

**INFORMATION TECHNOLOGY  
SKILL STANDARDS  
GRADES 9-14**

**Career & Technical Education**

*Skills for Employment & Lifelong Learning*



This document was prepared by:

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Adopted by the State Board of Education /  
State Board for Occupational Education on  
April 12, 2003

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## **ACKNOWLEDGEMENTS**

The Nevada Department of Education wishes to acknowledge the contributions of those who worked on the development of this framework. Members of the IT writing team were selected through a local nomination process by the NDE Office of Career, Technical, and Adult Education. Selection criteria included a combination of industry, secondary and postsecondary education, and practical IT experience from a cross section of statewide rural and urban communities.

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## **FOREWARD**

The Nevada Department of Education (NDE), working in conjunction with community colleges, high schools, and business and industry representatives throughout the state has undertaken the ambitious effort to develop the Information Technology (IT) skill standards. These standards are intended to outline the development of standards for preparing students to attain the skill sets necessary to meet the demands of today's high-tech industry. The approved academic standards previously derived by the Computer and Technology Education Standards writing team have been integrated into the following standards. The State of Nevada clearly sees the need in bridging this gap between the educational system and the workforce.

In support of this effort, an IT writing team was formed to establish the IT standards. The writing team has identified seven career clusters that define the IT field and eleven essential core IT skills that are applicable to all seven clusters. The clusters are defined around specific occupational areas. Educators at all levels are encouraged to use the essential core IT skills to focus curriculum objectives for entry-level programs. The career clusters and essential core IT skills are identified below:

### **Career Clusters:**

1. Network Systems
2. Service & Support
3. Graphics & Multimedia
4. Computer Programming (Software Development)
5. Computer Applications
6. IT Management
7. Telecommunications

### **Essential Core IT Skills:**

- |   |  |
|---|--|
| 1. Keyboarding and Other Input Devices              | 7. Disaster and Recovery Procedures              |
| 2. Computer Literacy                                | 8. Oral and Written Communication                |
| 3. Safety, Ergonomics and Use of Hand Tools         | 9. Customer and Interpersonal Relations          |
| 4. Basic Internet Access, Research & Communication  | 10. Professional Development (Lifelong Learning) |
| 5. Basic Hardware and Software Installation & Setup | 11. Basic Electronics                            |
| 6. Computer Numbering Systems                       |  |

The essential core IT skills listed above have been specifically designed to target secondary and postsecondary (9-14) IT programs. In an effort to ensure an effective transition between secondary and postsecondary levels of education, both shall endeavor to articulate courses where applicable.

Specific levels of IT industry certification mentioned in the report as exit standards are dependent on the given institution's facilities and programs. Each of the community colleges within the UCCSN system offer one or more degrees and certificates associated with the seven career clusters. Many of the career clusters have a vendor-specific certification program associated with them.

\*Common certifying organizations include:

CompTIA (Computer Technologies Industry Association)  
Microsoft Corp.  
Cisco Systems, Inc.  
Novell Systems, Inc.  
Sun Microsystems, Inc.  
Oracle Corp.  
IBM Corp.  
ETA (Electronic Technicians Association)  
ISCET (International Society of Certified Electronic Technicians)

\*The organizations listed above are not meant to be all-inclusive, but representative of various certifying organizations.

Unemployment statistics for information technology will vary each business quarter due to the volatile nature of the economy as it relates to technology.

Currently, Nevada is tied with the national unemployment rate of 4.5% in all employment areas. Within IT, the national rate stands at 2.30% with 2.25% in Nevada. These percentages reflect a national total of 2,620,080 individuals employed in IT with 9,240 being employed in Nevada. This data was collected from statistics provided by the Research and Analysis Bureau, Nevada Department of Employment, Training and Rehabilitation (DETR).

The sample job titles included in each career cluster are meant to be representative of titles commonly identified in the State of Nevada. They are not meant to be a comprehensive list due to the rapid and continual growth of the IT industry.

## **INTRODUCTION**

### **1. NETWORK SYSTEMS**

**Individuals within this cluster demonstrate an understanding of network systems, administration, security, file and disk management, topology, and internetworking design and implementation.**

#### **Essential skills:**

Basic Network Design & Theory  
Network Maintenance & Support  
Internetworking Equipment  
LAN/WAN

- Operations
- Protocols
- Topologies
- Administration
- Security
- Network Operating Systems (NOS)
- Disaster Recovery
- Troubleshooting & Diagnostics

Transmission Media  
Cabling Methods & Standards  
Baseband Technologies  
Broadband Technologies  
Basic Electronics  
Hand Tools  
Test Equipment

#### **Sample Job Titles:**

Network Specialist  
Network Operations Analyst  
Communications Analyst  
Cable Installers  
Local Area Network (LAN) Technician  
Network Maintenance & Operations  
Hardware Support/Maintenance  
Network Administrator  
Wide Area Network (WAN) Technician  
Customer Service Coordinator  
Hardware Installations Coordinator  
Network Technician  
Network Security Specialist  
Service Technician  
System Analyst  
Network Engineer  
Customer Support  
Technical Writer  
Security Specialist

## 2. SERVICE & SUPPORT

**Individuals within this cluster demonstrate an understanding of basic hardware and software support, excellent customer service skills, documentation skills, basic electronics and troubleshooting skills utilizing electronic test equipment and hand tools.**

### **Essential Skills:**

Hardware Maintenance & Support  
Network Maintenance & Support  
Internetworking Equipment  
Software Installation  
Software Support  
Customer (Support) Service Skills  
LAN/WAN & PC

- Operations
- Security
- Network Operating Systems (NOS)
- Troubleshooting & Diagnostics
- Disaster Recovery

Documentation & Records  
Technical Training Methods & Techniques  
Basic Electronics  
Baseband Technologies  
Broadband Technologies  
Hand and Repair Tools  
Test Equipment

### **Sample Job Titles:**

Application Trainer  
Information Services Operator  
Computer Operations Technician  
Operations Scheduler  
Customer Service Representative  
Technical Support Engineer  
Product Support Engineer  
Call Center Support Representative  
Help Desk Technician  
Technical Support Consultant  
PC Support Specialist  
PC System Coordinator  
PC Technician  
Customer Service Coordinator  
System Administrator  
Customer Support  
Technical Writer  
Security Specialist

### 3. GRAPHICS & MULTIMEDIA

**Individuals within this cluster demonstrate an understanding of fundamental drawing techniques, animation, digital imaging through the use of graphic design tools; web design fundamentals, e-commerce, intellectual property and copyright law.**

#### **Essential Skills:**

Fundamental Drawing Techniques  
Authoring Languages/Applications  
Web Design Fundamentals

- Web Browsers
- Web Servers

Interactive Digital Media  
Application Design  
Media Design  
GUI/Interface  
Animation  
Digital Imaging  
Audio/Visual Production  
Instructional Application  
Specialized Equipment  
Media Distribution & Selection  
Intellectual Property & Copyright Law  
Digital Videography  
Layout & Typography

#### **Sample Job Titles:**

Animator & Digital Effects Specialists  
Imaging Specialist  
Audio/Visual Specialist  
Media Designer  
Videography Specialist  
Multimedia Specialist  
Production Assistant  
Interactive Digital Media Specialist  
Virtual Reality Designer  
Web Designer  
Graphic Designer  
Multimedia Programmer  
Graphics Technician  
Visual Design Consultant  
Web Content Designer  
Instructional Designer  
Multimedia Technician  
Quality Assurance Technician  
Customer Support  
Technical Writer  
Security Specialist

#### **4. COMPUTER PROGRAMMING (SOFTWARE DEVELOPMENT)**

**Individuals within this cluster demonstrate an understanding of essential programming skills using contemporary programming languages; analysis, design, test and integration of software and e-commerce systems.**

##### **Essential Skills:**

Programming Language(s)

Examples:

- C, C++, C#, etc.
- SQL Databases (Microsoft, Oracle, etc.)
- Visual Basic, VBA, etc.
- JAVA, PERL, etc.
- HTML, VRML, XML, etc.

Application Development/Implementation

Internet/Intranet Integration

GUI Interface

Program Analysis

Software Design & Data Structures

Operating Systems Development &  
Implementation

Computer System Architecture

Boolean Algebra & Computer No. Systems

##### **Sample Job Titles:**

Systems Analyst

Programmer Analyst

Operating Systems Specialist

Software Designer

Test Specialist

Database Software Technician

Entry/Senior Level Programmer

Database Analyst/Developer/Specialist

Database Administrator

Software Engineer

Cryptologist

Systems Integrator

Numerical Control Programmer

PLC Programmer

Technical Writer

Customer Support

Security Specialist

## 5. COMPUTER APPLICATIONS

**Individuals within this cluster demonstrate an understanding of contemporary applications programs including: spreadsheets, databases, word processing, web design, desktop publishing and presentation; hardware and software installation, setup and upgrades.**

### **Essential Skills:**

Basic Operating Systems  
Spreadsheets  
Databases  
Word Processing  
Software Integration  
Graphics/Presentation Software  
Communication/Personal Mgmt. Software  
Web Design Fundamentals

- Web Browsers
- Web Servers

Task Specific Applications

- CAD/CAM
- Accounting
- Project Management

Software Installation/Setup/Upgrade  
Peripheral Devices  
Basic Hardware Interface/Installation  
Basic Troubleshooting

### **Sample Job Titles:**

Software Application Support  
Software Application Specialist  
Computer Application Analyst  
System Analyst  
Data Analyst  
Application Trainer  
Application Support  
Web Designer  
CAD/CAM Engineer  
CAD/CAM Analyst  
CAD/CAM Specialist  
Technical Writer  
Customer Support  
Security Specialist

## 6. IT MANAGEMENT

**Individuals within this cluster demonstrate a strong technical IT background, proficiency in management of all IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policy and security.**

### **Essential Skills:**

Supervisory Fundamentals  
Interviewing/Performance Evaluation  
Interpersonal Communications  
Customer/Employee Relations  
Security Systems

- Personnel
- Facilities & Equipment
- Data & Access

Oral and Written Presentations  
Budgeting & Planning  
Project Engineering & Management  
Total Quality Management (TQM)  
Systems Analysis & Design  
Industry Standards  
System Administration  
Network Operating Systems (NOS)  
Internetworking Equipment  
Testing & Integration (T&I)

### **Sample Job Titles:**

Project Manager  
Technical Sales Manager  
Chief Information Officer (CIO)  
Information Systems Manager  
Service & Support Manager  
IT Recruiter  
Network Systems Manager  
Software Design Manager  
IT Manager  
Telecommunications Manager  
Quality Assurance & Control Manager  
Quality Assurance Engineer Manager  
Customer Service Manager  
Technical Writer  
Customer Support  
Security Specialist

