

Career & Technical Education
Curriculum Alignment with
Common Core ELA & Math Standards

Computer Essentials Strata

Course Title	110101 Computer Essentials - STRATA IT	Grade Levels	9-12	Credit Value	1
Description	Focuses on the design of computing systems, including instruction in the principles of computer hardware & software components, algorithms data basis, telecommunications, etc. Includes the knowledge to identify and explain PC components, setup a basic PC workstation, conduct basic software installation, identify compatibility issues and recognize/prevent basic security risks and also gives knowledge in the areas of Green IT and preventative maintenance of computers.				
Unit Title	<u>Technology and Computer Hardware Basics</u>				

Technical Content

- 1) Perform computer user support to maintain service
- 2) Perform standard computer backup procedures to protect IT information

KY Core Academic Standards (Big Idea)

Communication/Technology - Vocational Studies

Special communication and technology skills are needed for success in schooling and in the workplace. Students will be able to express information and ideas using a variety of technologies in various ways.

Career Awareness, Exploration, Planning - Vocational Studies

Career awareness, exploration and planning gives students the opportunity to discover the various career areas that exist and introduce them to the realities involved with the workplace. Many factors need to be considered when selecting a career path and preparing for employment. Career awareness, exploration and planning will enable students to recognize the value of education, learn how to plan for careers and integrate academic subjects.

Information, Communication and Productivity - Technology

Students demonstrate a sound understanding of the nature and operations of technology systems. Students use technology to learn, to communicate, increase productivity and become competent users of technology.

Students manage and create effective oral, written and multimedia communication in a variety of forms and contexts.

Personal Wellness (Health Education) - Practical Living

Wellness is maximum well-being or total health. Personal wellness is a combination of physical, mental, emotional, spiritual and social well-being. It involves making behavioral choices and decisions each day that promote an individual's physical well-being, the prevention of illnesses and diseases and the ability to remain, physically, mentally, spiritually, socially and emotionally healthy.

English/Language Arts Common Core Standards

CC.9-10.L.4 Vocabulary Acquisition and Use: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, choosing flexibly from a range of strategies.

CC.9-10.L.4.a Vocabulary Acquisition and Use: Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

CC.11-12.L.4 Vocabulary Acquisition and Use: Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

CC.11-12.L.4.a Vocabulary Acquisition and Use: Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

Technical Literacy Standards

Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or an event, noting discrepancies among sources.

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Learning Targets

Identify basic IT Vocabulary

RAM and Processor speed/cores (Part of Basic Vocabulary)

Sample Learner Activities

-an activity possibly assigning vocabulary words to students, use properly in a sentence

-Activities to show students different types of RAM:

- o DDR, DDR2, DDR3

- o DIMMS vs. SODIMMS

-an activity to display/illustrate these processor attributes:

- o Single/Dual/Quad core

- o Intel based / Cell based/AMD based

- o GHz vs. MHz

- o Processor cache size

- o Bus speed (as they relate to motherboards, memory, etc)

Hard Drives (Part of Basic Vocabulary)

-An activity to have students understand differences/similarities with hard drives:

- o RPMs
- o Cache size
- o Flash based vs. traditional hard drives
- o SATA, SCSI, IDE
- o Internal vs. external
- o Local vs. network shares

Networking (Part of Basic Vocabulary)

-Activity - have students lay out laptops, have students connect to wireless access point and then have them connect to wired ethernet, discuss differences between the two.

- o Wireless networking terms
 - 802.11a/b/g/n
 - Bluetooth
 - RF (Radio Frequency)
 - Interference
 - WAP (Wireless Access Point)
 - SSID
 - Wireless router
- o Ethernet technologies
 - CAT5 connections and cables
 - Home plug (Ethernet over Power)
 - Broadband router
 - DSL and cable modems
 - Standard vs. crossover cables
 - Auto-negotiating (speed and duplex)
- o Internet
 - Protocols
 - HTTP vs. HTTPS
 - FTP
 - SSL
 - POP3
 - SMTP
 - IMAP
 - DNS
 - DHCP
 - TCP/IP (IPv4 address, IPv6 address)
 - Browser features
 - Plug-ins
 - Customization (text sizes, text styles, etc)
 - Anti-phishing features
 - ActiveX and Java
 - Cookies
 - Internet Cache

Demonstrate the proper use of the hardware devices

-Pass around examples of different types of hardware, have students identify each, discuss the differences and any similarities.

- Monitors
- o Adjust monitor settings (brightness, contrast, etc)
- Desktop
- Server
- Portable
- o Laptop
- o PDA
- o Smartphon

Explain the characteristics and functions of internal and external storage devices

-Instructor would lecture and model the various hardware - get students involved by higher order questioning: 1) What are some new uses of storage media technology i.e. flash drives, MP3? 2) Why do you feel that PDA's are no longer a necessity in the workplace? 3) Distinguish between the different types of SD Cards?

- CD/CD-RW Drive
- DVD/DVD-RW Drive
- Blu-Ray Disk Drive
- USB storage (solid state vs. magnetic disk)
- Multi-card reader and writer
- Hard drives
- Mobile media devices (e.g. MP3 player or PDAs)

Explain the characteristics and functions of peripheral devices

-Activity - have students pass around various peripheral devices, have a student list different types of peripheral devices used with computers today.

