100% accuracy.
- 32.2.5 Demonstrate knowledge of how an analog signal can be converted to a digital signal given signals with 85% accuracy.
- 32.2.6 Demonstrate knowledge of how a digital signal can be converted to an analog signal given signals with 85% accuracy.

Competency 32.3: Demonstrate proficiency in working with microcomputer systems (ISS = I)

Competency Builders:

- 32.3.1 Demonstrate knowledge of the essential components of microcomputers and the functions of each given textbook with 100% accuracy. (ISS)
- 32.3.2 Demonstrate knowledge of the principles and operation of bus concepts given textbook with 100% accuracy. (e.g., VESA, EISA) (ISS)
- 32.3.3 Demonstrate knowledge of the principles and operation of different types of memory circuits given textbook with 100% accuracy.
- 32.3.4 Demonstrate knowledge of the operating systems given operating system with 85% accuracy. (e.g., DOS, OS/2, UNIX) (ISS)
- 32.3.5 Demonstrate knowledge of the microprocessor instruction sets given microprocessor with 100% accuracy. (ISS)
- 32.3.6 Demonstrate knowledge of the principles and operation of microprocessor machine code given program with 100% accuracy.
- 32.3.7 Apply microprocessor machine code given program with 100% accuracy.
- 32.3.8 Disassemble microprocessor machine code given program with 100% accuracy.
- 32.3.9 Demonstrate knowledge of types of input and output devices and peripherals given equipment with 100% accuracy. (ISS)
- 32.3.10 Demonstrate knowledge of the principles and operation of storage devices given equipment with 100% accuracy. (ISS)
- 32.3.11 Connect input and output ports to peripherals given ports with 100% accuracy. (ISS)
- 32.3.12 Demonstrate knowledge of central processing unit building blocks and their uses given textbook with 85% accuracy. (ISS)
- 32.3.13 Demonstrate knowledge of the levels of computer languages given textbook with 85% accuracy. (ISS)

Competency 32.4: Demonstrate proficiency in working with computer system architecture (ISS, NS = I)

Competency Builders:

- 32.4.1 Demonstrate knowledge of the principles and operation of computer system architecture given textbook with 85% accuracy. (ISS)
- 32.4.2 Operate computer system architecture given computer with 100% accuracy.
- 32.4.3 Repair computer system architecture given computer with 100% accuracy.
- 32.4.4 Demonstrate knowledge of the principles and operation of addresses and interrupts given computer with 100% accuracy.
- 32.4.5 Demonstrate knowledge of the principles and operation of volatile and nonvolatile memory given memory with 100% accuracy.
- 32.4.6 Demonstrate the use of volatile and nonvolatile memory given memory 100% accuracy.
- 32.4.7 Repair/replace volatile and nonvolatile memory given computer with 100% accuracy.
- 32.4.8 Demonstrate knowledge of the principles and operation of advanced memory techniques given computer with 85% accuracy.
- 32.4.9 Define individual system blocks given block diagram with 100% accuracy.
- 32.4.10 Draw systems configuration in block detail given system with 85% accuracy.
- 32.4.11 Interpret computer acronyms given textbook with 85% accuracy.
- 32.4.12 Demonstrate knowledge of priorities and interrupts at systems level
- 32.4.13 Demonstrate knowledge of direct-memory-access data-handling system(s) given computer with 100% accuracy.
- 32.4.14 Define functions of advanced memory techniques given textbook with 85% accuracy.(e.g., virtual, pipeline, cache)

Competency 32.5: Demonstrate knowledge of the basic elements of communication interfacing (ISS = I, NS = P)

Competency Builders:

