EL DORADO UNION HIGH SCHOOL DISTRICT
Educational Services

Course of Study Information Page

Course Title: Technology Team 1 (Course #477)	
Rationale: Give students the opportunity to acquire the knowledge, skills and experience needed to perform basic maintenance and troubleshooting of their PC.	
Course Description: Technology Team is a basic course that teaches students to troubleshoot, maintain, and upgrade a personal computer. Students apply their skills through maintaining equipment in classrooms and labs.	
Length of Course:	Year
Grade Level:	10 - 12
Credit: ❑ Number of units: 5 credits ❑ Meets graduation requirements ❒ Request for UC "a-g" requirements ❒ College Prep ❒ Elective ❒ Vocational	
Prerequisites:	Computer Applications II and/or teacher approval
Department(s):	Non- departmental
District Sites:	All
Board of Trustees Adoption Date:	January 23, 2007
Textbook(s)/Instructional Materials:	
Date Adopted by the Board of Trustees:	

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UNIT #1: Introducing Hardware

GOAL: Students will become familiar with the parts of the computer, its components, and how they function with each other.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Learn PC Hardware components and their functions: a. Outside the computer case – input and output devices b. Inside the computer case – processing, communication, storage, and power	Students will open a computer and use the drawing toolbar and callouts in Word to diagram and label all of the inside and outside devices and components. Students will get hands-on experience as computer parts are passed around the class for close inspection, such as motherboards. Students will carefully diagram and label components on a motherboard. Students will create a complete list of computer components needed in order to build a computer for a client: With a listing of parts, where they can be purchased, and price Students will also begin their creation of an on-going project – a technical manual of their creation.
2. Learn how to protect their Computer System and themselves a. Protecting against ESD – Electrostatic Discharge b. Protecting against EMI – Electromagnetic Interference c. Providing Surge Protection and Battery backup	Students be introduced and allowed to manipulate ground bracelets, ground mats, and static shielding bags. Students will be asked to demonstrate good safety techniques for a classroom computer lab Students will go on-line to experience measuring electrical energy such as volts, amps, ohms, and watts.

3. Discussion of neutral or ground – grounding, short circuit, or short	Students will discuss and examine diagrams that illustrate the concept of where power comes from and how it arrives at their home. Discussion of hot, neutral, or grounded power lines and what it means for the personal computer

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UNIT #2: How Hardware and Software Work Together

GOAL: Students will become familiar with operating systems and how to use a computer's BIOS and system tools.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Be introduced to what an Operating System is, what it does, and different types	Students will diagram and label their own filename and path and explain the file extension.
2. Review system BIOS settings	Students will boot up their PC and navigate trough the CMOS setup screens in order to answer questions about the BIOS such as: What keystroke did you use to access CMOS setup? What brand and version of BIOS does your motherboard use? What are the system date and system time reported by the CMOS setup?
3. Become familiar with devices and device drivers	Students will explore on-line the device drivers that are available on device manufacturers Website and create a table of current updates that could be applied to their PC
4. Students will identify the difference between and warm boot and a cold boot as they explore the concept of booting up your computer	Students will apply troubleshooting techniques of booting for frozen computers within the lab Students will create a PowerPoint slide showing the POST process Students will be asked to trouble shoot what it means when you bet a black screen with the error message "Non-system disk or disk error", and how to fix the problem

5. Will learn operating system tools to examine their PC system	Students will use printscreens and callouts to show the process to access the device manager, how to review the properties for a device, and how to develop a printout of system information. Will also explore the system information utility in order to obtain more detailed information than the device manager provides Students will generate and then compare two different reports in order to identify a problem device Run the following diagnostic tools: ▪ Defrag disk drive ▪ Scan disk ▪ Use system control panel to check specific components
6. Become familiar with creating a rescue disk	For their technical manual, students will create an illustrated step-by-step set of instructions on how to use the Automated System Recovery wizard to create a recovery disk
7. Explain how to tell whether you're dealing with a software or hardware problem.	Students will be given different computer problem scenarios and will be asked to determine which are hardware and which are software problems as well as the most common way to identify such problems.