- Digital camera
- Web camera
- Speaker
- Tuner
- Microphone
- Printer / scanner

Explain the characteristics and functions of core input devices

-Activity - have students pass around variouscore input devices, have a student list different types of core input devices used with computers today.

- Keyboard
- Mouse
- Tablet (touch screen)
- Numeric keypad
- Gamepad

Identify the risks associated with upgrading the following technologies and equipment.

-Activities could include: 1) lecture on different types of operating systems 2) lab installing an operating system as a group, discussion with group as to problems arising during installation and what might happen if you were to replace an operating system if you didn't backup or compatibility issues if installing a new OS. 3) LAB - installing additional RAM stick, discussion on compatibility and speeds, importance of 4) Lecture on installing and updating applications and OS 5) Discussion - why does updates take an enormous amount of time? Discussion of VoIP, Streaming, web delivered services.

- Operating systems (open source and commercial)

- Compatibility issues

- Upgrade issues

- Data loss

- PC Speed/storage capability

- Compatibility issues

- Upgrade issues

- Bus differences

- Hardware failure

- Application

- Minimum requirements

- Compatibility issues

- Bandwidth and contention

- VoIP

- Streaming

- Web delivered services

- Automatic application and operating system updates

- Risks of automatic updates

- Risks of not using automatic updates

- Risks of not using manufacturer websites

Demonstrate the ability to set up a basic PC workstation

-An activity - Have students in groups, bring computer up to verify full operation, including log into the computer, then completely with using proper safety procedures, completely disassemble PC removing every item from the case ensuring proper diagraming of where parts belong, instructor verifies case is empty, NOW, reverse process ensuring upon completion a fully functioning computer.

- Identify differences between connector types
 - o DVI, VGA, HDMI
 - o USB, PS/2
 - o FireWire
 - o Bluetooth and Wireless
 - o Serial
 - o Network connectors
 - o PCMCIA
 - o ExpressCard
 - o 3.5mm audio jack
 - o Power connectors
- Monitor types
- Computer (desktop, tower, laptop, custom cases)
- Keyboard (keyboard layout: regionalization)
- Mouse (touchpad, optical, trackball)
- Printer (USB, wireless, networked)
- Voltage and power requirements
- Turn on and use the PC and peripherals

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Unit Title	<u>Compatibility Issues and Common Errors</u>				

Technical Content

- 1) Employ knowledge of information system analysis and design to evaluate information systems
- 2) Utilize hardware design, operation and maintenance knowledge and skills to provide computer user support.

Technical Literacy Standards

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. By the end of 9th-12th grades, read and comprehend literary nonfiction in the grades 9-12 text complexity band proficiently, with scaffolding as needed at the high end of the range.

Learning Targets

Identify basic compatibility issues

Sample Learner Activities

- Lecture/discussion modeling and comparing FireWire, USB, and E-SATA
- Lecture of compatibility between processor and RAM and how one affects the other
- Processor performance
- RAM memory
- USB (1.1, 2.0)
- FireWire
- PS/2
- Ethernet
- Wireless networks

Recognize common operational problems caused by hardware

- Discussion/Lecture on various causes of BSD
- Critical error message or crash
- System lockup (freeze)
- Application will not start or load
- Cannot logon to network
- Driver / hardware compatibility
- Input device will not function

Demonstrate the ability to minimize risks

- Lecture on "importance of back-ups"
- Data loss
- Loss of service
- Damage to equipment

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Unit Title	<u>Software Installation and Functions</u>				

Technical Content

- 1) Demonstrate and apply knowledge of Operating System design, operation and maintenance to perform information support and service tasks
- 2) Employ system installation and maintenance skills when setting-up and maintaining an information system to demonstrate application of fundamental system knowledge.
- 3) Manage software systems to maintain and update service.

Technical Literacy Standards

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Learning Targets

Conduct basic software installation, removal and/or upgrading.

Sample Learner Activities

Step 1 - Uninstall Office in Groups

Step 2 - Install Office using media, reading documentation including system requirements in groups

Step 3 - Reflection - discuss in groups what went well, what went wrong, what would you do different next time

- Follow basic installation/upgrade procedures
 - o Check PC meets minimum requirements
 - o Administrative Rights
 - o Firewall access (unblocking ports for proper functionality)
 - Configure the Operating System
 - o Adjust basic settings (e.g. volume, date, time, time zone)
 - o User accounts
 - o Power settings (power save, sleep mode, etc)
 - o Screen resolutions
 - Documentation
 - o Licensing (Commercial, Freeware, Shareware)
 - o Software registration
 - Digital Rights Management
 - Software removal (clean un-installation)
 - Re-installation (clean installation)

Identify issues related to folder and file management

-Lab including creating a folder, then a file within the folder, then print the file, then renaming both the folder and file, and moving the location of both and deleting when finished. (Place name, date, class in file)

- Create, delete, rename and move folders
 - o Assign folder structure during installation
 - Create, delete, rename, move and print files
 - Importance of following back-up guidelines and procedures

Explain the function and purpose of software tools

-LAB - students do a web search starting with download.com, looking for current utility programs to perform the functions below, useable for current OS

- Performance and error correction tools
- Activity or event logging
- Back-up tools
- Disk clean-up tools
- File compression tools

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Unit Title	<u>Security</u>				

Technical Content

- 1) Recognize and analyze potential IT security threats to develop and maintain security requirements.
- 2) Perform standard computer backup procedures to protect IT information.