## 7. TELECOMMUNICATIONS

**Individuals within this cluster demonstrate an understanding of telecommunications technology including: telephony, public switch telephone network (PSTN) and its operation and specifications, broadband and baseband, LAN/MAN/WAN technologies, wireless technologies, and emerging communications technologies.**

### **Essential Skills:**

Cabling Methods & Standards  
Soldering Techniques  
Hand Tools  
Test Equipment  
Basic Electronics  
The Telephone  
Rotary vs. Touch Tone Telephone Specs.  
Wireless Telephony  
PDAs  
Television & Radio  
Public Switch Telephone Network (PSTN)  
Private Branch Exchange (PBX)  
System Configuration & Provisioning  
Standards Organizations  
LAN/WAN

- Operations
- Protocols
- Topologies
- Security

Baseband Technologies  
Broadband Technologies  
Transmission Media

- Fiber Optics
- Coaxial
- UTP/STP
- Infrared (IR)
- Microwave

Microwave & Antenna Technologies  
Satellite Communications

### **Sample Job Titles:**

Telephone Repair & Installation  
Telecommunications Technician  
Distance Learning (Education)  
Specialist/Engineer  
Cryptologist  
Telecommunications Engineer  
Cable Technician  
Fiber Optic Engineer  
Fiber Optic Technician  
Microwave Technician  
Technical Sales Representative  
WAN Technician/Developer/Engineer  
PBX Operator/Trainer  
Cable Splicer/Repair/Technician  
Telephone Installation & Repair  
Wireless Engineer/Technician  
System Installer  
PBX Operator  
PBX Trainer  
Telecommunications Security Specialist  
Digital Technician  
Analog Technician  
Voicemail Administrator  
Video/Audio Technician  
Installation & Repair (I&R) Specialist  
Technical Writer  
Customer Support  
Security Specialist

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Demonstrate an understanding of the management of IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policies and procedures. This implies that the student has a pre-established technical IT background.	
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**Content Standard 1.0: Network Systems** - The student will demonstrate an understanding of basic network systems to include administration, security, file and disk management, topology and internetworking design, implementation and network instrumentation.

Performance Standard 1.1:	The student will demonstrate the fundamental tasks required to administer a network.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Develop and analyze user and group policies.</li> <li>• Choose and implement the appropriate network solution (work groups vs. client server).</li> <li>• Combine differing network systems.</li> </ul>
<b>MEETS STANDARD</b>	<p>1.1.1 Establish user and group accounts.</p> <p>1.1.2 Examine the functionality, scalability, adaptability, and manageability of various networks.</p> <p>1.1.3 Prepare communication with network peripherals.</p> <p>1.1.4 Demonstrate proper documentation methods.</p> <p>1.1.5 Troubleshoot and repair common network failures.</p> <p>1.1.6 Demonstrate the configuration of various network protocols.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify internetworking equipment.</li> <li>• Describe user and group accounts.</li> <li>• Classify work groups vs. client server.</li> </ul>

**Content Standard 1.0: Network Systems** - The student will demonstrate an understanding of basic network systems to include administration, security, file and disk management, topology and internetworking design, implementation and network instrumentation.

Performance Standard 1.2:	The student will demonstrate the use of network security policies and procedures.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Evaluate threats to network security.</li> <li>• Investigate emerging network security concepts.</li> <li>• Evaluate available network security strategies, i.e., DMZ, VPN, proxy server, remote access and encryption.</li> <li>• Develop, implement and enforce a network security policy.</li> </ul>
<b>MEETS STANDARD</b>	<p>1.2.1 Ascertain possible security risks to a network.</p> <p>1.2.2 Install and configure firewall services.</p> <p>1.2.3 Installing and updating anti-virus software.</p> <p>1.2.4 Prepare and implement user classes of service.</p> <p>1.2.5 Explain proper password implementation.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Describe the purpose of a password.</li> <li>• Describe the purpose of a firewall.</li> <li>• Review viruses and anti-virus software.</li> <li>• Differentiate security classes of users.</li> </ul>

**Content Standard 1.0: Network Systems** - The student will demonstrate an understanding of basic network systems to include administration, security, file and disk management, topology and internetworking design, implementation and network instrumentation.

Performance Standard 1.3:	The student will demonstrate proper file and disk management skills.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Critique the different levels of RAID (redundant array of inexpensive disks) systems.</li> <li>• Develop a backup and disaster recovery strategy.</li> <li>• Compare and contrast various serial and parallel interfaces, i.e., USB, Firewire, SCSI, IDE.</li> </ul>
<b>MEETS STANDARD</b>	<p>1.3.1 Prepare, partition, and format hard drives.</p> <p>1.3.2 Exercise proper file system hierarchy.</p> <p>1.3.3 Explain the need and implementation of disk quotas.</p> <p>1.3.4 Demonstrate software and hardware installation techniques.</p> <p>1.3.5 Integrate file backup and disaster recovery.</p> <p>1.3.6 Examine and diagnose common disk and file errors.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Explain the use of directories and subdirectories.</li> <li>• Save and retrieve a file using removable storage.</li> <li>• Explain the environmental sensitivity of storage media.</li> </ul>

**Content Standard 1.0: Network Systems** - The student will demonstrate an understanding of basic network systems to include administration, security, file and disk management, topology and internetworking design, implementation and network instrumentation.

Performance Standard 1.4:	The student will construct, differentiate and diagnose network systems.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Construct networks using different topologies.</li> <li>• Develop and implement a plan to diagnose and monitor network performance and security.</li> <li>• Connect two or more LAN's using appropriate WAN protocols.</li> </ul>
<b>MEETS STANDARD</b>	<p>1.4.1 Explain networks using different topologies.            1.4.2 Maximize throughput usage in a network.            1.4.3 Investigate and diagnose network failures.            1.4.4 Demonstrate use of test equipment.            1.4.5 Demonstrate use of diagnostic tools.            1.4.6 Demonstrate proper use of hand tools.            1.4.7 Demonstrate proper cabling techniques.            1.4.8 Connect two or more hosts using appropriate LAN protocols.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Distinguish between a star, ring and mesh topology.</li> <li>• Characterize various network transmission media.</li> <li>• Distinguish between Ethernet and Token Ring.</li> <li>• Name the fundamental internetworking devices.</li> </ul>

**Content Standard 2.0: IT Service & Support** - The student will demonstrate an understanding of basic hardware and software support, quality customer service skills, documentation skills, basic electronics and troubleshooting skills, utilizing electronic test equipment and hand tools.

Performance Standard 2.1:	The student will demonstrate an understanding of hardware and software support.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Predict and anticipate the technical support needed.</li> <li>• Design a post-sales support plan.</li> <li>• Create a preventive maintenance schedule.</li> </ul>
<b>MEETS STANDARD</b>	<p>2.1.1 Diagnose IT related hardware problems.</p> <p>2.1.2 Diagnose IT related software problems.</p> <p>2.1.3 Assess and provide technical support.</p> <p>2.1.4 Apply troubleshooting and repair techniques.</p> <p>2.1.5 Utilize conflict resolution techniques.</p> <p>2.1.6 Produce and carry out a preventive maintenance schedule.</p> <p>2.1.7 Implement a customized call-log reporting system.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the importance of a customer service call-log.</li> <li>• Explain a rubric.</li> <li>• Demonstrate a basic knowledge of computer hardware and software terminology.</li> </ul>

**Content Standard 2.0: IT Service & Support** - The student will demonstrate an understanding of basic hardware and software support, quality customer service skills, documentation skills, basic electronics and troubleshooting skills, utilizing electronic test equipment and hand tools.

<b>Performance Standard 2.2:</b>	<b>The student will demonstrate an understanding of quality customer service skills.</b>
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Design a telephone support rubric.</li> <li>• Design training and documentation.</li> <li>• Assess strengths and weaknesses of products.</li> </ul>
<b>MEETS STANDARD</b>	<p>2.2.1 Develop and demonstrate interpersonal skills with customers and team members.</p> <p>2.2.2 Document customer complaints.</p> <p>2.2.3 Provide technical support needed for a specific task.</p> <p>2.2.4 Provide training and documentation.</p> <p>2.2.5 Demonstrate sensitivity in communicating with a diverse workforce.</p> <p>2.2.6 Demonstrate the proper use of the English language.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Demonstrate basic telephone etiquette.</li> <li>• Identify customer service skills.</li> <li>• Understand the importance of the proper use of English.</li> <li>• Recognize diversity within the workplace.</li> <li>• Recognize different skill levels among customers.</li> </ul>

**Content Standard 2.0: IT Service & Support** - The student will demonstrate an understanding of basic hardware and software support, quality customer service skills, documentation skills, basic electronics and troubleshooting skills, utilizing electronic test equipment and hand tools.

Performance Standard 2.3:	The student will demonstrate proficiency with documentation skills.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Design and evaluate standardized reporting forms.</li> <li>• Design a customized call-log reporting system.</li> <li>• Create a rubric based upon historical documentation.</li> <li>• Create a preventive maintenance schedule.</li> <li>• Create a hardware and software/license inventory schedule.</li> <li>• Facilitate proper documentation procedures.</li> </ul>
<b>MEETS STANDARD</b>	<p>2.3.1 Maintain a preventive maintenance schedule.</p> <p>2.3.2 Document a customer service event using standardized forms.</p> <p>2.3.3 Diagnose problems and their solutions based upon historical documentation.</p> <p>2.3.4 Apply oral and written communication skills as they relate to documentation.</p> <p>2.3.5 Maintain a hardware and software/license inventory schedule.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the importance of a preventive maintenance schedule.</li> <li>• Understand the importance of maintaining a hardware and software/license inventory schedule.</li> <li>• Understand the importance of proper documentation.</li> </ul>

**Content Standard 2.0: IT Service & Support** - The student will demonstrate an understanding of basic hardware and software support, quality customer service skills, documentation skills, basic electronics and troubleshooting skills, utilizing electronic test equipment and hand tools.