- 32.5.1 Demonstrate knowledge of common EIA, IEEE, and ITU-T (formerly CCITT) communication standards and their applications given textbook with 100% accuracy. (e.g., EIA 232 and 485, IEEE 488)
- 32.5.2 Demonstrate knowledge of the function and operation of sync devices given textbook with 85% accuracy.
- 32.5.3 Demonstrate knowledge of the function and operation of async devices given textbook with 85% accuracy.
- 32.5.4 Demonstrate knowledge of types of networks given networks with 85% accuracy. (e.g., token ring, Ethernet) (ISS)
- 32.5.5 Demonstrate knowledge of networking levels or layers given textbook with 85% accuracy.
- 32.5.6 Demonstrate knowledge of protocols given textbook with 85% accuracy. (ISS)
- 32.5.7 Demonstrate knowledge of the function and operation of packet switching given textbook with 85% accuracy.
- 32.5.8 Demonstrate knowledge of multi-user systems given system with 100% accuracy.
- 32.5.9 Demonstrate knowledge of types of network analyzer devices given network with 100% accuracy. (e.g., breakout box, sniffers)

32.5.10 Operate network analyzer devices given analyzer with 100% accuracy.

Competency 32.6: Apply troubleshooting and repair techniques to a microcomputer system (ISS, NS = P)

Competency Builders:

- 32.6.1 Demonstrate knowledge of the role of preventive maintenance given computer with 100% accuracy.
- 32.6.2 Differentiate between normal and abnormal operations given computer with 100% accuracy.
- 32.6.3 Demonstrate knowledge of standard troubleshooting procedures given defective computer with 100% accuracy.
- 32.6.4 Identify available troubleshooting aids and tools given textbook with 85% accuracy.
- 32.6.5 Demonstrate knowledge of safety rules for troubleshooting and repair given textbook with 100% accuracy.
- 32.6.6 Demonstrate knowledge of the techniques for identifying thermal failures given overheated computer with 100% accuracy.
- 32.6.7 Identify logical actions to take for a specific troubleshooting situation given computer with 100% accuracy.
- 32.6.8 Secure needed information using diagnostic software given computer with 100% accuracy.
- 32.6.9 Secure needed information using manufacturers manuals, schematics, and troubleshooting charts given problem with 100% accuracy.
- 32.6.10 Interpret prints given prints with 100% accuracy.
- 32.6.11 Isolate faults to systems boards given computer with 100% accuracy.
- 32.6.12 Isolate faults to memory circuits given computer with 100% accuracy.
- 32.6.13 Isolate faults to data storage devices given computer with 100% accuracy.
- 32.6.14 Isolate faults in power supplies given power supplies with 100% accuracy.
- 32.6.15 Troubleshoot I/O ports given computer with 100% accuracy.
- 32.6.16 Isolate faults in I/O interface circuitry given computer with 100% accuracy.
- 32.6.17 Repair faults given computer with 100% accuracy.
- 32.6.18 Maintain troubleshooting and repair records given computers with 100% accuracy.

Unit 33: Telecommunications

Competency 33.1: Demonstrate knowledge of transmission line applications (ISS = I, NS = P)

Competency Builders:

- 33.1.1 Define power conversion given textbook with 100% accuracy.
- 33.1.2 Demonstrate knowledge of the principles and operation of two-wire and four-wire transmission lines given textbook with 100% accuracy. (ISS)
- 33.1.3 Demonstrate knowledge of the principles and operation of coaxial cable given textbook with 100% accuracy. (ISS)
- 33.1.4 Demonstrate knowledge of the principles and operation of a microwave guide and wireless given textbook with 100% accuracy. (ISS)
- 33.1.5 Demonstrate knowledge of the principles and operation of fiber optics, analog, and digital circuits given textbook with 100% accuracy. (ISS)

Competency 33.2: Demonstrate proficiency in working with transmitters and receivers (NS = I)

Competency Builders:

- 33.2.1 Demonstrate knowledge of Federal Communication Commission (FCC) rules and regulations and PUCO given rules with 85% accuracy.
- 33.2.2 Demonstrate knowledge of the principles and operation of RF amplifiers given textbook with 85% accuracy.
- 33.2.3 Demonstrate knowledge of the principles and operation of modulation/demodulation given waveform with 100% accuracy. (e.g., AM, FM, SSB, DSSC, pulse modulation)
- 33.2.4 Construct modulators/demodulators given components with 100% accuracy.
- 33.2.5 Operate modulators/demodulators given circuits with 100% accuracy.
- 33.2.6 Demonstrate knowledge of the principles and operation of microwave and satellite communication systems given textbook with 85% accuracy.
- 33.2.7 Demonstrate knowledge of the principles and operation of repeater systems given equipment with 100% accuracy. (e.g., trunk and fiber/scramble/data)

