Montana Big Sky Pathways (Programs of Study)
Agreement Valid for 2012-2013 Academic Year

The Carl D. Perkins Career and Technical Education Act of 2006 (Perkins IV) calls for states to offer "career and technical programs of study," known as Big Sky Pathways in Montana, as an option to students and their parents when planning for and completing future coursework. These programs, at a minimum, must:

- Incorporate and align secondary and postsecondary education elements,
- Include academic and CTE content in a coordinated, non-duplicative progression of courses,
- Offer the opportunity, where appropriate, for secondary students to acquire postsecondary credits, and
- Lead to an industry-recognized credential or certificate at the postsecondary level, or an associate or baccalaureate degree.

By my signature on this form, I verify each of the eight (8) requirements listed below are demonstrated within the Big Sky Pathways Proposal and Gap Analysis. For approval, all eight (8) requirements must be checked.

<table>
<thead>
<tr>
<th>Name of Big Sky Pathway (Cluster Level):</th>
<th>Information Technology: Web &amp; Digital Communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of High School:</td>
<td>Plevna High School</td>
</tr>
<tr>
<td>Names of High School Lead Teacher &amp; Counselor:</td>
<td>Chasidy Davis &amp; Jean Brenner</td>
</tr>
<tr>
<td>The Lead High School Teacher will be contacted if OPI has questions about this request.</td>
<td>Lead Teacher's email address: <a href="mailto:cdavis@plevna.k12.mt.us">cdavis@plevna.k12.mt.us</a></td>
</tr>
<tr>
<td>Lead Teacher's phone number:</td>
<td>406-772-5866</td>
</tr>
<tr>
<td>Name of College:</td>
<td>Miles Community College</td>
</tr>
<tr>
<td>Name of College Program:</td>
<td>Information Technology: Graphics &amp; Web Design</td>
</tr>
<tr>
<td>Name of College Lead Faculty Member:</td>
<td>Nancy Swope</td>
</tr>
</tbody>
</table>

**REQUIREMENTS FOR APPROVAL**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>YES</th>
<th>IP</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Includes all state and local graduation requirements preparing students for entry into a postsecondary program or apprenticeship.</td>
<td>Y</td>
<td>IP</td>
<td></td>
</tr>
<tr>
<td>2. Identifies the appropriate secondary CTE, academic, and recommended elective courses offered by this high school which will prepare the student for college-level courses without remediation.</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Outlines a non-duplicative sequence of courses from grades 9-12 and from secondary to postsecondary education.</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Leads to an industry-recognized postsecondary credential, degree or employment</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Completed &quot;Gap Analysis&quot; with a program offered by a Montana postsecondary institution.</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. When applicable, dual enrollment, Advanced Placement, International Baccalaureate courses and CTE START (Statewide Articulations) opportunities have been identified.</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Pathway curriculum includes appropriate state/national standards and/or Industry skills standards. Identify standards used: National Standards for Business Education</td>
<td>Y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Links with a web-based guidance delivery system such as Montana Career Information System (MCIS). If using something other than MCIS, please indicate:</td>
<td></td>
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</tr>
</tbody>
</table>

High School Principal's Signature: ________________________________ Date: 1/24/12
High School CTE Teacher's Signature: ____________________________ Date: 1/24/12
High School Counselor's Signature: ______________________________ Date: 1/24/12

Please submit this Approval Form with the Big Sky Pathway Proposal to the Big Sky Pathway Coordinator at the College identified above.

College Chief Academic Officer's Signature: ________________________ Date: 2/10/12
College Lead Faculty Member's Signature: _________________________ Date: 2/10/12

Please submit this Approval Form with the Big Sky Pathway Proposal to:
OPI, Career and Technical Education, P. O. Box 202501, Helena, MT 59620-2501.

OPI Approval: __________________________ Date of Approval: May 15, 2012
OCHE Approval: _________________________ Date of Approval: October 28, 2012
### Cluster Overview:
Information Technology careers encompass entry level, technical, and professional careers related to the design, development, support and management of hardware, software, multimedia, and systems integration services.

### Pathway Options:
- Network Systems
- Information Support and Services
- Web and Digital Communications
- Programming and Software Development

### Occupation Examples:
- Animator
- Database Administrator
- Data Systems Designer
- E-Business Specialist
- Game Developer
- Information Technology Engineer Media Specialist
- Network Administrator
- Network Security Analyst
- PC Support Specialist
- Programmer
- Software Applications Specialist
- Systems Administrator
- Telecommunications Network Technician
- User Support Specialist
- Virtual Reality Specialist
- Web Architect/Designer

For a complete listing, go to:
http://online.onelcenter.org/find/career?c=11&g=Go

### Suggested High School Courses

<table>
<thead>
<tr>
<th>Grade</th>
<th>Requirement</th>
<th>English</th>
<th>Math</th>
<th>CTE Pathway Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>9th</td>
<td>Graduation Requirements</td>
<td>English, Algebra I, Earth Science, World History, or Geography, Health /P.E.</td>
<td>Workforce/2-Year College Prep</td>
<td>Recommended CTE Cluster Foundation Course(s): Computer Applications</td>
</tr>
<tr>
<td></td>
<td>4-Year MT College/Univ Prep (Rigorous Core)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CTE and/or Electives</td>
<td>Computer Applications I</td>
<td></td>
<td>Recommended CTE Pathway Courses: Computer Applications II Multimedia I</td>
</tr>
<tr>
<td>10th</td>
<td>Graduation Requirements</td>
<td>English II, Geometry, Biology, Civics &amp; MT History, Health/P.E.</td>
<td>Workforce/2-Year College Prep</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-Year MT College/Univ Prep (Rigorous Core)</td>
<td></td>
<td></td>
<td>Other Recommended CTE Courses: Accounting I Multimedia I</td>
</tr>
<tr>
<td></td>
<td>CTE and/or Electives</td>
<td>Computer Applications II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11th</td>
<td>Graduation Requirements</td>
<td>English III, Algebra II, US History</td>
<td>Workforce/2-Year College Prep</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-Year MT College/Univ Prep (Rigorous Core)</td>
<td></td>
<td></td>
<td>Career &amp; Technical Student Organization(s): BPA</td>
</tr>
<tr>
<td></td>
<td>CTE and/or Electives</td>
<td>Multimedia I, Accounting I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12th</td>
<td>Graduation Requirements</td>
<td>English IV, American Government</td>
<td>Workforce/2-Year College Prep</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-Year MT College/Univ Prep (Rigorous Core)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CTE and/or Electives</td>
<td>Multimedia I, Multimedia II, Accounting I</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Advanced Learning Opportunities

- High School to College/Career Linkages
- CTE START courses: Computer Applications I, Accounting I, MS Word, MS Excel
- Advanced Placement or IB courses:
- Dual Enrollment courses:
- Online courses:
  - MDTA, North Dakota Center for Distance Education
  - Other: High School Business Challenge, Stock Market Game (Montana Council on Economic Education)

### Postsecondary Program of Study

<table>
<thead>
<tr>
<th>Semester</th>
<th>Math</th>
<th>English</th>
<th>Major</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>13—Semester 1</td>
<td>M 108 Bus Math</td>
<td></td>
<td>CAPP 120 Intro to Computers ARTZ 105 Visual Language – Drawing BU 213 Marketing</td>
<td>CA 112 Public Speaking</td>
</tr>
<tr>
<td>Semester 1</td>
<td>13—Semester 2</td>
<td>WRIT 100 Bus Writing</td>
<td>AC 151 Photography I</td>
<td>ARTZ 106 Visual Lang – 2d Found.</td>
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</tr>
<tr>
<td>14—Semester 1</td>
<td></td>
<td>CSCI 110 Programming with Visual Basic I</td>
<td>IT 213 Photoshop &amp; Illustrator</td>
<td>IT 255 Web Animation &amp; Motion Graphics</td>
</tr>
<tr>
<td>14—Semester 2</td>
<td></td>
<td>CSCI 210 Web Programming</td>
<td>IT 214 Desktop Publishing</td>
<td>CSCI 121 Programming with Java II</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CA 102 Human Relations</td>
</tr>
</tbody>
</table>