Performance Standard 2.4:	The student will demonstrate an understanding of basic electronics, troubleshooting skills and the proper use of repair tools.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Repair or replace defective components in a computer system.</li> <li>• Expand, upgrade or repair computer peripheral devices.</li> <li>• Differentiate between the concepts of power, voltage, current and resistance.</li> </ul>
<b>MEETS STANDARD</b>	<p>2.4.1 Demonstrate the use of common diagnostic equipment, installation and repair tools.</p> <p>2.4.2 Demonstrate proficiency in analog and digital circuit theory.</p> <p>2.4.3 Differentiate between hardware and/or software problems.</p> <p>2.4.4 Demonstrate the proper use of common electronic test equipment.</p> <p>2.4.5 Diagnose common electronic problems.</p> <p>2.4.6 Demonstrate proper safety procedures.</p> <p>2.4.7 Demonstrate precautionary measures necessary to prevent electrostatic discharge (ESD) damage.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understands the effects of power variations, i.e., brownouts, blackouts, spikes and surges.</li> <li>• Describe common electronic repair tools.</li> <li>• Review Ohm's and Kirchoff's Laws.</li> <li>• Understand the inherent dangers of electrical shock.</li> <li>• Understand the basics of proper safety procedures.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.1:	The student will demonstrate an understanding of fundamental drawing techniques.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Create original visual presentations of design concepts through thumbnails, storyboards and sketches.</li> <li>• Design schematic diagrams and drawings.</li> <li>• Critique the proper use of composition such as color, perspective, depth of field, and other artistic attributes.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.1.1 Demonstrate basic technical drawing and graphic art skills, both traditional and computer-based.</p> <p>3.1.2 Interpret schematic diagrams and drawings.</p> <p>3.1.3 Employ the proper use of composition such as color, perspective, depth of field, and other artistic attributes.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Describe artistic attributes with regard to fundamental drawing techniques.</li> <li>• Reproduce basic technical drawings.</li> <li>• Describe the various tools used to render a fundamental drawing.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

<b>Performance Standard 3.2: The student will demonstrate an understanding of audio.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Determine and create the best balance between file size and sound quality.</li> <li>• Create multi-track audio documents.</li> <li>• Apply advanced sound manipulation and mixing techniques.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.2.1 Describe the technical issues with digital sound.</p> <p>3.2.2 Record, capture, save, and compress sound files.</p> <p>3.2.3 Prepare sound files for delivery to all types of media.</p> <p>3.2.4 Shape, shorten, lengthen and otherwise edit sounds.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Explain the difference between analog and digital sound.</li> <li>• List the issues that affect the quality of digital sound.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

<b>Performance Standard 3.3: The student will demonstrate an understanding of video.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Demonstrate creative film and screen play editing skills.</li> <li>• Apply advanced shooting and editing skills.</li> <li>• Assemble shots, both narratively and non-narratively, with advanced skill.</li> <li>• Apply advanced planning, shooting, video editing skills.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.3.1 Demonstrate how to capture (translate) media to digital format.</p> <p>3.3.2 Operate a video camera to shoot basic sequences using proper film grammar.</p> <p>3.3.3 Operate video editing equipment to make simple splices, i.e., assemble shots.</p> <p>3.3.4 Design, organize, storyboard, script, light, produce, direct and edit a short story.</p> <p>3.3.5 Manipulate and edit digital editing sequences using non-linear editing computer software.</p> <p>3.3.6 Apply special effects, title sequences, and creative scene transitions.</p> <p>3.3.7 Translate (export) digital video to tape and other media.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Explain basic montage theory.</li> <li>• Perform safely in video/studio/lab environments.</li> <li>• Operate a video camera, computer hardware and software.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.4:	The student will demonstrate an understanding of computer animation.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Incorporate animation within a video, web site, or multimedia production.</li> <li>• Apply advanced understanding of computer-generated animation software and techniques.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.4.1 Utilize appropriate sources of art, sound and animation.</p> <p>3.4.2 Manipulate 2D or 3D animations.</p> <p>3.4.3 Produce a basic wireframe model.</p> <p>3.4.4 Apply knowledge of lighting and camera angle.</p> <p>3.4.5 Create textures and background graphics.</p> <p>3.4.6 Capture, edit, and use sound within an animation.</p> <p>3.4.7 Demonstrate a basic understanding of the computer-generated animation process.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Create a basic animation using still drawings.</li> <li>• Define the components of animation.</li> <li>• Compare and contrast vector vs. bitmapped graphics and animations.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.5:	The student will demonstrate an understanding of typography.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Create a number of special type effects.</li> <li>• Design a layout using only type as the medium.</li> <li>• Craft type using a page layout program, including control over kerning and tracking, tabs and indents, leading.</li> <li>• Choose appropriate typefaces for a particular background and match a particular type personality to a message.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.5.1 Organize and load fonts.</p> <p>3.5.2 Establish a hierarchy of information through type treatments.</p> <p>3.5.3 Apply character and paragraph formatting to type using any major software package.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify basic type anatomy terms.</li> <li>• List type specification and measurement terms.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.6:	The student will demonstrate an understanding of computer digital imaging.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Perform professional level scans of black and white and color images using flatbed and film scanners.</li> <li>• Apply advanced software manipulation techniques to photos and other graphics.</li> <li>• Generate original image reflecting professional quality standards.</li> <li>• Use paint tools to create custom backgrounds, textures, and other artistic 2D designs.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.6.1 Operate digital devices to capture still images.</p> <p>3.6.2 Perform basic and intermediate density and color adjustments.</p> <p>3.6.3 Demonstrate an understanding of layers, channels, and modes.</p> <p>3.6.4 Demonstrate a basic proficiency using image manipulation software, including retouching, coloring, and montage techniques.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Explain digital capture technology.</li> <li>• Describe image resolution and how it affects image quality.</li> <li>• Access and manipulate CD-ROM images.</li> <li>• Explain the advantages and disadvantages of different image file formats.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.7:	The student will demonstrate an understanding of web design and development.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Demonstrate good graphic and layout design of web pages.</li> <li>• Enhance web pages with interactive features.</li> <li>• Create web pages with functional design and usability.</li> <li>• Manage the content of web pages for efficient updating.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.7.1 Explain the workings of the Internet and the web.</p> <p>3.7.2 Demonstrate the fundamentals of graphics preparation for the web.</p> <p>3.7.3 Set up web pages using basic Hypertext Markup Language (HTML).</p> <p>3.7.4 Use common web-designing tools to create basic web pages and web content.</p> <p>3.7.5 Organize and upload files to a web server.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Navigate and search the web to gather information.</li> <li>• Communicate and transfer files using e-mail.</li> <li>• Describe software and hardware requirements necessary for web browsing.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.8:	The student will demonstrate an understanding of the fundamentals of e-commerce.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Develop a shopping cart application.</li> <li>• Evaluate customer needs and recommend solutions.</li> <li>• Create password protection for a web site.</li> <li>• Explain security issues and technologies.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.8.1 Demonstrate an understanding of web stores.</p> <p>3.8.2 Produce web-based forms for business transactions.</p> <p>3.8.3 Examine issues and solutions for web-based security.</p> <p>3.8.4 Configure banner advertising and direct e-mail campaigns.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Navigate and search the web to make purchases.</li> <li>• Discuss advantages and disadvantages of e-commerce.</li> <li>• Find examples of good e-commerce web sites.</li> </ul>

**Content Standard 3.0: Multimedia** - The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.

Performance Standard 3.9:	The student will demonstrate an understanding of intellectual property and copyright law.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Assess copyright implications of borrowed media.</li> <li>• Interpret legal rights, responsibilities and copyright law.</li> </ul>
<b>MEETS STANDARD</b>	<p>3.9.1 Demonstrate knowledge of legal rights and responsibilities.</p> <p>3.9.2 Document references and proprietary information.</p> <p>3.9.3 Investigate various sources of intellectual property.</p> <p>3.9.4 Demonstrate ethical behavior when designing multimedia applications.</p> <p>3.9.5 Explain key principles in the Electronic Users' Bill of Rights, i.e., safety, security and privacy.</p> <p>3.9.6 Identify copyright and patent laws for multiple media, i.e., video, text, sound, pictures and intellectual property.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the importance of legal rights, responsibilities and copyright law.</li> <li>• Identify sources of intellectual property.</li> <li>• Read and review articles pertaining to copyright law.</li> </ul>

**Content Standard 4.0: Computer Programming** - The student will demonstrate an understanding of essential programming skills including the design and analysis, coding, testing and integration of software.

Performance Standard 4.1:	The student will demonstrate an understanding of essential programming skills.
<b>EXCEEDS STANDARDS</b>	<ul style="list-style-type: none"> <li>• Design an objective for a computer program.</li> <li>• Compare and contrast various computer languages.</li> <li>• Construct a flowchart corresponding to a given task.</li> <li>• Explain various low- and high-level programming techniques, e.g., object oriented programming, linear programming, assembly, machine and microcode.</li> </ul>
<b>MEETS STANDARD</b>	<p>4.1.1 Demonstrate proficiency with computer number systems and Boolean algebra.</p> <p>4.1.2 Demonstrate an understanding of basic computer architecture.</p> <p>4.1.3 Understand flowchart fundamentals and corresponding logic flow.</p> <p>4.1.4 Execute programs and subroutines.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the function of a program</li> <li>• Describe the purpose of a flowchart.</li> <li>• Identify flowchart symbols.</li> <li>• Distinguish between binary, octal, decimal and hexadecimal number systems.</li> </ul>

**Content Standard 4.0: Computer Programming** - The student will demonstrate an understanding of essential programming skills including the design and analysis, coding, testing and integration of software.

Performance Standard 4.2:	The student will demonstrate an understanding of the design and analysis of software.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Critique and evaluate the objective(s) of a computer program.</li> <li>• Write a design plan based upon the analysis to meet specified objectives.</li> <li>• Write a program in accordance with a given flowchart.</li> </ul>
<b>MEETS STANDARD</b>	<p>4.2.1 Investigate and determine user needs.            4.2.2 Determine the objective(s) of a program.            4.2.3 Construct a flowchart corresponding to a given program.            4.2.4 Determine hardware requirements and tradeoffs.            4.2.5 Determine language requirements and tradeoffs.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the need for program design and analysis.</li> <li>• Understand the basics of user needs.</li> <li>• Understand the functions of a program beyond user needs, e.g., measurement, control and testing.</li> <li>• Explain the need for a flowchart.</li> </ul>

**Content Standard 4.0: Computer Programming** - The student will demonstrate an understanding of essential programming skills including the design and analysis, coding, testing and integration of software.

Performance Standard 4.3:	The student will demonstrate an understanding of software coding.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Compare and contrast various assembler and compiler methods.</li> <li>• Rewrite a program in another language.</li> <li>• Compare and contrast low- and high-level languages.</li> <li>• Write reusable code, e.g., subroutines, dynamic link library (DLL), ActiveX controls, etc.</li> </ul>
<b>MEETS STANDARD</b>	<p>4.3.1 Demonstrate proper use of syntax rules corresponding to a given language.</p> <p>4.3.2 Write code to represent a given flowchart.</p> <p>4.3.3 Document programs through the use of comments or remark statements.</p> <p>4.3.4 Understand universal programming concepts, e.g., constants, variables, data types, data structures, logic controls and error handling.</p> <p>4.3.5 Understand reusable code structures, e.g., object oriented programming, component object model, standards and functions.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify various programming languages and their purposes.</li> <li>• Understand the need for comments and remarks in programs.</li> <li>• Describe universal programming concepts.</li> <li>• Review and interpret existing code.</li> <li>• Recognize reusable code structures.</li> </ul>

**Content Standard 4.0: Computer Programming** - The student will demonstrate an understanding of essential programming skills including the design and analysis, coding, testing and integration of software.