Competency 33.3: Demonstrate knowledge of various types of multiplexing systems (NS = I)

Competency Builders:

- 33.3.1 Demonstrate knowledge of the principles and operation of analog multiplexing systems given systems with 100% accuracy. (e.g., CATV)
- 33.3.2 Demonstrate knowledge of the principles and operation of digital multiplexing systems given textbook with 85% accuracy. (e.g., T-1, fiber)

Competency 33.4: Troubleshoot transmitters, receivers, and antennas

Competency Builders:

- 33.4.1 Isolate system faults in CRT modulation/demodulation circuits given monitors with 100% accuracy.
- 33.4.2 Isolate system faults in RF transmitters and receivers given equipment with 100% accuracy.
- 33.4.3 Isolate system faults in RF modulation/demodulation circuits given circuits with 100% accuracy.
- 33.4.4 Isolate system faults in antenna systems given antennas with 100% accuracy.

Competency 33.5: Demonstrate proficiency in working with data communications (ISS = I, NS = P)

Competency Builders:

- 33.5.1 Demonstrate knowledge of the principles and operation of data communications, signaling systems, codes, formats, and protocols given textbook with 85% accuracy.(ISS)
- 33.5.2 Demonstrate knowledge of the principles and operation of parallel and serial ports given ports with 100% accuracy.(ISS)
- 33.5.3 Demonstrate knowledge of the principles and operation of synchronous and asynchronous signals given signals with 100% accuracy.
- 33.5.4 Demonstrate knowledge of the principles and operation of data modems given modems with 100% accuracy. (ISS)
- 33.5.5 Operate data modems given modem with 100% accuracy.
- 33.5.6 Demonstrate knowledge of the principles and operation of fax machines given fax machine with 100% accuracy. (ISS)
- 33.5.7 Demonstrate knowledge of the principles and operation of various types of networks (e.g., Ethernet, token ring) given networks with 100% accuracy.(ISS)
- 33.5.8 Operate various types of networks given networks with 100% accuracy.
- 33.5.9 Employ accepted techniques for cable termination given cable with 100% accuracy. (e.g., UTP, COAX, FIBER)

Competency 33.6: Troubleshoot data communications (NS = I)

Competency Builders:

- 33.6.1 Isolate system faults in data modems given modems with 100% accuracy. (NS)
- 33.6.2 Isolate system faults in various types of networks given various networks with 100% accuracy. (NS)
- 33.6.3 Isolate system faults in various types of cable given cabling with 100% accuracy. (NS)
- 33.6.4 Isolate system faults in various types of carrier systems given systems with 100% accuracy. (NS)
- 33.6.5 Demonstrate knowledge of networking topologies given networks with 100% accuracy. (NS)
- 33.6.6 Determine hardware communication faults utilizing diagnostic tools given software with 100% accuracy. (NS)

33.6.7 Identify network problems utilizing network management tools given tools with 100% accuracy. (e.g., hardware, software carriers) (NS)

Competency 33.7: Demonstrate proficiency in working with fiber optic communications systems (ISS, NS = I)

Competency Builders:

- 33.7.1 Employ accepted techniques for fiber splicing given cable with 100% accuracy.
- 33.7.2 Employ accepted techniques for fiber termination given cabling with 100% accuracy.
- 33.7.3 Demonstrate knowledge of the basic characteristics of optics given textbook with 85% accuracy. (e.g., reflection, total reflection, and refraction)
- 33.7.4 Demonstrate knowledge of the characteristics and components of fiber optic cables
- 33.7.5 Identify bandwidth and attenuation limitations for fiber optic systems given specifications with 100% accuracy.
- 33.7.6 Demonstrate knowledge of the technique of wavelength multiplexing in fiber optic cables given specifications with 100% accuracy.
- 33.7.7 Demonstrate knowledge of the characteristics of various types of light sources and light detectors used in fiber optic systems given textbook with 100% accuracy.
- 33.7.8 Identify the components of fiber optic transmission systems and the function of each given system with 100% accuracy.
- 33.7.9 Demonstrate knowledge of how data signals are transformed into light pulses given textbook with 100% accuracy.
- 33.7.10 Operate a simple fiber optic data transmission system given system with 100% accuracy.
- 33.7.11 Demonstrate knowledge of the characteristics of multi-mode and single-mode systems given textbook with 100% accuracy.