**MONTANA POSTSECONDARY OPPORTUNITIES**

*Montana University System Degree and Program Inventory: [http://www.homepage.montana.edu/~mus/dqrinr/](http://www.homepage.montana.edu/~mus/dqrinr/)*

*Your Guide to Montana's Certificate and Associate Degree Programs: [http://mus.edu/2y/year/YourGuide.html](http://mus.edu/2y/year/YourGuide.html)*

<table>
<thead>
<tr>
<th>Colleges of Technology:</th>
<th>Community Colleges:</th>
<th>Tribal Colleges:</th>
<th>Four Year Colleges/Universities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLCOT—Billings; GFCOT—Great Falls; HCOT—Helena; TECHCOT—Butte; UMCOT—Missoula; GCP—Bozeman</td>
<td>DCC—Glendive; FVCC—Kallispelet; MCC—Missoula City</td>
<td>BFCC—Browning; CCBC—Lame Deer; FBCC—Harlem; FPCC—Poplar; LBHC—Crow Agency; SCC—Box Elder, SKC—Pablo</td>
<td>MSU—Bozeman, MSUB—Billings; MSUN—Havre; TECH—Butte; UM—Missoula; UMW— Dillon</td>
</tr>
</tbody>
</table>

**MILITARY**
- Requires diploma or GED
- 17 with parental consent; 18 without

**PROFESSIONAL CERTIFICATE**
- Requires diploma or GED
- Less than 30 credits; little/no general ed credits
- Complete in one year or less

**APPRENTICESHIP**
- Requires diploma or GED
- Must be at least 18
- Minimum 2,000 hours of supervised experience

**CERTIFICATE OF APPLIED SCIENCE**
- Requires diploma or GED
- 30-45 credits; limited general education credits
- Complete in one year or less

**ASSOCIATE’S OF APPLIED SCIENCE DEGREE**
- Requires diploma or GED
- 60-72 credits; includes 15-25 general ed credits
- Complete in two years *(if prepared academically in math and English)*

**BACCALAUREATE DEGREE**
- Requires 4-year college prep for admission
- 128 credits (approximately)
- Complete in four years

Air Force, Air Guard, Army, Coast Guard, Marines, and Navy
For more information: [http://todaysmilitary.com](http://todaysmilitary.com)

See the MT Dept of Labor website for more information: [http://wsl.let.mt.gov/apprenticeship/default.asp](http://wsl.let.mt.gov/apprenticeship/default.asp)

Computer Assistant — HCOT, TECHCOT, GFCOT
Computer Desktop/Network Support — FPCC
Computer Networking — BLCOT, TECHCOT, GFCOT, UMW
Computer Science/Technology — BFCC
Computer Skills Specialist — HCOT
Computer Support — UMCOT
Programming Technology — FPCC
Web Technology/Development/Design — DCC

Computer Desktop/Network Support — BLCOT, SKC
Computer Graphics — MCC
Computer Information Systems — UMCOT, MSUN,
Computer Networking — HCOT, UMCOT, TECHCOT, GFCOT, MCC, FPCC
Computer Science/Technology — FPCC, BFCC
Computer Systems Tech — BLCOT
Computer Technical Support Specialist — DCC
Information Technology/Systems — FVCC
Microcomputer Specialist/Technology — GFCOT
Programming Technology — HCOT, BLCOT
Web Technology/Development/Design — HCOT, TECHCOT, GFCOT, FVCC

Computer Engineering — MSU, SKC
Network Technology — TECH
Computer Science — MSU, UM
Computer Info Systems — MSUN
Information Systems — UM
Information Technology — SKC

Degree and Program Inventory above may not be all inclusive
PATHWAY DESCRIPTION

Web and Digital Communications: Careers in Web and Digital Communications involve creating, designing and producing interactive multimedia products and services, including development of digitally-generated or computer-enhanced media used in business, training, entertainment, communications and marketing. Organizations of all types and sizes use digital media (the World Wide Web, CD-ROM, DVD) to communicate with existing and potential customers, to track transactions, and to collaborate with colleagues. Web and digital communications experts can find employment opportunities in organizations of all sizes and types, doing work such as creating e-business auction Web sites that allow people around the world to buy and sell items in real-time.

C. CLUSTER (FOUNDATION) KNOWLEDGE AND SKILLS

The following Cluster (Foundation) Knowledge and Skill statements apply to all careers in the Information Technology Cluster. Persons preparing for careers in the Information Technology Cluster should be able to demonstrate these skills in addition to those found on the Essential Knowledge and Skills Chart.

Cluster Topic

ITC01 ACADEMIC FOUNDATIONS: Achieve additional academic knowledge and skills required to pursue the full range of career and postsecondary education opportunities within a career cluster.
No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

Cluster Topic

ITC02 COMMUNICATIONS: Use oral and written communication skills in creating, expressing and interpreting information and ideas including technical terminology and information.
Develop positive customer relations to build and maintain a customer base in the IT industry.

ITC02.01 Demonstrate knowledge of organization's offerings and of customers' importance to the organization.

Sample Indicators

Identify organization's products and services (including own strengths as an agent of the company).
Recognize the importance of all customers to the business.

ITC02.01.02 Demonstrate ability to assist customers in a professional manner.

Sample Indicators

Determine customers' individual needs.
### Career Clusters Knowledge and Skills

**Project a professional business image (e.g., appearance, voice, grammar, word usage, enunciation, nonverbal communication).**

Interact with customers and colleagues in a professional manner (e.g., prompt, friendly, courteous, respectful, helpful, knowledgeable, understandable).

Ensure that your assistance promotes the best interests of the company.

**Effectively use organizational protocols and systems to fulfill customer service requirements.**

- Comply with established business protocols and company policies.
- Communicate company policies to customers.
- Handle merchandise returns in accordance with customer service policy.
- Handle customer complaints in accordance with customer service policy.
- Facilitate customer service through the maintenance of key information systems.

**Ensure that customers' needs are met to maintain a customer base.**

- Follow through on commitments made to customers (e.g., special orders, delivery specifications, new items).
- Maintain customer base.

**Perform scheduling functions to meet customer needs.**

- Schedule customer appointments.

  - Create calendars/schedules.
  - Maintain appointment calendars.
  - Process requests for appointments.
  - Verify appointments.
  - Notify customers of changes in schedule.
  - Manage scheduling conflicts.

- Document results of customer appointments.

  - Document results.

### Cluster Topic

**PROBLEM-SOLVING AND CRITICAL THINKING:** Solve problems using critical thinking skills (analyze, synthesize, and evaluate) independently and in teams. Solve problems using creativity and innovation.

**Use product/service design processes and guidelines to produce a quality IT product/service.**

**ITC03.01**

Summarize the process of IT product/service design.