Performance Standard 4.4:	The student will demonstrate an understanding of software testing and integration.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Design and implement a systematic testing procedure to identify and resolve coding errors and error handling issues.</li> <li>• Create end-user manuals and help files for a given program.</li> <li>• Create a testing procedure to validate interoperability of various software components.</li> <li>• Recommend the appropriate use of breakpoints in testing and integration of software.</li> </ul>
<b>MEETS STANDARD</b>	<p>4.4.1 Diagnose problems within the executable code.</p> <p>4.4.2 Debug software routines using troubleshooting techniques such as insertion of breakpoints, watch points, single stepping and messages.</p> <p>4.4.3 Confirm the proper execution of a finished program.</p> <p>4.4.4 Understand the role of systematic testing to identify logic and/or user errors.</p> <p>4.4.5 Explain the importance of end-user documentation for a given program.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the purpose of testing software.</li> <li>• Identify the types of problems that can exist with programs.</li> <li>• Identify the significance of a systematic testing approach.</li> <li>• Describe the importance of end-user documentation.</li> <li>• Describe the various techniques used to debug and test a software program.</li> </ul>

**Content Standard 5.0: Computer Applications** - The student will demonstrate an understanding of contemporary application programs, including: spreadsheets, databases, word processing, desktop publishing and presentation software, to include installation, setup and upgrades.

Performance Standard 5.1:	The student will demonstrate an understanding of office software application products.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Obtain industry certification in a software application product.</li> <li>• Utilize advanced software application features.</li> <li>• Create software application templates.</li> <li>• Explain and demonstrate software application integration and automation.</li> <li>• Design and create a database incorporating relationships.</li> <li>• Create a presentation incorporating various software application products.</li> </ul>
<b>MEETS STANDARD</b>	<p>5.1.1 Create a spreadsheet using basic editing, formatting, formulas and functions.</p> <p>5.1.2 Process, format, edit and enhance a document(s) using a word processing application.</p> <p>5.1.3 Create and utilize a basic database to input and extract data.</p> <p>5.1.4 Apply design and layout principles to create a document(s) using desktop publishing software.</p> <p>5.1.5 Employ presentation software, integrating text, graphics, and other media.</p> <p>5.1.6 Demonstrate input of data from various sources, e.g., Web, scanner, digital camera, etc.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand the differences between various software application products.</li> <li>• Examine various features offered in software application products.</li> <li>• Identify the appropriate software application needed for a specific task.</li> <li>• Relate software application products to the various needs within the workplace.</li> <li>• Understand software application terminology.</li> </ul>

**Content Standard 5.0: Computer Applications** - The student will demonstrate an understanding of contemporary application programs, including: spreadsheets, databases, word processing, desktop publishing and presentation software, to include installation, setup and upgrades.

<b>Performance Standard 5.2:</b>	<b>The student will demonstrate an understanding of software installation, setup and upgrades.</b>
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Download and install service packs and upgrades.</li> <li>• Automate installation and upgrades throughout a network.</li> </ul>
<b>MEETS STANDARD</b>	<p>5.2.1 Demonstrate proficiency in installing and uninstalling application programs.</p> <p>5.2.2 Customize and set up application programs as necessary.</p> <p>5.2.3 Complete software upgrades as instructed.</p> <p>5.2.4 Identify the software version and manufacturer.</p> <p>5.2.5 Complete the registration procedures associated with installing software.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand how software is loaded into computer memory.</li> <li>• Identify resources to obtain assistance to install or upgrade software.</li> <li>• Describe the purpose of software versions and upgrades.</li> <li>• Explain how to uninstall a program.</li> <li>• Understand the importance of registering software.</li> </ul>

**Content Standard 6.0: IT Management** - The student will demonstrate an understanding of the management of IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policies and procedures. Note: This content standard requires the student to have a pre-established technical IT background.

<b>Performance Standard 6.1:</b>	<b>The student will demonstrate an understanding of the management of IT organizational issues.</b>
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Prepare a mission statement for the organization.</li> <li>• Create and/or revise organizational issues.</li> <li>• Prepare an organizational chart.</li> <li>• Validate departmental documentation.</li> <li>• Evaluate the performance of personnel.</li> </ul>
<b>MEETS STANDARD</b>	<p>6.1.1 Document IT resources.</p> <p>6.1.2 Layout IT scheduling and project management issues.</p> <p>6.1.3 Manage IT personnel.</p> <p>6.1.4 Produce IT departmental documentation.</p> <p>6.1.5 Prioritize IT organizational issues.</p> <p>6.1.6 Exercise effective management principles.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Understand basic management principles.</li> <li>• Recognize organization’s mission statement and management hierarchy.</li> <li>• Understand the importance of prioritizing IT organizational issues.</li> </ul>

**Content Standard 6.0: IT Management** - The student will demonstrate an understanding of the management of IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policies and procedures. Note: This content standard requires the student to have a pre-established technical IT background.

<b>Performance Standard 6.2:</b>	<b>The student will demonstrate proficiency in communication skills.</b>
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Evaluate and critique oral and written communication skills.</li> <li>• Evaluate and critique presentations.</li> </ul>
<b>MEETS STANDARD</b>	6.2.1 Demonstrate proficient oral communication skills. 6.2.2 Apply proper writing techniques in the workplace. 6.2.3 Produce effective presentations. 6.2.4 Employ appropriate interpersonal skills.
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify effective oral and written communication skills.</li> <li>• Identify the need for effective presentations.</li> <li>• Describe effective interpersonal skills.</li> </ul>

**Content Standard 6.0: IT Management** - The student will demonstrate an understanding of the management of IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policies and procedures. Note: This content standard requires the student to have a pre-established technical IT background.

Performance Standard 6.3:	The student will demonstrate an understanding of the enforcement and compliance of company IT policies and procedures.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Develop IT related policies and procedures.</li> <li>• Measure and assess enforcement of existing IT policies and procedures.</li> <li>• Measure and assess compliance with existing IT policies and procedures.</li> <li>• Make recommendations to enhance company IT policies and procedures.</li> </ul>
<b>MEETS STANDARD</b>	<p>6.3.1 Examine a company's existing IT policies and procedures.</p> <p>6.3.2 Examine company enforcement of existing IT policies and procedures.</p> <p>6.3.3 Examine company compliance with existing IT policies and procedures.</p> <p>6.3.4 Compare and contrast the enforcement vs. compliance of a company's IT policies and procedures.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify the purpose of a company's IT policies and procedures.</li> <li>• Summarize a company's IT policies and procedures.</li> <li>• Differentiate between enforcement and compliance of IT policies and procedures.</li> </ul>

**Content Standard 7.0: Telecommunications** - The student will demonstrate an understanding of telecommunications technology, including telephony, public switch telephone network (PSTN) and its operation and specifications, broadband and baseband LAN/MAN/WAN technologies, wireless technologies and emerging communications technologies.

Performance Standard 7.1:	The student will demonstrate an understanding of telephony and PSTN, including its operation and specifications.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Test and verify electrical and signaling specifications of the telephone lines and trunk circuits.</li> <li>• Explain the differences between analog and digital telephone lines.</li> <li>• Program, configure and maintain a PBX system.</li> <li>• Compare and contrast touch-tone signaling vs. rotary dial signaling.</li> <li>• Explain differing data compression algorithms and modulation techniques.</li> </ul>
<b>MEETS STANDARD</b>	<p>7.1.1 Distinguish between rotary-dial and touch-tone (DTMF) systems and specifications.</p> <p>7.1.2 Examine analog and digital signaling characteristics for PBX systems and the PSTN, using proper test equipment.</p> <p>7.1.3 Demonstrate an understanding of the control functions applied to end-user equipment, including voice mail systems and handsets.</p> <p>7.1.4 Distinguish between telephone trunk circuits and subscriber loops.</p> <p>7.1.5 Characterize the standard voice-grade telephone lines in terms of bandwidth.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Define the acronyms DTMF, PBX and PSTN.</li> <li>• Describe the difference between an analog and digital signal.</li> <li>• Explain the advantages of touch-tone dialing over rotary dialing.</li> <li>• Explain what is meant by bandwidth.</li> <li>• Give examples of telephony equipment.</li> </ul>

**Content Standard 7.0: Telecommunications** - The student will demonstrate an understanding of telecommunications technology, including telephony, public switch telephone network (PSTN) and its operation and specifications, broadband and baseband LAN/MAN/WAN technologies, wireless technologies and emerging communications technologies.

Performance Standard 7.2:	The student will demonstrate an understanding of broadband and baseband LAN/MAN/WAN systems.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Design a LAN and WAN system.</li> <li>• Construct a LAN or WAN system.</li> <li>• Evaluate the impacts of noise, propagation delay, bandwidth and attenuation on network performance.</li> </ul>
<b>MEETS STANDARD</b>	<p>7.2.1 Differentiate among current baseband and broadband specifications and technologies as defined by standards organizations.</p> <p>7.2.2 Practice proper cabling techniques, using appropriate hand tools and test equipment.</p> <p>7.2.3 Demonstrate an understanding of interactive multi-band telecommunications systems.</p> <p>7.2.4 Configure various internetworking devices.</p> <p>7.2.5 Distinguish between various broadband and baseband signaling protocols.</p> <p>7.2.6 Compare and contrast between various transmission media.</p> <p>7.2.7 Characterize the OSI model in terms of internetworking equipment and protocols.</p> <p>7.2.8 Characterize differing network topologies.</p> <p>7.2.9 Demonstrate an understanding of network addressing.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Name the seven layers of the OSI model.</li> <li>• Describe the various types of connectors, hand tools, test equipment and transmission media commonly used with networks.</li> <li>• Explain what is meant by network topology.</li> <li>• List various internetworking devices.</li> </ul>

**Content Standard 7.0: Telecommunications-**The student will demonstrate an understanding of telecommunications technology, including telephony, public switch telephone network (PSTN) and its operation and specifications, broadband and baseband LAN/MAN/WAN technologies, wireless technologies and emerging communications technologies.