Competency 33.8: Practice RF systems safety

Competency Builders:

- 33.8.1 Comply with safety procedures for working with RF systems antennae and support structures given industry standards with 100% accuracy. (e.g., towers)
- 33.8.2 Comply with safety procedures for working with RF systems high voltage/power supply given industry standard with 100% accuracy.
- 33.8.3 Comply with safety procedures for working with RF generators given industry standard with 100% accuracy.
- 33.8.4 Comply with safety procedures for working in RF radiating environments given industry standard with 100% accuracy.

Competency 33.9: Demonstrate knowledge of antenna systems

Competency Builders:

- 33.9.1 Demonstrate knowledge of the principles and operation of single-element antennae given textbook with 100% accuracy. (e.g., 1/4 wave dipole, longwire, vertical)
- 33.9.2 Demonstrate knowledge of the principles and operation of multi-element antennae given textbook with 100% accuracy. (e.g., point-to-point, broadcast)

- 33.9.3 Demonstrate knowledge of the principles and operation of impedance matching of antennae systems given textbook with 100% accuracy.
- 33.9.4 Demonstrate knowledge of antennae system measurement given system with 100% accuracy.

Competency 33.10: Demonstrate knowledge of telecommunications networks (ISS, NS = I)

Competency Builders:

- 33.10.1 Demonstrate knowledge of the role telecommunication networks play in the contemporary business environment given textbook with 85% accuracy. (ISS)
- 33.10.2 Demonstrate knowledge of how voice, data, and video inputs are converted to electromagnetic signals given textbook with 100% accuracy. (ISS)
- 33.10.3 Demonstrate knowledge of advanced telecommunication technologies, including frame relay and ATM given textbook with 85% accuracy. (ISS)
- 33.10.4 Demonstrate knowledge of how to design telecommunication protocols given application with 100% accuracy.
- 33.10.5 Demonstrate knowledge of the TCP/IP protocol and how each layer functions given textbook with 100% accuracy.
- 33.10.6 Identify applications that should be addressed using the client-server model given scenario with 100% accuracy.
- 33.10.7 Demonstrate knowledge of the X.25 protocol given textbook with 100% accuracy.
- 33.10.8 Demonstrate knowledge of the characteristics and function of ISDN and ISDN signaling given textbook with 100% accuracy.
- 33.10.9 Demonstrate knowledge of the characteristics and function of frame relay congestion control given textbook with 100% accuracy.
- 33.10.10 Demonstrate knowledge of the characteristics and function of asynchronous transfer mode given textbook with 100% accuracy. (ATM)
- 33.10.11 Demonstrate knowledge of legacy traffic over ATM given textbook with 100% accuracy.
- 33.10.12 Demonstrate knowledge of how ATM traffic is managed given textbook with 100% accuracy.
- 33.10.13 Demonstrate knowledge of ATM PNNI given textbook with 100% accuracy.
- 33.10.14 Demonstrate knowledge of mobile communications technologies, including cellular and personal communication networks given textbook with 100% accuracy.
- 33.10.15 Demonstrate knowledge of international telecommunications standards, models, trends given industry standard with 100% accuracy.
- 33.10.16 Demonstrate knowledge of error detection and correction systems given textbook with 100% accuracy.
- 33.10.17 Demonstrate knowledge of the characteristics and function of data compression given textbook with 100% accuracy.
- 33.10.18 Demonstrate knowledge of the characteristics and function of data concentration given textbook with 100% accuracy.