- Test products for reliability.
- Initiate predictive maintenance procedures.
- Document a Quality Assurance (QA) program (includes creating a plan and evaluating effectiveness of the program).
<table>
<thead>
<tr>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ITC03.01.02</strong> Plan for products/services using reliability factors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC03.01.03</strong> Create products/services using reliability factors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC03.01.04</strong> Test new products/services for reliability.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC03.01.05</strong> Maintain the reliability of new products/services.</td>
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<td></td>
</tr>
</tbody>
</table>

**Implement problem-solving processes to evaluate and verify the nature of problems in the IT industry.**

**ITC03.02**

| **ITC03.02.01** Explain information systems theory and practice. |
| | |
| **Sample Indicators** |
| Demonstrate knowledge of the underlying concepts of the information systems discipline. |
| Demonstrate knowledge of methods for achieving productivity in knowledge work. |
| Apply general systems theory to the analysis and development of an information system. |
| Identify procedures for formal problem-solving. |
| Demonstrate knowledge of the fundamental concept of information theory and organizational system processes. |
| Identify the essential properties of information systems. |

| **ITC03.02.02** Explain information systems problem-solving techniques and approaches. |
| **ITC03.02.03** Evaluate information systems problem-solving techniques and approaches. |

**Employ organization and design principles to sort and group information used in the IT industry.**

**ITC03.03**

| **ITC03.03.01** Demonstrate the use of information organization principles. |
| | |
| **Sample Indicators** |
| Demonstrate knowledge of group support technology for common knowledge requirements. |
| Demonstrate knowledge of the information analysis process. |
| Demonstrate knowledge of Information Technology solutions. |
| Demonstrate knowledge of methods for achieving productivity in knowledge work. |

| **ITC03.03.02** Demonstrate the use of design and color principles. |

**Cluster Topic**

**ITC04**

**INFORMATION TECHNOLOGY APPLICATIONS:** *Use information technology tools specific to the career cluster to access, manage, integrate, and create information.*
**Career Clusters Knowledge and Skills**

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

<table>
<thead>
<tr>
<th>Cluster Topic</th>
<th>ITC05.01</th>
<th>ITC05.02</th>
<th>ITC05.03</th>
</tr>
</thead>
</table>
| **SYSTEMS:** Understand roles within teams, work units, departments, organizations, inter-organizational systems, and the larger environment. Identify how key organizational systems affect organizational performance and the quality of products and services. Understand global context of industries and careers. **Analyze and summarize the use of IT in business to enhance effectiveness.** | **Sample Indicators** Integrate IT into various types of business models.  
Determine how business activities interface with data processing functions.  
Differentiate between the role of information systems within a company and their role in a global environment.  
Measure increases in productivity realized by the implementation of information systems. | **Sample Indicators** Implement cross-functional teams to achieve IT project goals.  
Summarize the importance of cross-functional teams in achieving IT project goals.  
Consider the benefits of using a cross-functional team in policy and procedure development.  
Identify desired group and team behavior in an IT context.  
Explain technical concepts to various audiences in non-technical terms.  
Describe strategies for maximizing productivity in a high tech environment. | **Sample Indicators** Employ project management knowledge to oversee IT projects.  
Implement project methodologies to manage information system projects.  
Define the project's contribution to business needs.  
Define the scope of the project.  
Identify stakeholders and decision makers.  
Identify ooooolation procedures.  
Develop task list (work breakdown structures).  
Evaluate project requirements.  
Identify required resources and budget.  
Estimate time requirements.  
Develop initial project management flowchart.  
Identify interdependencies. |

<table>
<thead>
<tr>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I -- Computer Applications I and II</td>
<td>R -- CAPP151 -- MS Office</td>
</tr>
<tr>
<td>R -- IT214 -- Desktop Publishing R -- IT250 -- Internet &amp; Web Page</td>
<td></td>
</tr>
<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
</tr>
<tr>
<td>-------------------------------------</td>
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<tr>
<td>Identify critical milestones.</td>
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<tr>
<td>Evaluate risks.</td>
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<tr>
<td>Prepare contingency plan.</td>
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<tr>
<td>Manage the change control process.</td>
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<tr>
<td>Track critical milestones.</td>
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<tr>
<td>Participate in project phase review.</td>
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<tr>
<td>Report project status.</td>
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<tr>
<td>Utilize project management software.</td>
<td></td>
</tr>
<tr>
<td>Develop a method of evaluation.</td>
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</tr>
</tbody>
</table>

**Sample Indicators ITC05.03.02**

Define scope of work to achieve individual and group goals.

Assess the task's contribution to overall business needs.

Identify size and specifics of the task.

Formulate task sequence.

Plan multiple tasks simultaneously.

Identify potential problems.

Develop contingency plans.

**Sample Indicators ITC05.03.03**

Develop time and activity plans to achieve objectives.

Coordinate plan with team, cross-functional groups, or individuals.

Formulate a task strategy.

Prioritize tasks according to business needs.

Manage multiple tasks simultaneously.

Devise plan of action.

**Cluster Topic ITC06**

**SAFETY, HEALTH AND ENVIRONMENTAL:** *Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.*

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.