Performance Standard 7.3:	The student will demonstrate an understanding of wireless technologies.
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Compare the advantages and disadvantages of frequency hopping vs. direct sequencing.</li> <li>• Explain the advantages and disadvantages of various antennae.</li> <li>• Incorporate various security measures in wireless devices.</li> <li>• Explain the significance of the ISM band in relation to wireless network systems and cellular telephony.</li> <li>• Distinguish among the various radiation patterns and modes.</li> </ul>
<b>MEETS STANDARD</b>	<p>7.3.1 Differentiate among current wireless transmission specifications as defined by standards organizations.</p> <p>7.3.2 Distinguish among various modulation techniques used in the wireless industry.</p> <p>7.3.3 Compare and contrast the various frequency bands within the electromagnetic frequency spectrum.</p> <p>7.3.4 Identify the differences among antenna characteristics and related hardware.</p> <p>7.3.5 Configure various wireless devices, e.g., access points, NICs and bridges.</p> <p>7.3.6 Demonstrate the proper use of wireless test equipment.</p> <p>7.3.7 Examine the impact of electromagnetic interference (EMI) on wireless systems.</p> <p>7.3.8 Distinguish between analog and PCS technology.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• State the various wireless devices.</li> <li>• Identify wireless test equipment.</li> <li>• Recognize the importance of power, frequency and transmission media in terms of distance and reception.</li> <li>• Cite differences between radio frequency (RF) and infrared (IR) technologies.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

<b>Performance Standard 8.1: Students shall demonstrate problem-solving skills.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Revise a program, network, design, or action plan based on information gained through research of alternative solutions.</li> <li>• Develop methods to analyze the advantages and disadvantages of alternative solutions.</li> <li>• Evaluate the benefits of solving a program, network, design, or action plan problem.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.1.1 Solve a work-related problem using the appropriate steps in a problem-solving process.</p> <p>8.1.2 Demonstrate brainstorming techniques.</p> <p>8.1.3 Examine and explain the advantages and disadvantages of alternative solutions to one or more problems.</p> <p>8.1.4 Create an action plan based upon a solution to a work-related problem.</p> <p>8.1.5 Identify the benefits of solving a work-related problem.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify a problem-solving process to be used in varied information technology contexts (such as troubleshooting).</li> <li>• Identify the basic steps of the problem-solving process.</li> <li>• Identify alternative solutions to a problem.</li> <li>• Identify basic components of an action plan.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

<b>Performance Standard 8.2: Students shall demonstrate critical-thinking skills.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Demonstrate the skills necessary to identify, analyze, and solve program, network, design, or action plan problems.</li> <li>• Formulate, implement, and evaluate an information technology action plan.</li> <li>• Analyze how critical-thinking skills affect work performance.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.2.1 Identify and explain the essential elements of the critical-thinking process.</p> <p>8.2.2 Demonstrate critical-thinking skills necessary in the workplace.</p> <p>8.2.3 Explain how emotional thinking and logical thinking affect decision making in the workplace.</p> <p>8.2.4 Explain the difference between reliable and unreliable observations and statements of facts.</p> <p>8.2.5 Recognize patterns or relationships through observation and discovery.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• State the importance of critical thinking in identifying, analyzing, and solving program, network, design, or action plan problems.</li> <li>• Identify the difference between opinion and fact.</li> <li>• Define emotional and logical thinking.</li> <li>• Identify steps of critical thinking.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

<b>Performance Standard 8.3: Students shall demonstrate the ability to speak, write and listen effectively.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Describe and use techniques to improve visual, electronic, and verbal communication.</li> <li>• Identify, research, prepare, and deliver an information technology related presentation.</li> <li>• Prepare and defend a program, network, design, or action plan.</li> <li>• Prepare technical documents and written reports.</li> <li>• Interpret and respond to complex verbal and nonverbal messages.</li> <li>• Demonstrate exemplary customer service skills.</li> <li>• Determine and demonstrate knowledge of audience’s level of comprehension.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.3.1 Explain the benefits of effective communication skills in the workplace.</p> <p>8.3.2 Effectively interpret and respond to verbal and nonverbal messages.</p> <p>8.3.3 Demonstrate proper telephone etiquette.</p> <p>8.3.4 Effectively communicate thoughts, ideas and information in writing.</p> <p>8.3.5 Organize ideas and communicate orally; is able to effectively demonstrate job skills to others.</p> <p>8.3.6 Locate, understand and interpret information in documents such as manuals, graphs and schedules.</p> <p>8.3.7 Select and utilize an appropriate medium for conveying messages with dignity and respect.</p> <p>8.3.8 Organize information into the appropriate format in accordance with standard practices, which includes prewriting, drafting, proofreading, editing/revising, and preparing final copy.</p> <p>8.3.9 Demonstrate sensitivity to cultural diversity in communication.</p> <p>8.3.10 Identify common communication barriers and methods for improving communication.</p>

<b>Performance Standard 8.3:</b>		<b>Students shall demonstrate the ability to speak, write and listen effectively.</b>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Explain the benefits of effective communication in the workplace.</li> <li>• Communicate thoughts, ideas, and information in writing reports, documents, and electronic messages.</li> <li>• Communicate thoughts, ideas, and information verbally using appropriate information technology terminology.</li> <li>• Listen attentively.</li> <li>• Identify an appropriate medium for conveying messages.</li> </ul>	

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 8.4: Students shall demonstrate the ability to select, apply and maintain appropriate technology.	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Diagnose and make necessary corrections or improvements within an information technology environment.</li> <li>• Critique the use, benefits, and cost of an information technology system.</li> <li>• Analyze the impact of technological changes on one or more aspects of information technology by researching current literature.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.4.1 Demonstrate ability to utilize basic keyboarding techniques.</p> <p>8.4.2 Demonstrate ability to utilize other input devices.</p> <p>8.4.3 Demonstrate the ability to utilize various electronic research methods.</p> <p>8.4.4 Demonstrate knowledge of the basic technology systems currently available and how they apply to your field (i.e., word processing, spreadsheets, multimedia applications and database).</p> <p>8.4.5 Investigate and explain the use, benefits, and costs of technology developments in the workplace and school.</p> <p>8.4.6 Identify and demonstrate the appropriate use of technology to enhance the efficiency of the workplace and school.</p> <p>8.4.7 Demonstrate routine maintenance and repair of technological equipment.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Recognize and describe the basic technology systems currently available.</li> <li>• Describe the technical systems related to career interest areas.</li> <li>• Recognize the impact of essential technological changes within the information technology industry as reported in current literature.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

<b>Performance Standard 8.5: Students shall demonstrate leadership and teamwork skills.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Analyze the stages of group development.</li> <li>• Wear professional attire.</li> <li>• Demonstrate leadership ability within a group or a team.</li> <li>• Compromise and/or build consensus within a group and summarize the decision of the group while maintaining respect for diverse viewpoints.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.5.1 Work cooperatively with others when given a group project.</p> <p>8.5.2 Explain traits necessary to effectively lead and influence individuals and groups.</p> <p>8.5.3 Demonstrate appropriate attitudes and behaviors for effective leadership.</p> <p>8.5.4 Demonstrate respect for team members, team processes and team goals.</p> <p>8.5.5 Participate in the implementation of a group’s decision and evaluates the results.</p> <p>8.5.6 Demonstrate the qualities of an effective leader and team member.</p> <p>8.5.7 Describe the importance of a company’s dress codes.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify essential leadership qualities.</li> <li>• Identify team member roles and responsibilities.</li> <li>• Recognize the interpersonal skills necessary to build teamwork.</li> <li>• Recognize and consider diverse viewpoints.</li> <li>• Identify team processes and team goals.</li> <li>• Understand appropriate dress.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

<b>Performance Standard 8.6: Students shall demonstrate sound work ethics.</b>	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Assume responsibility for decisions and actions.</li> <li>• Demonstrate time-management skills and cost-effective practices.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.6.1 Develop personal work ethics through work experience.</p> <p>8.6.2 Describe the importance of ethics in the workplace.</p> <p>8.6.3 Demonstrate regular attendance, promptness, and the willingness to follow instructions and complete an assigned task.</p> <p>8.6.4 Demonstrate appropriate personal and professional attitudes and behaviors.</p> <p>8.6.5 Maintain a safe, clean, and organized work area.</p> <p>8.6.6 Demonstrate awareness of legal responsibilities related to individual performance, safety and customer satisfaction.</p> <p>8.6.7 Demonstrate knowledge of various types of harassment.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Identify appropriate responses to unethical actions.</li> <li>• Identify established rules, regulations and attendance policies.</li> <li>• Comply with all safety and health rules and procedures.</li> <li>• Identify hazardous substances in the workplace.</li> <li>• Properly use and maintain tools and equipment.</li> <li>• Understand and follow emergency procedures.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 8.7: Students shall demonstrate the ability to effectively manage resources in high-performance workplaces.	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Recognize the individual roles of team members, delegate tasks, and provide feedback on performance.</li> <li>• Acknowledge and utilize the skills, abilities, and input of all members of a team.</li> <li>• Develop an action plan to accomplish tasks within a given time frame.</li> <li>• Demonstrate knowledge of compensation practices and financial management, and explain how financial resources can be used effectively and efficiently.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.7.1 Identify and organize the human resources needed to complete a job assignment.</p> <p>8.7.2 Identify and organize the material resources and space requirements needed to complete the job assignment.</p> <p>8.7.3 Effectively use technology at its highest level to complete a job assignment.</p> <p>8.7.4 Demonstrate cooperation and leadership in a team at school or in a workplace setting.</p> <p>8.7.5 Use the basic components of effective time management.</p> <p>8.7.6 Recognize the need for management skills in the workplace with regard to stress, anger management, and substance abuse.</p> <p>8.7.7 Estimate costs and prepares a detailed work order.</p> <p>8.7.8 Develop a time schedule and prioritize a task list to complete an assignment.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• List effective time management skills.</li> <li>• Use technology to complete assignments.</li> <li>• Utilize materials, tools, and processes to complete a task related to a career selection.</li> <li>• Read and follow instructions from manuals on the use and care of materials, tools, and equipment.</li> <li>• Maintain a clean, organized, and safe workstation.</li> <li>• Identify traits needed for cooperation and leadership in a team at school or in a workplace setting.</li> <li>• Identify the material resources and space requirements needed to complete an assignment.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 8.8: Students shall demonstrate career planning and development skills.	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Develop a community service or job-shadowing project.</li> <li>• Develop an education/training plan to fulfill long-term career goals.</li> <li>• Define advantages and disadvantages of self-employment or working for various sizes and types of businesses.</li> <li>• Critique results of a job interview.</li> <li>• Develop a proposal for an organized community-service project.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.8.1 Prepare a job application.</p> <p>8.8.2 Prepare a personal resume.</p> <p>8.8.3 Complete a personal aptitude and interest inventory.</p> <p>8.8.4 Participate in a job interview.</p> <p>8.8.5 Establish short-term career goals.</p> <p>8.8.6 Establish long-term career goals.</p> <p>8.8.7 Use the Nevada Career Information System (NCIS) or a similar computer-based program to research careers in a chosen field.</p> <p>8.8.8 Participate in an organized job-shadowing activity.</p> <p>8.8.9 Participate in a community service project.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Locate employment opportunities.</li> <li>• Identify job requirements for entry-level positions in the information technology industry.</li> <li>• Identify general conditions for employment.</li> <li>• Identify educational/training requirements for related information technology field.</li> <li>• Complete a personal aptitude and interest inventory.</li> <li>• Identify the elements of goals setting.</li> <li>• Identify information technology related careers.</li> <li>• Identify job interview skills.</li> <li>• Identify the components of a career portfolio.</li> </ul>

**Content Standard 8.0: Employability Skills** - Students shall achieve competence in workplace readiness, career development, and lifelong learning.