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UNIT #3 : Understanding the Motherboard, the CPU, and Troubleshooting Basics

GOAL: Students will be able to identify parts on the motherboard, identify the CPU and be introduced to troubleshooting basics.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Understand and use essential hand tools and test equipment found	Students will create a check list for the standard computer repair tools they will need in a standard kit – using images to illustrate each tool
2. Be able to identify on an ATX motherboard, the CPU, memory slots and expansion slots	Students will be able to pull out of a box and identify a motherboard, CPU and RAM Students will also be able to manipulate the proper manner in which to install a CPU and RAM onto a motherboard
3. Taking apart and putting together a PC	Students will be assigned their own PC and given all the parts, in an anti-static bag, and asked to put their computer together and successfully power it on!
4. Be able to identify the components of a motherboard: a. CPU b. Heat sinks and cooling fans c. Voltage regulation d. Buses and expansion slots	Students will create a table in which to identify newer and older bus standards along with their speeds and data transfer rate. Students will give the definition of asynchronous in relation to a component on the motherboard.
5. Demonstrate correct hardware configuration	Students will identify the coin cell battery on a motherboard, and successfully complete 19 steps as they put together a computer.
6. Students will be able to install a motherboard	Students will be able to physically manipulate different types of motherboards as they explore for different components and slots. Students will use the appropriate tools as they use spacers and screws to install and attach the motherboard, and identify connecting wires.

7. students will be equipped with the basics of troubleshooting	Students will be asked to separate computer problems into two categories: ▪ problems that prevent the PC from booting and problems that occur after a successful boot Will use POST to obtain initial troubleshooting clues Students will flash BIOS on their newly built computers and follow a step-by-step set of instructions

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UNIT #4 Managing Memory
GOAL: Look in detail at components on the motherboard, including the CPU and chip set, buses and expansion slots, ROM BIOS, and components used to change hardware configuration settings as well as how operating systems manage memory

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Learn how to determine the amount of memory installed on a computer, which memory modules a system can support, and the steps to install memory in a computer	Students will be given a scenario where a client complains of programs moving slowly and receiving error messages about memory issues. They will then identify the problem as well as a solution to the problem and come up with a cost estimate on fixing the memory issue.
2. Learn about the different kinds of physical memory used on the motherboard	Students will answer the question "What does it mean when DRAM and SRAM are referred to as synchronous or asynchronous. Students will also create a chart identifying SIMM, DIMM, and RIMM with information and identifying images
3. identify the difference between single-channel mode and dual-channel mode for memory modules	Identify the different RAM and label correctly.
4. Learn the connection between application software, the OS, memory and drivers	Complete a diagram that illustrates how the Windows OS manages memory for their technical manual
5. Become aware of virtual memory and scratch disks	Change Virtual Memory settings and paging file size in Windows XP Identify solutions to avoiding the creation of virtual memory

6. Gain knowledge on how to upgrade memory on their own PCs	Answer questions to determine how much and what kind of memory to buy – create a checklist for a possible client to determine their memory needs Match memory to the motherboard – go on-line to virtually purchase a mother board and memory, from different vendors Bring into class ads from computer magazines and companies for different types of memory modules ▪ Create a chart identifying amount of memory, density, speed and price ▪ Identify the quality of memory modules
7. Learn how to install memory	Students will install memory to old motherboards to practice safety and correct installation They will be asked to verbally list 5 safety precautions to first apply
8. Students will learn possible steps to take when receiving a memory error message	Will be asked to list possibilities if, when upgrading memory, the computer does not recognize new memory

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UNIT #5 Understanding, Installing, and Troubleshooting disk Drives
GOAL: Students will learn how hard drives work and organize data, how to install a hard drive, how floppy drives work and how to install a floppy drive, about optical storage devices and hard drive troubleshooting