**Cluster Topic ITC07**

**LEADERSHIP AND TEAMWORK:** *Use leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.*

No additional statements in this topic beyond those found in the Essential Knowledge and Skills Chart.
<table>
<thead>
<tr>
<th>Cluster Topic</th>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ITC08</strong></td>
<td>ETHICS AND LEGAL RESPONSIBILITIES: <em>Know and understand the importance of professional ethics and legal responsibilities.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC08.01</strong></td>
<td><strong>Apply standard practices and behaviors that meet legal and ethical responsibilities and exhibit positive cyber-citizenry to understand legal issues faced by IT professionals.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC08.01.01</strong></td>
<td>Explain legal issues faced by IT professionals.</td>
<td>I-- All IT Courses</td>
<td>All IT Courses</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of the legal issues that face Information Technology professionals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Identify issues and trends affecting computers and information privacy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Explain legal issues involved in a company security policy.</td>
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</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Identify legal issues involved concerning a security breach.</td>
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</tr>
<tr>
<td><strong>ITC08.01.02</strong></td>
<td>Summarize the rights and responsibilities of IT workers.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC08.01.03</strong></td>
<td>Identify ethical issues common to the IT field.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC09</strong></td>
<td>EMPLOYABILITY AND CAREER DEVELOPMENT: <em>Know and understand the importance of employability skills. Explore, plan, and effectively manage careers. Know and understand the importance of entrepreneurship skills.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC09.01</strong></td>
<td><strong>Identify and explain the implications IT has on business transformation and development to demonstrate an understanding of the impact on business.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC09.01.01</strong></td>
<td>Demonstrate understanding of the impact of IT on businesses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of how both PCs and larger computer systems impact people and are used in business/industry/government and other institutions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of the impact of computers on career pathways in business/industry (e.g., how computers have eliminated and created jobs).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of the impact of computers on access to information and information exchange worldwide.</td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of ethical issues that have surfaced in the information age.</td>
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<tr>
<td><strong>ITC10</strong></td>
<td>TECHNICAL SKILLS: <em>Use the technical knowledge and skills required to pursue the targeted careers for all pathways in the career cluster, including knowledge of design, operation, and maintenance of technological systems critical to the career cluster.</em></td>
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<tr>
<td><strong>ITC10.01</strong></td>
<td>Demonstrate knowledge of the hardware components associated with information systems.</td>
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<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
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<tr>
<td>ITC10.01.01 Explain the fundamentals of operating systems.</td>
<td>R--CAPP120-- Introduction to Computers</td>
<td>I -- Computer Applications I</td>
<td></td>
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<tr>
<td>Sample Indicators Identify major operating system fundamentals and components.</td>
<td>R--IT150-- Operating Systems</td>
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<tr>
<td>ITC10.01.02 Explain the role of number systems in information systems.</td>
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<tr>
<td>Sample Indicators Identify the role the binary and hexadecimal system in information systems.</td>
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<tr>
<td>ITC10.01.03 Identify computer classifications and hardware.</td>
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<tr>
<td>Sample Indicators Identify major hardware components and their functions.</td>
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<tr>
<td>Identify the hardware associated with telecommunications functions.</td>
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<tr>
<td>Identify types of computer storage devices.</td>
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<tr>
<td>ITC10.01.04 Describe elements and types of information processing.</td>
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<tr>
<td>Sample Indicators Identify the elements of the information processing cycle (i.e., input, process, output, and storage).</td>
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<tr>
<td>Identify types of processing (e.g., batch, interactive, event-driven, object-oriented).</td>
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<tr>
<td>ITC10.01.05 Use available reference tools as appropriate.</td>
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<tr>
<td>Sample Indicators Access needed information using company and manufacturers' references (e.g., procedural manuals, documentation, standards, work flowcharts).</td>
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<tr>
<td>ITC10.01.06 Describe the function of CPUs.</td>
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<tr>
<td><strong>Compare classes of software associated with the development and maintenance information systems to develop software and maintain computer systems.</strong></td>
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<tr>
<td><strong>ITC10.02</strong></td>
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<tr>
<td><strong>ITC10.02.01</strong> Explain the key functions and applications of software.</td>
<td>I -- Computer Applications I</td>
<td>R--CAPP120-- Intro to Computers</td>
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<tr>
<td>Sample Indicators Demonstrate knowledge of the key functions of systems software.</td>
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<tr>
<td>Demonstrate knowledge of widely used software applications (e.g., word processing, database management, spreadsheet development).</td>
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<tr>
<td>Demonstrate knowledge of the function and operation of compilers and interpreters.</td>
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<tr>
<td><strong>ITC10.02.02</strong> Describe the range of languages used in software development.</td>
<td></td>
<td>R--CSCI 110-- Programming with Visual Basic I</td>
<td></td>
</tr>
<tr>
<td>Sample Indicators Demonstrate knowledge of the range of languages used in software development.</td>
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<tr>
<td><strong>ITC10.02.03</strong> Summarize how data is organized in software development.</td>
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<tr>
<td>Sample Indicators Demonstrate knowledge of how data is organized in software development.</td>
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<tr>
<td><strong>ITC10.02.04</strong> Explain new and emerging classes of software.</td>
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<tr>
<td>Sample Indicators Identify new and emerging classes of software.</td>
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<tr>
<td><strong>ITC10.03</strong> Identify and compare new IT trends and technologies to build an understanding of their potential influence on IT practices.</td>
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<tr>
<td>Career Clusters Knowledge and Skills</td>
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<tr>
<td><strong>ITC10.03.01</strong> Explain measurement techniques for increased productivity due to information support implementation. Measure increases in productivity realized by the implementation of information systems.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.03.02</strong> Identify new IT technologies. Identify new technologies relevant to information technology. Assess the importance of new technologies to future developments and to future knowledge worker productivity. Identify new and emerging drivers and inhibitors of Information Technology change. Assess the potential importance and impact of new IT technologies in the future.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>Summarize basic data communications components and trends to maintain and update IT systems.</strong></td>
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<td><strong>ITC10.04</strong></td>
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<tr>
<td><strong>ITC10.04.01</strong> Explain data communications procedures, equipment and media. Demonstrate knowledge of key communications procedures. Demonstrate knowledge of the uses of data communication equipment. Demonstrate knowledge of types of communications media.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.04.02</strong> Explain data transmission codes and protocols. Demonstrate knowledge of data transmission codes and protocols.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.04.03</strong> Explain the differences between local and wide area networks. Distinguish between local area networks and wide-area networks.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.04.04</strong> Summarize data communication trends and issues. Identify data communication trends. Identify major current issues in data communications.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>Demonstrate technical knowledge of the Internet to develop and maintain IT systems.</strong></td>
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<td><strong>ITC10.05</strong></td>
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<tr>
<td><strong>ITC10.05.01</strong> Describe Internet protocols. Demonstrate knowledge of the Transmission Control Protocol/Internet Protocol (TCP/IP) suites. Demonstrate knowledge of management protocols, applications and procedures (e.g., SNMP, intrusion detection, and reporting issues). Explain the concept of routing.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.05.02</strong> Explain Domain Name Server (DNS). Demonstrate knowledge of the Domain Name System (DNS). Explain the DNS hierarchy. Identify elements of DNS (e.g., zones, server types). Summarize Internet security issues and systems available for addressing them.</td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.05.03</strong> Demonstrate knowledge of the Domain Name System (DNS).</td>
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<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
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<tr>
<td>Explain the DNS hierarchy.</td>
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<tr>
<td>Identify elements of DNS (e.g., zones, server types).</td>
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<tr>
<td><strong>Access and use Internet services when completing IT related tasks to service and update IT systems.</strong></td>
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<td><strong>ITC10.06</strong></td>
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<tr>
<td><strong>ITC10.06.01</strong> Demonstrate the use of an Internet connection.</td>
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<tr>
<td>Configure a small home office Internet connection using cable, DSL, wireless or satellite connection.</td>
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<tr>
<td>Test Internet connection using tools such as ping, trace route, net stat, host, dig, and nslookup.</td>
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<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.06.02</strong> Troubleshoot Internet connection problems.</td>
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<tr>
<td><strong>ITC10.06.03</strong> Explain the components of Internet software.</td>
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<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.06.04</strong> Install Internet software for use on an operating system.</td>
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<tr>
<td>Identify common browser features.</td>
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<tr>
<td>Install Internet software.</td>
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<tr>
<td>Differentiate between Web-based applications and applications installed on a local computer.</td>
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<tr>
<td>Download software upgrades and shareware from the Internet.</td>
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<td>Unpack files using compression software.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.06.05</strong> Describe virus protection procedures.</td>
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<tr>
<td>Demonstrate acute awareness of virus protection techniques.</td>
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<tr>
<td>Identify types and capabilities of popular virus protection software.</td>
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<tr>
<td>Explain spyware, adware, and malware.</td>
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<tr>
<td>Identify how to avoid spyware, adware, and malware and how to recover from infection.</td>
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<tr>
<td>Explain cookies and adware on an internet connected computer system.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.06.06</strong> Demonstrate knowledge of cookies and their use on an internet-connected computer system.</td>
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<tr>
<td>Identify types and consequences of pop-ups and ad-ware.</td>
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<tr>
<td><strong>Install and configure software programs to maintain and update IT systems.</strong></td>
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<td><strong>ITC10.07</strong></td>
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<tr>
<td><strong>ITC10.07.01</strong> Verify that hardware and software system components are compatible prior to performing installation.</td>
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<tr>
<td>Identify hardware requirements (e.g., processor, memory, disk space, communications, printers, monitors).</td>
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<tr>
<td>Determine compatibility of hardware and software.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td><strong>ITC10.07.02</strong> Verify that software to be installed is licensed prior to performing installation.</td>
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<tr>
<td>Verify conformance to licensing agreement.</td>
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<tr>
<td>Understand the concept of an End User Licence Agreement (EULA).</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<td><strong>Sample Indicators</strong></td>
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<tr>
<td>Career Clusters Knowledge and Skills</td>
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<tr>
<td>Differentiate between open source and proprietary licenses.</td>
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<td>Computers</td>
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<tr>
<td>Explain the concept of open source.</td>
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<tr>
<td>Identify common characteristics of open source licensing agreements, including</td>
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<tr>
<td>the GNU General Public License (GPL).</td>
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<tr>
<td>Perform installation accurately and completely, using available resources</td>
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<td>as needed.</td>
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<tr>
<td>Install given application/system software on various platforms in accordance</td>
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<td>with manufacturer's procedures.</td>
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<tr>
<td>Disable/uninstall software that may interfere with installation of new</td>
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<td>R--CAPP120--</td>
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<tr>
<td>software.</td>
<td></td>
<td>Intro to</td>
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<tr>
<td>Differentiate between procedures for an upgrade and for a new installation.</td>
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<td>Computers</td>
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<tr>
<td>Differentiate between stand-alone and network installation procedures.</td>
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<td>R--IT231--</td>
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<tr>
<td>Select appropriate installation options (e.g., default, customized).</td>
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<td>Comp TIA A+</td>
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<tr>
<td>Configure software to appropriate operating system settings.</td>
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<tr>
<td>Configure macros, tools, and packages to accomplish simple organizational and</td>
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<td>personal tasks.</td>
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<td>Convert data files if required.</td>
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<tr>
<td>Verify software installation and operation.</td>
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<tr>
<td>Resolve problems with installation if they occur.</td>
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<tr>
<td>Troubleshoot unexpected results.</td>
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<tr>
<td>Access needed help using manufacturers' technical help lines or Internet</td>
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<td>R--IT231--Comp</td>
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<tr>
<td>sites.</td>
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<td>TIA A+</td>
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<tr>
<td>Formulate new installation procedure if needed.</td>
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<tr>
<td>Perform customization as requested.</td>
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<tr>
<td>Customize software to meet user preferences.</td>
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<tr>
<td>Document procedures, using clear and effective notes, for future use.</td>
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<tr>
<td>**Demonstrate knowledge of Web page basics to build an understanding of Web</td>
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<tr>
<td>page design and functioning.</td>
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<tr>
<td><strong>ITC08</strong></td>
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<tr>
<td><strong>ITC08.01</strong> Explain the features and functions of Web browsing software.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<tr>
<td>Demonstrate knowledge of the role of browsers in reading files on the World</td>
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<tr>
<td>Wide Web (text-only, hypertext).</td>
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<tr>
<td>Identify how different browsers affect the look of a web page.</td>
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<tr>
<td>Demonstrate knowledge of the characteristics and uses of plug-ins.</td>
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<tr>
<td><strong>ITC08.02</strong> Explain the features and functions of Web page design software.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<tr>
<td>Compare/contrast the features and functions of software editors available for</td>
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<tr>
<td>designing web pages.</td>
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<tr>
<td><strong>ITC08.03</strong> Compare and contrast clients and servers.</td>
<td>R--IT250--</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td>I &amp; Multimedia</td>
<td>Internet &amp; Web</td>
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<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
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<tr>
<td>Explain how traditional and modern Internet clients exploit the client/server relationship.</td>
<td>ii</td>
<td>Page</td>
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<tr>
<td>Describe how bandwidth affects data transmission and on-screen image.</td>
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<tr>
<td>Demonstrate knowledge of how bandwidths affect data transmission and on-screen image.</td>
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<tr>
<td>ITC10.08.04</td>
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<tr>
<td>Sample Indicators</td>
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<tr>
<td>Compare the benefits of internal and external Web hosting.</td>
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<tr>
<td>ITC10.08.05</td>
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<tr>
<td>Sample Indicators</td>
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<tr>
<td>Compare the advantages and disadvantages of internal external web hosting.</td>
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<tr>
<td>Employ IT knowledge and procedures when configuring or modifying an operating system to ensure optimal system functioning.</td>
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<tr>
<td>ITC10.09</td>
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<tr>
<td>ITC10.09.01</td>
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<tr>
<td>Configure/modify system as needed.</td>
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<tr>
<td>Secure needed supplies and resources.</td>
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<tr>
<td>Review automated scheduling software.</td>
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<tr>
<td>Identify data requirements.</td>
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<tr>
<td>Identify scheduling priority in programming.</td>
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<tr>
<td>Build system software command structures using operating system macro facilities for computer systems.</td>
<td></td>
<td>R--IT150--Operating Systems</td>
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<tr>
<td>ITC10.09.02</td>
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<tr>
<td>Use operating system principles to ensure optimal system function.</td>
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<tr>
<td>Apply basic commands of operating system software.</td>
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<tr>
<td>Apply appropriate file and disk management techniques.</td>
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<tr>
<td>Employ desktop operating skills.</td>
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<tr>
<td>Handle materials and equipment in a responsible manner.</td>
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<tr>
<td>Follow power-up and log-on procedures.</td>
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<tr>
<td>Interact with/respond to system messages using console device.</td>
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<tr>
<td>Run applications/jobs in accordance with processing procedures.</td>
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<tr>
<td>Follow log-off and power-down procedure(s).</td>
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<tr>
<td>ITC10.09.03</td>
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<tr>
<td>Use available reference tools as appropriate.</td>
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<tr>
<td>Access needed information using appropriate reference materials.</td>
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<tr>
<td>ITC10.09.04</td>
<td></td>
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<tr>
<td>Document procedures and actions.</td>
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<tr>
<td>Sample Indicators</td>
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<tr>
<td>Develop audit trails.</td>
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<td>ITC10.09.05</td>
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<tr>
<td>Configure systems to provide optimal system interfaces.</td>
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<tr>
<td>Perform standard computer backup procedures to protect IT information.</td>
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<tr>
<td>ITC10.10</td>
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<tr>
<td>ITC10.10.01</td>
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<tr>
<td>Explain the need for regular backup procedures.</td>
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<tr>
<td>Sample Indicators</td>
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<tr>
<td>Recognize the need for regular backup procedures.</td>
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<tr>
<td>ITC10.10.02</td>
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<tr>
<td>Configure, perform and maintain backup procedures.</td>
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<tr>
<td>Sample Indicators</td>
<td></td>
<td></td>
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<tr>
<td>Load backup software.</td>
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<tr>
<td>R--IT150--Operating Systems</td>
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</tbody>
</table>