Performance Standard 8.9: Students shall demonstrate the understanding of job retention and lifelong learning skills.	
<b>EXCEEDS STANDARD</b>	<ul style="list-style-type: none"> <li>• Maintain an electronic portfolio.</li> <li>• Create a plan for lifelong learning.</li> <li>• Create a presentation illustrating interpersonal skills needed for job retention.</li> <li>• Adapt new knowledge and skills in changing situations.</li> <li>• Analyze how work life is affected by families and how families are affected by work life.</li> </ul>
<b>MEETS STANDARD</b>	<p>8.9.1 Maintain an employment/career portfolio.</p> <p>8.9.2 Identify strategies for balancing work and family roles.</p> <p>8.9.3 Demonstrate understanding of the need for lifelong learning in a rapidly changing job market.</p> <p>8.9.4 Identify strategies to maintain employment in the face of job reduction.</p> <p>8.9.5 Develop long-term career-planning strategies.</p> <p>8.9.6 Identify various educational options needed for job advancement.</p> <p>8.9.7 Demonstrate interpersonal skills needed for job retention.</p> <p>8.9.8 Identify and model sound workplace ethics, such as loyalty, punctuality and initiative.</p>
<b>APPROACHES STANDARD</b>	<ul style="list-style-type: none"> <li>• Recognize the importance of a portfolio.</li> <li>• Identify options for lifelong learning.</li> <li>• Identify interpersonal skills needed for job retention.</li> <li>• Identify jobs with opportunity for advancement.</li> <li>• Recognize the importance of career planning.</li> </ul>

**CROSSWALK OF INFORMATION TECHNOLOGY AND ACADEMIC STANDARDS**

**Content Standard 1.0  
NETWORK SYSTEMS**

**The student will demonstrate an understanding of basic network systems to include administration, security, file and disk management, topology and internetworking design, implementation and network instrumentation.**

<b>Performance Indicators</b>	<b>Academic Standards</b>
1.1.1, 1.1.2, 1.1.3, 1.1.4	<b>4.12.6, 6.12.5, 6.12.7, 7.12.1, 7.12.4, 7.12.5 (English)</b> 4.12.6 Read and apply multi-step directions to perform complex procedures and tasks. 6.12.5 Edit for use of standard English. 6.12.7 Share final drafts with a designated audience. 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 7.12.4 Use rules of capitalization. 7.12.5 Demonstrate conventional spelling.
1.2.1-1.2.5	<b>4.12.6 (English)</b> 4.12.6 Read and apply multi-step directions to perform complex procedures and tasks.
1.3.1, 1.3.5	<b>3.12.3, 19.12.4 (Science)</b> 3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material. 19.12.4 Distinguish between hypotheses, laws, theories and rules, and explain the level of their limitations.
1.3.6, 1.4.3	<b>19.12.1, 19.12.3 (Science)</b> 19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information. 19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).
1.4.1	<b>7.12.1, 9.12.1 (Reading)</b> 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.
1.4.3	<b>10.12.2, 10.12.4 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints.
1.4.4, 1.4.5	<b>19.12.1, 19.12.3, 23.12.5, 23.12.6, 24.12.3, 24.12.4, 24.12.5, 24.12.6 (Science)</b> 19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information. 19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual). 23.12.5 Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision.

Performance Indicators	Academic Standards
	<p>23.12.6 Select samples by some random system to avoid bias.</p> <p>24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.</p> <p>24.12.4 Maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations.</p> <p>24.12.5 Write procedures for the investigation of delegated or original scientific problems.</p> <p>24.12.6 Carry out an independent scientific investigation.</p>
1.4.6	<p><b>24.8.3, 24.12.3 (Science)</b></p> <p>24.8.3 Choose appropriate common materials for making and repairing simple mechanical constructions.</p> <p>24.12.3 Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.</p>

**Content Standard 2.0  
IT SERVICE AND SUPPORT**

**The student will demonstrate an understanding of basic hardware and software support, quality customer service skills, documentation skills, basic electronics and troubleshooting skills, utilizing electronic test equipment and hand tools.**

<b>Performance Indicators</b>	<b>Academic Standards</b>
2.1.1	<b>19.12.1, 19.12.3 (Science)</b> 19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information. 19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).
2.1.1, 2.1.2	<b>10.12.2, 10.12.4 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints.
2.1.3, 2.1.4	<b>10.12.2, 10.12.4 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints.
2.1.6, 2.1.7	<b>7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 10.12.2, 10.12.4 (Reading)</b> 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect. 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.4 Use rules of capitalization. 7.12.5 Demonstrate conventional spelling. 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints.
2.21	<b>9.12.1, 9.12.3 (Reading)</b> 9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas. 9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.
2.2.2-2.2.6, 2.3.1-2.3.5	<b>6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 9.12.3, 9.12.4 (Reading)</b> 6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose. 6.12.3 Write compositions that present complex ideas in a sustained and compelling manner. 6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view. 6.12.5 Edit for use of standard English. 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.

Performance Indicators	Academic Standards
	<p>7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.</p> <p>7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.</p> <p>7.12.4 Use rules of capitalization.</p> <p>7.12.5 Demonstrate conventional spelling.</p> <p>9.12.1 Use specific and varied vocabulary.</p> <p>9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.</p> <p>9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.</p> <p>9.12.4 Read aloud or recite literary, dramatic, and original works.</p>
2.4.1, 2.4.4	<p><b>19.12.1, 19.12.3, 23.12.5, 23.12.6 (Science)</b></p> <p>19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).</p> <p>23.12.5 Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision.</p> <p>23.12.6 Select samples by some random system to avoid bias.</p>
2.4.2, 2.4.5	<p><b>1.12.5, 3.12.3, 3.12.4, 3.12.5 (Science)</b></p> <p>1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).</p> <p>3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by material they enter, and change direction when entering a new material.</p> <p>3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.</p> <p>3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.</p>
2.4.5	<p><b>10.12.2, 10.12.4, 11.12.2, 11.12.5 (Reading)</b></p> <p>10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.</p> <p>10.12.4 Justify a position using logic and refuting opposing viewpoints.</p> <p>11.12.2 Evaluate possible sources of information for credibility and usefulness.</p> <p>11.12.5 Organize and present research findings using appropriate media.</p>
2.4.6, 2.4.7	<p><b>24.12.1 (Science)</b></p> <p>24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.</p>
2.4.1	<p><b>6.13, 6.14 (Math)</b></p> <p>6.13 Use technology, including calculators, to solve problems and verify solutions.</p> <p>6.14 Use technology, including calculators, to investigate, define, and describe quantitative relationships such as patterns and functions.</p>
2.4.2	<p><b>1.12.1, 1.12.2, 1.12.3, 1.12.5, 2.12.4, 2.12.5, 2.12.6, 2.12.7, 3.12.2, 3.12.3, 3.12.5, 4.12.7, 5.12.1 (Math)</b></p> <p>1.12.1 Calculate and estimate sums, differences, products, quotients, powers, and roots using mental math, formulas, and algorithms.</p> <p>1.12.2 Apply the laws of exponents to perform operations on expressions with integral exponents and expressions in scientific notation.</p>

Performance Indicators	Academic Standards
	<p>1.12.3 Apply the properties and theories of the real number system to everyday situations.</p> <p>1.12.5 Perform simple operations on matrices.</p> <p>2.12.4 Add, subtract, multiply, and factor (1<sup>st</sup> and 2<sup>nd</sup> degree) polynomials, describing each step in the process and the connection between the algebraic process and the arithmetic process; use simple quadratic equations with integer roots to solve practical and mathematical problems.</p> <p>2.12.5 Model practical problems from everyday situations with a variety of models that includes matrices, translating among tabular, symbolic and graphical representations of functions, with and without technology.</p> <p>2.12.6 Determine the domain and range of linear relations given a graph or a set of ordered pairs; explain their importance in problem solving situations.</p> <p>2.12.7 Solve systems of two linear equations, both algebraically and graphically, use graphing calculators as a primary tool in solving these problems and to verify solutions found by other methods.</p> <p>3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass.</p> <p>3.12.3 Distinguish and differentiate among the structures, language and uses of systems of measure (e.g., linear, square units, cubic units); justify and communicate the differences between accuracy, precision, error, and tolerance in measurement; describe how each of these can affect solutions found in problem situations.</p> <p>3.12.5 Use relationships (e.g., proportions) and formulas (indirect measurement) to determine the measurement of unknown dimensions, angles, areas, and volumes to solve problems.</p> <p>4.12.7 Apply the Pythagorean Theorem, its converse, properties of special right triangles, and right triangle trigonometry to solve practical problems.</p> <p>5.12.1 Use calculators and computers to create and manipulate tables, graphs, and matrices to communicate statistical information; use the shape of graphs of normal distributions to compare and analyze information.</p>
2.4.4, 2.4.5	<p><b>3.12.2 (Math)</b></p> <p>3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass.</p>



**Content Standard 3.0  
MULTIMEDIA**

**The student will demonstrate an understanding of multimedia content creation and authoring. This will encompass fundamental drawing techniques, audio, video, animation, typography, digital imaging and an understanding of web design and development, e-commerce, intellectual property and copyright law.**

Performance Indicators	Academic Standards
3.1.1, 3.1.2	<p><b>1.12.5, 2.12.3, 11.12.2 (Reading)</b>            1.12.5 Apply knowledge of syntax and literary allusions to acquire an understanding of new words and to comprehend text.            2.12.3 Plan, monitor, and assess the strategies used to ensure comprehension of a variety of texts.            11.12.2 Evaluate possible sources of information for credibility and usefulness.</p>
3.2.1	<p><b>7.12.1, 9.12.1, 9.12.2, 9.12.3 (Reading)</b>            7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.            9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.            9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.            9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.  <b>3.12.3, 3.12.5 (Science)</b>            3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.            3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.</p>
3.3.4	<p><b>6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 9.12.3, 9.12.4 (Reading)</b>            6.12.5 Edit for use of standard English.            7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.            7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.            7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.            7.12.4 Use rules of capitalization.            7.12.5 Demonstrate conventional spelling.            9.12.1 Use specific and varied vocabulary.            9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.            9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.            9.12.4 Read aloud or recite literary, dramatic, and original works.</p>
3.5.1	<p><b>6.12.2, 6.12.3 (Reading)</b>            6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.</p>