Technical Literacy Standards

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Learning Targets

Recognize basic security risks

Sample Learner Activities

-LAB - Students will go to symantec.com and Norton.com identifying and listing the current risk and finding definitions for the following terms.

- Identify Risks
- o Social Engineering
- o Viruses
- o Worms
- o Trojan Horses
- o Unauthorized Access
- Hackers
- Phishing
- Spyware
- Adware
- Malware
- Identity Fraud
- o File and folder sharing
- o Web browser risks
- o Operating System vulnerability
- Service packs
- Security updates
- o Theft
- o Open or free networks

Identify prevention methods

-Lecture using powerpoints from Microsoft

- o User awareness/education
- o Anti-virus software
- o Ensure proper security certificate are used (SSL)
- o Wireless encryption (WPA/WEP)
- o Anti-spyware
- o File encryption
- o Firewalls
- o Anti-spam software
- o Password best practice
 - Complexity (password construction)
 - Password confidentiality
 - Change frequency
 - Re-use
 - Utilization

Identify access control methods

-Lecture using power points from Microsoft

- o Passwords and User ID
- o Screensavers
- o Physical security of hardware
- o Locks
- o Parental controls
- o Smart card
- o Fingerprint reader
- o One time password

Identify security threats

-Lab - have students go to symantec.com, Norton.com, and Microsoft identify security threats - have discussion with peers in groups reflecting on current threat issues

- o Media used for backup (theft or loss)
- o Screen visibility (shoulder surfing)
- o Cookies (can be stolen, stores passwords, browser tracking)
- o Pop-ups (automatic installations, click on links to malware)
- o Accidental mis-configuration

Recognize security breaches and ways to resolve them.

-LAB - locate and install Microsoft Security Essentials, include a group/class discussion importance of anti-virus scans and how common ways to get infected, how to avoid them, and what to do if you get infected.

- Recognize the proper diagnostic procedures when infected with a virus
- o Run anti-virus scan
- o Quarantine virus when possible
- o Escalate to IT professional when needed
- Recognize the proper procedures to maintain a secure environment
- o Regular antivirus and malware scans
- o Application / operating system updates

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Grade Levels 9-12

Credit Value 1

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Unit Title **Green IT and Preventative Maintenance**

Technical Content

- 1) Identify environmentally sound techniques to preserve power and dispose of materials properly
- 2) Identify green techniques, equipment and procedures
- 3) Identify preventative maintenance products, techniques, and how to use them

Technical Literacy Standards

Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.

Learning Targets

Identify environmentally sound techniques to preserve power and dispose of materials.

Sample Learner Activities

-Students in groups go to EPA.gov, research and identify proper disposal for the items below: In groups discuss any future changes that groups can identify in the disposal process, discuss how power management saves energy.

- Environmentally hazardous substance disposal
 - o Battery disposal
 - o CRT disposal-replace with LCDs
 - o Recycling of computers for reuse or parts
 - o Toner disposal
 - o Cleaning supply disposal
 - o Materials that meet RoHS guidelines
- Power management (Power saving features)
 - o Shutdown/power off procedures/policies at end of day
 - o Automatic power off after 15 minutes of non-use
 - o Shutdown scripts
- Power management PCs and lower power servers replace large desktops with energy efficient laptops and thin clients

Identify green techniques, equipment and procedures

-In groups, do a google search for environmental green techniques in computing - list/identify looking for the below items and see what the current techniques and how they are accomplishing the green techniques today. How have the techniques changed over the years?

- Define Cloud computing
- o Define Virtualization (Have more than one server running on a single piece of hardware)
- o Reduced power and cooling consumption
 - Duplex printing and use lower cost per page network printers
 - Terminal Servers
 - Energy Star rating
 - Use low power NAS (network attached storage) instead of file servers
 - Employee telecommuting
- o Reduced emissions
- o Reduced office space heating, lighting, etc
 - Solid State drives
 - Define VoIP and how it relates to Green IT
 - Green building infrastructure
- o Eliminate cool air leaks in server rooms
- o Proper spacing for cooling IT equipment
- o Energy efficient cooling fans-BIOS adjustable

Identify preventative maintenance products, techniques, and how to use them.

-Lecture with power point on the items below - possibly have a speaker from the district IT department regarding the preventative maintenance procedures.

- Liquid cleaning compounds
- Types of materials to clean contacts and connections
- Compressed air
- Cleaning monitors
- Cleaning removable media devices
- Ventilation, dust and moisture control on the PC hardware interior
- Surge suppressors
- Use of ESD equipment
- Wire placement and safety