<table>
<thead>
<tr>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
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</thead>
<tbody>
<tr>
<td>Load compression drive backup software. Install surge suppression protection. Identify battery backup equipment. Maintain battery backup system. Identify hot and warm site backup concepts. <strong>Recognize and analyze potential IT security threats to develop and maintain security requirements.</strong></td>
<td></td>
<td>Systems R--CAPP120--Intro to Computers</td>
</tr>
<tr>
<td><strong>ITC10.11</strong></td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.11.01</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Describe potential security threats to information systems. Identify the range of security needs and the problems that can occur due to security lapses.</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.11.03</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Assess security threats. <strong>Sample Indicators</strong></td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Maximize threat reduction. Assess exposure to security issues. Implement countermeasures. Ensure compliance with security rules, regulations, and codes. Demonstrate knowledge of virus protection strategy. Implement security procedures in accordance with business ethics.</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.11.04</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Develop plans to address security threats.</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.11.05</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Implement plans to address security procedures. <strong>Sample Indicators</strong></td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Maintain confidentiality. Load virus detection and protection software. Identify sources of virus infections. Remove viruses. Report viruses in compliance with company standards. Implement backup and recovery procedures. Follow disaster plan. Provide for user authentication and restricted access (e.g., assign passwords, access level).</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.11.06</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Document security procedures. <strong>Maintain computer systems to ensure optimal IT system functioning.</strong></td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>ITC10.12</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
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<tr>
<td>ITC10.12.01</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Sample Indicators</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Create a query to extract information from a file. Create a query to extract information from multiple files. Create reports from queries. Create and use logical files. Develop a display screen for use with high-level language program. Access needed information using appropriate reference materials.</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
<td>PS</td>
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</tr>
<tr>
<td><strong>ITC10.12.02</strong> Ensure that system is functioning optimally.</td>
<td></td>
<td>R--IT150-- Operating Systems</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Monitor system status and performance.</td>
<td></td>
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<tr>
<td>Run diagnostics.</td>
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<tr>
<td>Respond to system messages.</td>
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<tr>
<td>Perform preventive maintenance procedures on computer and peripheral devices.</td>
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<tr>
<td>Handle materials and equipment in a responsible manner.</td>
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<tr>
<td>Optimize windows environment to maximize performance of desktop resources.</td>
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<tr>
<td>Review automated scheduling software.</td>
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<tr>
<td><strong>ITC10.12.03</strong> Fix and document system problems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fix recoverable problems.</td>
<td></td>
<td>R--IT150-- Operating Systems</td>
</tr>
<tr>
<td>Restore system.</td>
<td></td>
<td></td>
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<tr>
<td>Document computer system malfunction(s).</td>
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</tr>
<tr>
<td>Document software malfunction(s).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITC10.12.04</strong> Configure systems to provide optimal system interfaces.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
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<tr>
<td>Define hardware-software interface issues for a computer system.</td>
<td></td>
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<tr>
<td>Identify standards and issues related to I/O programming and design of I/O interfaces.</td>
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<tr>
<td>Interface peripheral devices/controllers in the computer system (e.g., software and hardware interrupts, exceptions, Direct Memory Addressing [DMA], bus structures).</td>
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<tr>
<td>Apply concepts of privileged instructions and protected mode programming.</td>
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<tr>
<td>Configure peripheral device drivers (e.g., disk, display, printer, modem, keyboard, mouse, network).</td>
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<tr>
<td>Apply advanced I/O concepts (e.g., disk caching, data compression, extended memory, magnetic disk/CD-ROM storage and formats).</td>
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<tr>
<td>Allocate disk space, non-sharable resources, and I/O devices.</td>
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<tr>
<td><strong>Provide IT support and training to maintain proper network functioning.</strong></td>
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<tr>
<td><strong>ITC10.13</strong></td>
<td></td>
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<tr>
<td><strong>ITC10.13.01</strong> Provide Help Desk service to computer users within the organization.</td>
<td></td>
<td>R--IT231--Comp TIA A+</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Provide Help Desk service to computer users within the organization.</td>
<td></td>
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<tr>
<td>Operate help desk.</td>
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<tr>
<td>Employ desktop productivity tools.</td>
<td></td>
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<tr>
<td>Support computer users.</td>
<td></td>
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<tr>
<td><strong>ITC10.13.02</strong> Provide training for basic computer use within the organization.</td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Train computer users.</td>
<td></td>
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<td>R--CAPP151-- MS Office</td>
</tr>
</tbody>
</table>
### Career Clusters Knowledge and Skills