Performance Indicators	Academic Standards
	6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.
3.5.3	<p><b>6.12.2, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5 (Reading)</b>          6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.          6.12.4 Edit for use of standard English.          6.12.5 Edit for use of standard English.          6.12.7 Share final drafts with a designated audience.          7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.          7.12.4 Use rules of capitalization.          7.12.5 Demonstrate conventional spelling.</p>
3.7.1	<p><b>9.12.1, 9.12.2 (Reading)</b>          9.12.1 Use specific and varied vocabulary and apply standard English to communicate ideas.          9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.</p>
3.8.3	<p><b>10.12.2 (Reading)</b>          10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.</p>
3.9.1, 3.9.4, 3.9.5	<p><b>7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 10.12.1 (Reading)</b>          7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.          7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.          7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.          7.12.4 Use rules of capitalization.          7.12.5 Demonstrate conventional spelling.          9.12.1 Use specific and varied vocabulary.          9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.          10.12.1 Participate in problem-solving conversations or group discussions by identifying, synthesizing, and evaluating data.</p>
3.9.2	<p><b>11.8.4 (Reading)</b>          11.8.4 Record information using a variety of note-taking and organizational strategies.</p>
3.9.3, 3.9.6	<p><b>10.12.2, 10.12.4, 11.12.2, 11.12.3, 11.12.5 (Reading)</b>          10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.          10.12.4 Justify a position using logic and refuting opposing viewpoints.          11.12.2 Evaluate possible sources of information for credibility and usefulness.          11.12.3 Cite sources of information using a standard method of documentation.          11.12.5 Organize and present research findings using appropriate media.</p>
3.1.1, 3.1.2	<p><b>3.12.2 (Math)</b>          3.12.2 Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass.</p>

**Content Standard 4.0  
COMPUTER PROGRAMMING**

**The student will demonstrate an understanding of essential programming skills including the design and analysis, coding, testing and integration of software.**

<b>Performance Indicators</b>	<b>Academic Standards</b>
4.2.1, 4.2.2, 4.2.4, 4.2.5	<b>10.12.2, 10.12.4, 11.12.2 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints. 11.12.2 Evaluate possible sources of information for credibility and usefulness.
4.3.1	<b>2.12.3, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5 (Reading)</b> 2.12.3 Plan, monitor, and assess the strategies used to ensure comprehension of a variety of texts. 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect. 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.4 Use rules of capitalization. 7.12.5 Demonstrate conventional spelling.
4.3.2, 4.3.3	<b>7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 11.12.5 (Reading)</b> 7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing. 7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect. 7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing. 7.12.4 Use rules of capitalization. 7.12.5 Demonstrate conventional spelling. 11.12.5 Organize and present research findings using appropriate media.
4.3.4	<b>19.12.4 (Science)</b> 19.12.4 Distinguish between hypotheses, laws, theories and rules, and explain the level of their limitations.
4.4.1	<b>10.12.2, 10.12.4, 11.12.5 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints. 11.12.5 Organize and present research findings using appropriate media.
4.4.1, 4.4.2, 4.4.4	<b>24.12.5 (Science)</b> 24.12.5 Write procedures for the investigation of delegated or original scientific problems.
4.4.2, 4.4.3, 4.4.5	<b>9.12.1, 9.12.2, 9.12.3, 9.12.4 (Reading)</b> 9.12.1 Use specific and varied vocabulary. 9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose. 9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.

Performance Indicators	Academic Standards
	9.12.4 Read aloud or recite literary, dramatic, and original works.
4.4.1	<p><b>1.12.1, 1.12.3, 2.12.3, 2.12.4, 2.12.5 (Math)</b></p> <p>1.12.1 Calculate and estimate sums, differences, products, quotients, powers, and roots using mental math, formulas, and algorithms.</p> <p>1.12.3 Apply the properties and theories of the real number system to everyday situations.</p> <p>1.12.5 Perform simple operations on matrices.</p> <p>2.12.3 Create and use different forms of a variety of equations, proportions, and/or formulas (e.g., <math>I=PRT</math> or <math>R=I/PT</math>), solving for the needed variable as necessary in given situations.</p> <p>2.12.4 Add, subtract, multiply, and factor (<math>1^{st}</math> and <math>2^{nd}</math> degree) polynomials, describing each step in the process and the connection between the algebraic process and the arithmetic process; use simple quadratic equations with integer roots to solve practical and mathematical problems.</p> <p>2.12.5 Model practical problems from everyday situations with a variety of models that includes matrices, translating among tabular, symbolic and graphical representations of functions, with and without technology.</p>

**Content Standard 5.0**  
**COMPUTER APPLICATIONS**

**The student will demonstrate an understanding of contemporary application programs including, spreadsheets, databases, word processing, desktop publishing and presentation software, to include installation, setup and upgrades.**

<b>Performance Indicators</b>	<b>Academic Standards</b>
5.1.1-5.1.3	<p><b>6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5 (Reading)</b></p> <p>6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.</p> <p>6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.</p> <p>6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view.</p> <p>6.12.5 Edit for use of standard English.</p> <p>7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.</p> <p>7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.</p> <p>7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.</p> <p>7.12.4 Use rules of capitalization.</p> <p>7.12.5 Demonstrate conventional spelling.</p>
5.2.1-5.2.3, 5.2.5	<p><b>4.12.6 (Reading)</b></p> <p>4.12.6 Read and apply multi-step directions to perform complex procedures and tasks.</p>
5.2.4	<p><b>10.12.2, 11.12.2 (Reading)</b></p> <p>10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.</p> <p>11.12.2 Evaluate possible sources of information for credibility and usefulness.</p>
5.1.1	<p><b>1.12.1, 1.12.2, 1.12.3, 1.12.5, 2.12.4, 2.12.5 (Math)</b></p> <p>1.12.1 Calculate and estimate sums, differences, products, quotients, powers, and roots using mental math, formulas, and algorithms.</p> <p>1.12.2 Apply the laws of exponents to perform operations on expressions with integral exponents and expressions in scientific notation.</p> <p>1.12.3 Apply the properties and theories of the real number system to everyday situations.</p> <p>1.12.5 Perform simple operations on matrices.</p> <p>2.12.4 Add, subtract, multiply, and factor (1<sup>st</sup> and 2<sup>nd</sup> degree) polynomials, describing each step in the process and the connection between the algebraic process and the arithmetic process; use simple quadratic equations with integer roots to solve practical and mathematical problems.</p> <p>2.12.5 Model practical problems from everyday situations with a variety of models that includes matrices, translating among tabular, symbolic and graphical representations of functions, with and without technology.</p>

**Content Standard 6.0**  
**INFORMATION TECHNOLOGY MANAGEMENT**

**The Student will demonstrate an understanding of the management of IT areas within an organization, workplace interpersonal communication skills, proficiency in oral, written and presentation communication skills, enforcement and compliance of company policies and procedures. Note: This content standard requires the student to have a pre-established technical IT background.**

Performance Indicators	Academic Standards
6.1.1, 6.1.2, 6.1.4	<p><b>6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5 (Reading)</b></p> <p>6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.</p> <p>6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.</p> <p>6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view.</p> <p>6.12.5 Edit for use of standard English.</p> <p>7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.</p> <p>7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.</p> <p>7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.</p> <p>7.12.4 Use rules of capitalization.</p> <p>7.12.5 Demonstrate conventional spelling.</p>
6.1.5	<p><b>10.12.2, 10.12.4, 11.12.5 (Reading)</b></p> <p>10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.</p> <p>10.12.4 Justify a position using logic and refuting opposing viewpoints.</p> <p>11.12.5 Organize and present research findings using appropriate media.</p>
6.2.1-6.2.4	<p><b>6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 9.12.3 (Reading)</b></p> <p>6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.</p> <p>6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.</p> <p>6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view.</p> <p>6.12.5 Edit for use of standard English.</p> <p>7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.</p> <p>7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.</p> <p>7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.</p> <p>7.12.4 Use rules of capitalization.</p> <p>7.12.5 Demonstrate conventional spelling.</p> <p>9.12.1 Use specific and varied vocabulary.</p>

Performance Indicators	Academic Standards
	9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose. 9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.
6.3.1-6.3.4	<b>10.12.2, 10.12.4, 11.12.2 (Reading)</b> 10.12.2 Negotiate to arrive at consensus by proposing and examining possible options. 10.12.4 Justify a position using logic and refuting opposing viewpoints. 11.12.2 Evaluate possible sources of information for credibility and usefulness.

**Content Standard 7.0  
TELECOMMUNICATIONS**

**The Student will demonstrate an understanding of telecommunications technology, including telephony, public switch telephone network (PSTN) and its operation and specifications, broadband and baseband LAN/MAN/WAN technologies, wireless technologies and emerging communications.**

<b>Performance Indicators</b>	<b>Academic Standards</b>
7.1.1, 7.1.2, 7.1.5	<p><b>10.12.2, 10.12.4, 11.12.2 (Reading)</b>            10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.            10.12.4 Justify a position using logic and refuting opposing viewpoints.            11.12.2 Evaluate possible sources of information for credibility and usefulness.</p>
7.1.1, 7.1.2, 7.1.4, 7.1.5	<p><b>1.12.5, 3.12.3, 3.12.4, 3.12.5 (Science)</b>            1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force. (e.g., electric motors, generators, radios).            3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by material they enter, and change direction when entering a new material.            3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.            3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.</p>
7.2.2	<p><b>23.12.4, 23.12.5, 23.12.6 (Science)</b>            23.12.4 Use derived quantities, ratios, proportions, and constants.            23.12.5 Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision.            23.12.6 Select samples by some random system to avoid bias.</p>
7.2.1, 7.2.3, 7.2.5-7.2.9	<p><b>2.12.3, 6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 9.12.3, 9.12.4, 10.12.4 (Reading)</b>            2.12.3 Plan, monitor, and assess the strategies used to ensure comprehension of a variety of texts.            6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.            6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.            6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view.            6.12.5 Edit for use of standard English.            7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.            7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.            7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.            7.12.4 Use rules of capitalization.            7.12.5 Demonstrate conventional spelling.            9.12.1 Use specific and varied vocabulary.            9.12.2 Make formal oral or multimedia presentations, using vocabulary</p>

Performance Indicators	Academic Standards
	<p>and public speaking techniques appropriate to audience and purpose.            9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.            9.12.4 Read aloud or recite literary, dramatic, and original works.            10.12.4 Justify a position using logic and refuting opposing viewpoints.</p>
7.3.1-7.3.4, 7.3.6, 7.3.8	<p><b>2.12.3, 6.12.2, 6.12.3, 6.12.4, 6.12.5, 7.12.1, 7.12.2, 7.12.3, 7.12.4, 7.12.5, 9.12.1, 9.12.2, 9.12.3, 9.12.4, 10.12.4 (Reading)</b>            2.12.3 Plan, monitor, and assess the strategies used to ensure comprehension of a variety of texts.            6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.            6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.            6.12.4 Revise writing, using given criteria, such as rubrics or feedback from others, to improve word choice, organization, and point of view.            6.12.5 Edit for use of standard English.            7.12.1 Apply the rules of usage, grammar, and capitalization with few significant errors; use modifiers, parallel structure, and subordination correctly in writing.            7.12.2 Use multiple structures such as inversion, parallelism, and sentences of varying lengths for stylistic effect.            7.12.3 Use rules of punctuation; manipulate conventions for emphasis in writing.            7.12.4 Use rules of capitalization.            7.12.5 Demonstrate conventional spelling.            9.12.1 Use specific and varied vocabulary.            9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.            9.12.3 Organize and deliver planned, extemporaneous, and impromptu presentations that address a topic and engage the audience.            9.12.4 Read aloud or recite literary, dramatic, and original works.            10.12.4 Justify a position using logic and refuting opposing viewpoints.</p>
7.3.1-7.3.3, 7.3.6, 7.3.8	<p><b>1.12.5, 3.12.3, 3.12.5 (Science)</b>            1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force.            3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.            3.12.5 Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.</p>
7.3.4	<p><b>1.12.5, 3.12.3, 3.12.4, 3.12.5, 5.12.4 (Science)</b>            1.12.5 Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force.            3.12.3 Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.            3.12.4 Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.            3.12.5 Investigate and describe how matter and energy may be changed</p>

Performance Indicators	Academic Standards
	<p>and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.</p> <p>5.12.4 Describe electromagnetic waves including a wide range of forms and varying wavelengths.</p>
7.3.7	<p><b>19.12.1, 19.12.3, 19.12.4 (Science)</b></p> <p>19.12.1 Identify and determine the credibility of sources of information based on the techniques used to gather that information.</p> <p>19.12.3 Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).</p> <p>19.12.4 Distinguish between hypotheses, laws, theories and rules, and explain the level of their limitations.</p>
7.3.7	<p><b>10.12.2, 10.12.4 (Reading)</b></p> <p>10.12.2 Negotiate to arrive at consensus by proposing and examining possible options.</p> <p>10.12.4 Justify a position using logic and refuting opposing viewpoints.</p>
7.2.2	<p><b>3.12.2 (Math)</b></p> <p>Select and use measurement tools, techniques, and formulas to calculate and compare rates, cost, distances, interest, temperatures, and weight/mass.</p>

**Content Standard 8.0****EMPLOYABILITY SKILLS - Students shall achieve competence in workplace readiness, career development, and lifelong learning.**

Performance Indicators	Academic Standards
8.1.2	<p><b>4.12.6, 6.12.2 (English)</b>            4.12.6 Read and apply multi-step directions in order to perform complex procedures and tasks.            6.12.2 Organize ideas in compositions by selecting and applying structures such as comparison/contrast or cause/effect, which enhance the central idea, theme, or purpose.</p> <p><b>22.12.2, 22.12.5 (Science)</b>            22.12.2 Use tables, charts and graphs in making arguments and claims in oral and written presentations.            24.12.5 Write procedures for the investigation of delegated or original scientific problems.</p>
8.3.3, 8.3.5	<p><b>5.12.2, 6.12.1, 6.12.3, 6.12.5, 6.12.7, 7.12.2, 9.12.2 (English)</b>            5.12.2 Produce subject-specific technical writing, such as instructions for a shop project or field reports for science.            6.12.1 Generate ideas for writing by selecting appropriate prewriting strategies with attention to audience, purpose, and personal style.            6.12.3 Write compositions that present complex ideas in a sustained and compelling manner.            6.12.5 Edit for use of Standard English.            6.12.7 Share final drafts with a designated audience.            7.12.2 Use multiple structures such as inversion, parallelism, and sentence of varying lengths for stylistic effect.            9.12.2 Make formal oral or multimedia presentations, using vocabulary and public speaking techniques appropriate to audience and purpose.</p>
8.4.5	<p><b>18.12.5 (Science)</b>            18.12.5 Explain that technological problems create a demand for new scientific knowledge and new technologies, which makes it possible for scientists to extend their research in new ways or to undertake entirely new lines of research.</p>
8.5.1, 8.5.5, 8.5.7	<p><b>22.12.3 (Science)</b>            22.12.3 Discuss scientific topics by restating or summarizing accurately what others have said; ask for clarifications or elaborations, and express alternative positions using available multimedia resources.</p>
8.6.5, 8.6.6	<p><b>18.12.7, 22.12.3, 24.12.1 (Science)</b>            18.12.7 Explain that scientists have ethical procedures, violations of which have consequences.            22.12.3 Discuss scientific topics by restating or summarizing accurately what others have said; ask for clarifications or elaborations, and express alternative positions using available multimedia resources.            24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.</p>
8.7.7, 8.7.9	<p><b>23.12.2, 23.12.3 (Science)</b>            23.12.2 Use algebraic equations when appropriate.            23.12.3 Estimate answers to the correct order of magnitude.</p> <p><b>1.12.1 (Math)</b>            1.12.1 Calculate and estimate sums, differences, products, quotients, powers, and roots using mental math, formulas, and algorithms.</p>
8.8.11, 8.8.12	<p><b>24.12.1 (Science)</b>            24.12.1 Demonstrate personal responsibility for using safety equipment and observing all safety standards.</p>

## GLOSSARY

A+	PC certification awarded by CompTIA.
Analog	Any continuous and variable quantity as a function of time, e.g., sinusoidal wave, triangle wave, dc voltage.
Application	End user software program, e.g., word processing.
Baseband	An encoded signal transmitted directly onto the channel without modulation, e.g., Ethernet.
Basic Operating Systems	Software program which manages the basic operations of a computer system.
Boolean Algebra	A mathematical method used to describe or reduce the logical operation of digital circuits and programs.
Broadband	An encoded signal transmitted onto the channel with various modulation methods, e.g., cable TV.
C, C++, C#	Higher level object oriented programming languages.
CAD/CAM	Computer-Aided Design / Computer-Aided Manufacturing application.
CCAI	Cisco Certified Academy Instructor.
CCNA	Cisco Certified Network Associate
CETsr	Senior Certified Electronics Technician
CIS	Computer Information Systems
CIT	Computer & Information Technology
Coaxial cable	Cable with an inner conductor surrounded by insulation and metallic shielding.
CompTIA	Computer Technology Industries Association
Computer Number Systems	Binary (Base 2), octal (Base 8), decimal (Base 10), and hexadecimal (Base 16). Ordinal (starting at 0), cardinal (starting at 1).
Computer Literacy	Familiarization with common computer operations, applications and peripherals.
Computer Systems Architecture	Interconnection of computer components.
Cryptologist	An individual who deciphers or creates complex encrypted codes and messages.
Database	Grouping and storage of data that can be manipulated, updated and extracted by software.
Digital	Information that is encoded into two discrete binary levels: a logic 1 or a logic 0.
e-commerce	Business transactions conducted electronically, most commonly via the Internet.
Ergonomics	The study of people adjusting to their working environment.
Ethernet	A baseband LAN system that is standardized by the IEEE (Institute of Electrical and Electronic Engineers).

Fiber optics	The communications technology that utilizes the transmission of light over glass or plastic fiber cables.
GUI	Graphical User Interface, a generic name for any computer interface that substitutes graphics for characters.
HTML	Hyper Text Markup Language; a language used to code web pages.
Infrared	That portion of the electromagnetic spectrum having a wavelength ranging from 770 nanometers to 10 <sup>6</sup> nanometers and utilized in wireless communications.
Information Technology (IT)	The design, development, implementation, support, or management of computer-based information systems.
Intellectual Property	Legal term covering patents, registered designs, design right, copyright, confidential information and moral rights.
Internet	A public Wide Area Network (WAN) consisting of a collection of thousands of linked networks spanning the globe.
Internetworking Equipment	Electronic networking equipment such as bridges, switches, routers and hubs used to connect computers and networks.
Intranet	A corporate network infrastructure based on internet standards.
IS	Information systems.
Java	A high level programming language developed by SUN Microsystems.
Keyboarding	Formerly known as typing.
LAN	Local Area Network. A privately owned network of interconnecting data communicating devices that share resources within a local area.
MAN	Metropolitan Area Network. A network of interconnecting data communicating devices that share resources within a metropolitan area.
MCSE	Microsoft Certified Systems Engineer, networking certification awarded by Microsoft.
MCT	Microsoft Certified Trainer, Instructor and trainer certification awarded by Microsoft.
Microwave	The technology that utilizes electromagnetic waves above 890 MHz.
MOUS	Microsoft Office User Specialist, application certifications awarded by Microsoft.
Multimedia	Combinations of multiple forms of media used in the communication of information, e.g., audio, video, text, and graphics.
Network Operating Systems (NOS)	Computer program used to manage the operations of a computer network.
Network+	Network certification awarded by CompTIA.
PBX	Private Branch Exchange.
PC	Personal Computer.
PDA's	Personal Digital Assistant.

Peripheral devices	External devices connected to a computer, e.g., mouse, monitor, keyboard.
PERL	Practical Extraction and Report Language, a high level script language.
PLC	Programmable Logic Controller.
Protocols	A set of rules governing communication.
PSTN	Public Switched Telephone Network, the dial-up telephone network.
Spreadsheet	A computer program that simulates an accountant ledger paper of columns and rows.
SQL	Structured Query Language, a powerful database language used for creating, maintaining and viewing database data.
STP	Shielded Twisted-Pair wire, twisted pair cables with aluminum foil surrounding them serving as a shield to electromagnetic interference. Commonly used in Token Ring systems.
T&I	Testing and Integration, the development phase between research and development (R&D) and production.
Telecommunications	Communications via a conglomeration of information-sharing networks tied together.
Topologies	The logical and physical layout of a network.
Total Quality Management (TQM)	Is a management philosophy first identified by W. Edwards Demming based on the principles of listening skills, empowerment, teaming, excellent customer service, reward systems, training for all employees, control and statistical theory and assessment after implementation.
Transmission media	Transmission lines consisting of fiber, copper, microwave and infrared (IR).
UCCSN	University and Community College System of Nevada
UTP	Unshielded Twisted Pair, twisted pair cable commonly used in Ethernet systems and telephone systems (CAT5 and CAT6 cables).
VBA	Visual Basic for Applications, a high level object oriented programming language requiring an underlying application object.
Visual Basic	A high level object oriented language created by Microsoft.
VRML	Virtual Reality Modeling Language, a language for writing 3D HTML applications.
WAN	Wide Area Network, consisting of a collection of many linked networks spanning a large geographical area.
Web browser	A software program that interprets HTML and allows the user to interact with the Internet.
Web server	A powerful computer used to host web pages and their related text and graphical data and is accessed through the Internet or Intranet.
Wireless technology	Any technology that utilizes electromagnetic or infrared (IR) transmission of analog or digital intelligence.

Word processing	Keyboarding with spell check.
XML	Extensible Markup Language, a new language developed to allow the transfer of information between non-compatible systems using HTML type tags.