**Identify and describe quality assurance concepts to develop an understanding of the requirements for quality IT products/services.**

<table>
<thead>
<tr>
<th>ITC10.14</th>
<th>Explain the history and standards of key quality management initiatives.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demonstrate knowledge of the historical evolution of quality assurance/total quality management (e.g., Deming, ISO 9000).</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of changes brought about by quality leaders in the world.</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of the ISO 9000 process.</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of the standards/requirements for the Baldridge award.</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of successful efforts by industry to improve quality and/or reduce costs.</td>
</tr>
</tbody>
</table>

**Sample Indicators**

- Explain the terminology, role and benefits of quality within an organization.

<table>
<thead>
<tr>
<th>ITC10.14.02</th>
<th>Summarize the elements of a quality management system.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Demonstrate knowledge of the control devices used in functional areas (e.g., SPC, equipment).</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of the relationship among organizational structures, policies, procedures, and quality assurance.</td>
</tr>
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<td></td>
<td>Identify internal and external customers.</td>
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<td></td>
<td>Differentiate between prevention and detection.</td>
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<td></td>
<td>Differentiate between variable and attribute data.</td>
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<td></td>
<td>Identify types of control charts.</td>
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<tr>
<td></td>
<td>Demonstrate knowledge of how statistical techniques used to control quality (e.g., SPC, DOE, CR).</td>
</tr>
</tbody>
</table>

**Sample Indicators**

- Identify the role of quality within the organization.
- Identify the features and benefits of quality planning.

### Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.

<table>
<thead>
<tr>
<th>ITC10.15</th>
<th>Describe the role of computer forensic investigators.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define computer forensics.</td>
</tr>
<tr>
<td></td>
<td>List some of the basic skills and knowledge a computer forensics specialist should possess.</td>
</tr>
<tr>
<td></td>
<td>Identify the circumstances under which computer forensics evidence is typically used, who typically uses such evidence, and how it is used.</td>
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<tr>
<td></td>
<td>Demonstrate the effective use of basic computer applications relating to forensics investigations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITC10.15.01</th>
<th>Demonstrate the role of computer forensic investigators.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define computer forensics.</td>
</tr>
<tr>
<td></td>
<td>List some of the basic skills and knowledge a computer forensics specialist should possess.</td>
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<tr>
<td></td>
<td>Identify the circumstances under which computer forensics evidence is typically used, who typically uses such evidence, and how it is used.</td>
</tr>
<tr>
<td></td>
<td>Demonstrate the effective use of basic computer applications relating to forensics investigations.</td>
</tr>
</tbody>
</table>
**D. PATHWAY KNOWLEDGE AND SKILLS**

The following knowledge and skill statements apply to all careers in the Web and Digital Communications Pathway.

**WEB AND DIGITAL COMMUNICATIONS**

**ITPC01**

**ITPC01.01**

*Iterate through the design and development process to create a uniform Web/digital product.*

**ITPC01.01.01**

Participate in iterative development with clients and team members.

**Sample Indicators**

- Manage the change control process.
- Identify and track critical milestones.
- Report project status.
- Identify optimal strategies for successful interactions with clients and team members.

**ITPC01.02**

*Participate in a user focused design and development process to produce Web and digital communications solutions.*

**ITPC01.02.01**

Analyze Usability and Accessibility as it pertains to customer needs.

**Sample Indicators**

- Demonstrate knowledge of WAI priorities.
- Demonstrate knowledge of web metrics and governance (policies and stylebooks).
- Demonstrate knowledge of cultural implications on design and deployment of digital communication products.
- Engage in user testing throughout the design and development process.

**ITPC01.03**

**Design and employ the use of motion graphics to create a visual Web/digital designs.**

**ITPC01.03.01**

Implement functional design criteria.
<table>
<thead>
<tr>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
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</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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</tr>
<tr>
<td>Identify, utilize and create reusable components.</td>
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<tr>
<td>Create and produce content.</td>
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<tr>
<td>Create and refine design concepts.</td>
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<tr>
<td><strong>ITPC01.03.02</strong> Create product visual design.</td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Apply principles and elements of design.</td>
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<td>Apply color theory to select appropriate colors.</td>
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<tr>
<td>Create and/or implement the look and feel of the product.</td>
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<td>Create graphical images and videos.</td>
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<tr>
<td>Apply knowledge of typography.</td>
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<tr>
<td>Enhance digital communication presentation using a photographic process.</td>
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<tr>
<td>Alter digitized images using an image manipulation program.</td>
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<tr>
<td>Alter digitized video using a video manipulation program.</td>
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<tr>
<td>Evaluate visual appeal.</td>
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<tr>
<td><strong>ITPC01.03.03</strong> Employ basic motion graphic programming knowledge.</td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<tr>
<td>Demonstrate knowledge of key frames and frames.</td>
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<tr>
<td>Demonstrate knowledge of the impact deployment device has on design and production needs.</td>
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<tr>
<td>Demonstrate knowledge of animation techniques.</td>
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<tr>
<td>Demonstrate knowledge of motion graphic security.</td>
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<tr>
<td>Demonstrate that motion graphic meets the validation process and is compatible across multiple browsers or devices.</td>
<td></td>
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<tr>
<td><strong>Gather and analyze digital communication customer requirements to best meet consumer needs.</strong></td>
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<tr>
<td><strong>ITPC01.04</strong></td>
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<tr>
<td><strong>ITPC01.04.01</strong> Gather data to identify customer requirements.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
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<tr>
<td>Gather information using interviewing strategies.</td>
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<tr>
<td>Determine client's needs and expected outcomes.</td>
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<tr>
<td><strong>ITPC01.04.02</strong> Collect requirements data from customers and competing Web sites.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Determine purpose of the digital communication project.</td>
<td></td>
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<tr>
<td>Determine the target audience.</td>
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<tr>
<td>Determine the digital communication elements to be used.</td>
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<tr>
<td>Determine clients privacy policy and expectations.</td>
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<tr>
<td><strong>ITPC01.04.03</strong> Evaluate requirements data that has been collected.</td>
<td></td>
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<tr>
<td><strong>ITPC01.04.04</strong> Demonstrate how to create and receive approval for a Web site plan.</td>
<td></td>
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<tr>
<td><strong>ITPC01.04.05</strong> Convey technical concepts from Web design to a non-technical audience.</td>
<td></td>
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</tr>
<tr>
<td><strong>Define the scope of digital communication work in a written form to summarize and meet customer requirements.</strong></td>
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</tr>
<tr>
<td>Career Clusters Knowledge and Skills</td>
<td>HS</td>
<td>PS</td>
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<td>-------------------------------------</td>
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</tr>
<tr>
<td><strong>ITPC01.05.01</strong> Define scope of work to meet customer requirements.</td>
<td></td>
<td>R--BU213-- Marketing IT250--Internet &amp; Web Design</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop a design brief.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine the target audience requirements (such as web accessibility).</td>
<td></td>
<td></td>
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<tr>
<td>Identify available media and content sources.</td>
<td></td>
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<tr>
<td>Develop time line for completion.</td>
<td></td>
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</tr>
<tr>
<td>Determine staffing resources – internal and external – required to complete project.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop preliminary project budget.</td>
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</tr>
<tr>
<td>Write document.</td>
<td></td>
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</tr>
<tr>
<td>Obtain client approval on scope of work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prepare digital communication product specifications to communicate specifications with various audiences.</strong></td>
<td></td>
<td>R--IT250-- Internet &amp; Web Design</td>
</tr>
<tr>
<td><strong>ITPC01.06</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>ITPC01.06.01</strong> Prepare functional specifications.</td>
<td></td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop flowchart/navigational blueprints.</td>
<td></td>
<td>R--IT250-- Internet &amp; Web Design</td>
</tr>
<tr>
<td>Develop storyboards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Determine delivery platform(s).</td>
<td></td>
<td>R--ARTZ106-- Visual Language 2D Foundations R--IT250--Internet &amp; Web Design</td>
</tr>
<tr>
<td>Design system architecture.</td>
<td></td>
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<tr>
<td>Design user interface.</td>
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<tr>
<td>Design navigational schema.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ITPC01.06.02</strong> Prepare visual design specifications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply principles of design (color theory and schemes, proximity, alignment, repetition, web graphics, optimization, typography).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify technical constraints.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create sample design showing placement of buttons/navigational graphics and suggested color scheme.</td>
<td></td>
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</tr>
<tr>
<td><strong>ITPC01.06.03</strong> Create final project plan.</td>
<td></td>
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</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify and obtain tools and resources to do the job.</td>
<td></td>
<td>R--IT214 Desktop Publishing R--IT250--Internet &amp; Web Design</td>
</tr>
<tr>
<td>Identify and evaluate risks.</td>
<td></td>
<td></td>
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<tr>
<td>Develop detailed task list.</td>
<td></td>
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<tr>
<td>Identify critical milestones.</td>
<td></td>
<td></td>
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<tr>
<td>Identify interdependencies.</td>
<td></td>
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</tr>
<tr>
<td><strong>Demonstrate the effective use of tools for digital communication production, development and project management to complete web/digital communication projects.</strong></td>
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<tr>
<td><strong>ITPC01.07</strong></td>
<td></td>
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<tr>
<td><strong>ITPC01.07.01</strong> Select and use appropriate software tools.</td>
<td></td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate proficiency in the use of digital imaging, digital video techniques, and equipment.</td>
<td></td>
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</tr>
<tr>
<td>Demonstrate knowledge of available graphics, video, motion graphics, web software programs.</td>
<td></td>
<td>I--IT255--Web</td>
</tr>
</tbody>
</table>
### Career Clusters Knowledge and Skills

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate knowledge of available project management and collaborative tools.</td>
<td></td>
<td></td>
<td>Animation &amp; Motion Graphics</td>
</tr>
<tr>
<td>Demonstrate knowledge of integrated development environments (such as Visual Studio, Dreamweaver, Flash, Waterproof, etc.).</td>
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<td></td>
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</tr>
<tr>
<td>Manipulate images, video, and motion graphics.</td>
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<tr>
<td>Demonstrate knowledge of the basic principles of motion graphics.</td>
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</tr>
<tr>
<td>Identify how different user agents (browsers, devices) affect the digital communication product.</td>
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</tr>
</tbody>
</table>

#### Employ knowledge of Web design, programming, and administration to develop and maintain Web applications.

**ITPC01.08**

**Sample Indicators**

- Implement functional design criteria.
  - Identify, utilize and create reusable components.
  - Create and produce content.
  - Create and refine design concepts.

**ITPC01.08.02**

**Sample Indicators**

- Create product visual design.
  - Apply principles and elements of design.
  - Apply color theory to select appropriate colors.
  - Create and/or implement the look and feel of the product.
  - Create graphical images and/or video elements.
  - Apply knowledge of typography.
  - Enhance digital communication presentation using a photographic process.
  - Alter digitized images using an image manipulation program.
  - Alter digitized video using a video manipulation program.
  - Evaluate visual appeal.

**ITPC01.08.03**

**Sample Indicators**

- Use basic Web development skills.
  - Demonstrate knowledge of HTML, XHTML, and CSS.
  - Demonstrate knowledge of version control and documentation.
  - Demonstrate knowledge of basic web application security.
  - Demonstrate that website meets the validation process and is compatible across multiple browsers and devices.
  - Explain importance of web standards.

**ITPC01.08.04**

**Sample Indicators**

- Summarize Internet architecture elements.
  - Demonstrate knowledge of transfer protocols (FTP, WebDav).
  - Demonstrate knowledge Internet standards bodies.
  - Identify cross-platform issues.
  - Keep up-to-date with new and emerging trends related to the Internet.
  - Demonstrate knowledge of Web 2.0.

**ITPC01.08.05**

**Sample Indicators**

- Employ basic Web programming knowledge.
  - Demonstrate knowledge of the purpose of web content delivery enablers (e.g., CGI, API, SSI).
<table>
<thead>
<tr>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrate knowledge of how to interface client/server.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate knowledge of client-side processing and its advantages/disadvantages.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify security issues related to server-side processing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify standard scripting languages (e.g., JavaScript, .NET frameworks, PHP, ActiveX).</td>
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</tr>
<tr>
<td>Demonstrate knowledge of XML/XSL.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate knowledge of quality assurance.</td>
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<td></td>
</tr>
<tr>
<td>Demonstrate knowledge of the uses and advantages/disadvantages of various scripting languages.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrate knowledge of how to use a scripting language to program a site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employ Web administration skills to maintain a Web application.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sample Indicators**

- Demonstrate knowledge of how to use advanced communication protocols.
- Compare the advantages and disadvantages of running your own server vs. using a server provider.
- Identify hardware requirements for a server.
- Identify server software options.
- Evaluate server providers.
- Establish a domain name.
- Comply with TCP/IP (Transfer Control Protocol/Internet Protocol).
- Upload files to the server.
- Publicize the site (e.g., submit announcements to major search engines).
- Explain the importance of ethical behaviors and legal issues.
- Collect/analyze usage statistics.
- Utilize back-up and restore software features.
- Document server environment to include specifications, passwords, and software versions.

**ITPC01.09.09**

Create and implement a digital communication product to meet customer needs.

- Produce a digital communication product as member of a development team.

**Sample Indicators**

- Define the role of individual team members.
- Develop a conceptual model for the digital communication project.
- Select the media elements (e.g., sound, video, graphics, text, motion graphics) to be used.
- Integrate media elements.
- Select the publication process to be used.
- Select the distribution method to be used.
- Explain the impact publication process and distribution method have on product development.
### Career Clusters Knowledge and Skills

<table>
<thead>
<tr>
<th>ITPC01.09.02</th>
<th>List functional design terms and criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Identify, utilize and create reusable components.</td>
</tr>
<tr>
<td></td>
<td>Create and produce content.</td>
</tr>
<tr>
<td></td>
<td>Create and refine design concepts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITPC01.09.03</th>
<th>Employ functional design terms and criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Apply principles and elements of design.</td>
</tr>
<tr>
<td></td>
<td>Apply color theory to select appropriate colors.</td>
</tr>
<tr>
<td></td>
<td>Create and/or implement the look and feel of the product.</td>
</tr>
<tr>
<td></td>
<td>Create graphical images and video.</td>
</tr>
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<td></td>
<td>Apply knowledge of typography.</td>
</tr>
</tbody>
</table>

Enhance digital communication presentation using a photographic process.
Alter digitized images using an image manipulation program.
Alter digitized video using a video manipulation program.
Evaluate visual appeal.

<table>
<thead>
<tr>
<th>ITPC01.09.05</th>
<th>Produce content for a digital communication product.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Produce or acquire graphics content.</td>
</tr>
<tr>
<td></td>
<td>Produce or acquire motion graphics content.</td>
</tr>
<tr>
<td></td>
<td>Produce or acquire audio content.</td>
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<tr>
<td></td>
<td>Produce or acquire video content.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>ITPC01.09.06</th>
<th>Acquire content for use in a digital communication product.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of the purpose of web content delivery enablers (e.g., CGI, AP, SSI).</td>
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<td>Demonstrate knowledge of how to interface client/server.</td>
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<td>Demonstrate knowledge of the uses and advantages/disadvantages of various scripting languages.</td>
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<td></td>
<td>Demonstrate knowledge of how to use a scripting language to program a site.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITPC01.09.07</th>
<th>Employ Web development knowledge.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of key frames and frames.</td>
</tr>
<tr>
<td></td>
<td>Demonstrate knowledge of the impact deployment device has on design and production needs.</td>
</tr>
</tbody>
</table>

**HS**

- **R--ARTZ106--Visual Language--2D Foundations**
- **R--IT 214 Desktop Publishing R--ARTZ106--Visual Language--2D Foundations**
- **R--IT213 Photoshop & Illustrator R--AC151--Photography I**

**PS**

R--IT213 Photoshop & Illustrator R--AC151--Photography I

<table>
<thead>
<tr>
<th>ITPC01.09.08</th>
<th>Employ Web programming knowledge.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td>Demonstrate knowledge of key frames and frames.</td>
</tr>
<tr>
<td></td>
<td>Demonstrate knowledge of the impact deployment device has on design and production needs.</td>
</tr>
</tbody>
</table>

**HS**

- **R--IT213 Photoshop & Illustrator R--AC151--Photography I**

**PS**

R--IT255--Web Programming

R--IT213 Photoshop & Illustrator R--AC151--Photography I
<table>
<thead>
<tr>
<th>Career Clusters Knowledge and Skills</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demonstrate knowledge of animation techniques.</strong></td>
<td></td>
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<tr>
<td><strong>Demonstrate knowledge of motion graphic security.</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Demonstrate that motion graphic meets the validation process and is compatible across multiple browsers or devices.</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>ITPC01.09.09</strong> Employ basic motion graphic programming knowledge.</td>
<td></td>
<td>I--IT255--Web Animation &amp; Motion Graphics</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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</tr>
<tr>
<td>Integrate the use of photographic special effects into interactive media presentations.</td>
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<tr>
<td>Integrate photographically derived images with hand-drawn graphic images.</td>
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</tr>
<tr>
<td><strong>ITPC01.09.10</strong> Describe search engine management (SEM) and search engine optimization (SEO).</td>
<td></td>
<td>I--IT213--Photoshop &amp; Illustrator</td>
</tr>
<tr>
<td><strong>ITPC01.09.11</strong> Integrate media elements.</td>
<td></td>
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<tr>
<td><strong>ITPC01.09.12</strong> Explain concepts involved in social networking.</td>
<td></td>
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<tr>
<td><strong>ITPC01.09.13</strong> Describe applications and services used to create rich internet applications.</td>
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<tr>
<td><strong>ITPC01.09.14</strong> Identify Web 2.0 solutions.</td>
<td></td>
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</tr>
<tr>
<td><strong>ITPC01.10</strong> Test a digital communication product to evaluate its functionality.</td>
<td></td>
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<tr>
<td><strong>ITPC01.10.01</strong> Develop a test plan for the digital communication product.</td>
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<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
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<tr>
<td>Perform usability tests.</td>
<td></td>
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<tr>
<td>Assess product effectiveness.</td>
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<tr>
<td>Test product for reliability.</td>
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<tr>
<td>Plan and coordinate customer acceptance testing.</td>
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<tr>
<td><strong>ITPC01.10.02</strong> Implement a test plan for the digital communication product.</td>
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<td>R--BU213--Marketing</td>
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<td>R--IT213--Photoshop</td>
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<td></td>
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<td>R--IT255--Web</td>
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</tbody>
</table>
### Career Clusters Knowledge and Skills

<table>
<thead>
<tr>
<th>Sample Indicators</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td>Animation R--IT214-Desktop Publishing</td>
</tr>
<tr>
<td><strong>Sample Indicators</strong></td>
<td></td>
<td>R--Internet &amp; Web Page Development</td>
</tr>
</tbody>
</table>

**ITPC01.10.03**
Resolve product problems.

---

**Identify and implement quality assurance processes to deliver a quality digital communication products and services.**

**ITPC01.11**

**ITPC01.11.01**
Summarize digital communication quality assurance measures.

**Sample Indicators**
- Demonstrate knowledge of the quality assurance (QA) process.
- Demonstrate knowledge of the standards/requirements for QA.
- Develop team relationships to support quality assurance tasks.

**ITPC01.11.02**
Perform quality assurance tasks to produce a quality product.

**Sample Indicators**
- Use customer satisfaction in determining product characteristics (e.g., cost, user-friendliness).
- Recognize the relationship between dependability, functionality, ease of use, etc.
- Follow established procedures for testing, identifying problems, and tracking resolutions.

**Perform maintenance and customer support functions for digital communication products to maintain the delivery of quality products that meet customer needs.**

**ITPC01.12**

**ITPC01.12.01**
Analyze software technical support needs.

**Sample Indicators**
- Identify maintenance and support requirements.
- Apply information and data analysis techniques.
- Define scope of work to meet customer support needs.

**ITPC01.12.02**
Employ customer service techniques and strategies.

**Sample Indicators**
- Access needed information using appropriate reference materials.
- Provide help to first line user-support personnel to answer user questions.
- Provide troubleshooting for digital communication products.
- Provide troubleshooting for hardware.
- Perform system-tuning function.
- Diagnose problems within system.
- Perform technical functions required by customer/user.
- Communicate and document technical support provided.

**ITPC01.12.03**
Perform product maintenance activities.

**Sample Indicators**
- Follow organizational procedural in communicating and document maintenance tasks.
### Career Clusters Knowledge and Skills

<table>
<thead>
<tr>
<th>Identifying and analyze problem.</th>
<th>HS</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze and propose solutions.</td>
<td></td>
<td>K--11231--</td>
</tr>
<tr>
<td>Implement solutions in code and documentation.</td>
<td></td>
<td>CompTIA A+</td>
</tr>
<tr>
<td>Release software and documentation updates according to procedures.</td>
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</tbody>
</table>

### Consider intellectual property issues when creating Web pages.

- Explain the concept of intellectual property.
- Differentiate between copyright and trademarks.
- Describe the function of a non-disclosure agreement (NDA).

<table>
<thead>
<tr>
<th>ITPC01.13</th>
<th>ITPC01.13.01</th>
<th>ITPC01.13.02</th>
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<tbody>
<tr>
<td>ITPC01.13.03</td>
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</tbody>
</table>

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Information Technology Cluster Statements (Knowledge and Skill and Performance Elements);
Information Technology Career Cluster Knowledge and Skill Statements (Foundation);
Information Technology Cluster Information Support and Services Pathway Knowledge and Skill Statements;
Information Technology Cluster Network Systems Pathway Knowledge and Skill Statements;
Information Technology Cluster Web and Digital Communications Pathway Knowledge and Skill Statements;
Information Technology Cluster Programming and Software Development Pathway Knowledge and Skill Statements are based in part on skill statements developed by Education Development Center, Inc., ITWorks! Ohio, the National Workforce Center for Emerging Technologies (formerly the Northwest Center for Emerging Technologies) and the World Organization of Webmasters (WOW).