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Recognize how hard drives work	Students will be given a scenario where a client has problems with her computer taking a long time to start, applications are running slowly, and programs are taking a long time to start They will then develop a troubleshooting plan involving routine maintenance tasks, fragmented hard drive and disk caching speed
2. Learn what causes a hard drive crash	Students will open up an old hard drive and identify the different components
3. Learn how data is organized on a disk	Students will diagram and explain sectors, formatting, how data is stored on disks and why defragmenting your drive works!
4. Explain what partitioning is	In groups of 4 – brainstorm and research the steps on how to partition a hard drive with Windows 9x
5. Be able to format using high-level formatting and using high-level formatting using FAT	Groups of four will present different formatting involving boot sectors and boot records Create their own File Allocation Table
6. Identify file systems	Same groups will each complete a table on a file system and then share with the class as a whole ▪ FAT 12, FAT 16, FAT 32, NTFS
7. Understand the technology of how the hard drive interfaces with the system	Using the help system, identify how to use auto-detection to detect a new hard drive and automatically select the correct drive capacity and configuration
8. Become familiar with IDE/ATA Interface Standards	Create a summary of interface standards for IDE drives

9. Install a hard drive	Students will work in four teams to develop basic steps to install a hard drive using parallel ATA cabling – then students will actually install a hard drive with the help of their group and group leaders and mount it in the hard drive bay Refer to their tech manual for appropriate safety precautions – keeping notes as they proceed
10. Students will be able to describe how a floppy drive works	Students will contrast and compare 3 ½ inch floppies to 5 ½ inch floppies, and then to more recent storage devices – and discuss the future reality of floppy disk storage
11. Be able to identify optical storage devices	List at least three different storage devices and identify and label the storage capacity
12. Identify external and removable storage	In groups of four research and the newest and most recent technology in storage devices and present in a PowerPoint presentation
13. Learn tips on managing hard drives	Students will defragment their hard drives and use disk cleanup in the Windows Utility
14. Become familiar with troubleshooting hard drives	Students will develop a poster that illustrates and lists the steps to trouble shoot a hard drive
15. Students will learn how to apply troubleshooting to resolving common hard drive problems	Students will be given different scenarios and will have to write up a resolution for the hard drive problems
16. Be able to identify where to obtain technical support	Students will explore on-line technical support

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UNIT #6: Supporting Input, Output, and Multimedia Devices
GOAL: Focus on how to install and support input and output devices, including how to connect peripherals using ports, wireless connections, and expansion slots.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Get an overview of peripherals	Students will be asked to bring in examples of peripheral devices to share and demonstrate to class They will also identify whether they are input, output, process, or storage
2. Installation of peripheral devices	Review three basic steps to installing a new device
3. Observe diagrams of different ports and research the most current ports used on the latest computers and peripherals a. USB b. FireWire c. Parallel ports d. Serial ports	Label a digital photo of the back of their PC – identifying the different ports and what peripherals they connect Use CMOS setup to define configurations for serial and parallel ports, and use Windows XP device Manager to review port assignments Compare and contrast which is more accurate and useful to the average consumer/client
4. Compare cables	Students will connect heads on new cables, and problem solve whether or not the length of cable can affect the efficiency of connecting your PC to a printer
5. Explain wireless connections	Study and demonstrate infrared technology and explain its benefit to wireless technology Have students design their own futuristic computer – creating as many wireless parts as possible using infrared technology ▪ Make sure to include an infrared port, and transceiver ▪ Make use of any of the latest technologies with your computer of the future!

6. Identify expansion slots	Use motherboard diagrams to identify expansion slots: ▪ PCI ▪ AGP ▪ Current technology
7. Be able to correctly install an expansion card in an expansion slot	In groups of four, students will practice installing the correct expansion cards onto the correct slots on a motherboard
8. Be able to identify and know the difference of input, output, process, and storage devices	Students will find on-line images of their dream computers and using callouts – identify and label all the input, output, process, and storage devices
9. Be able to trouble shoot keyboards	Brainstorm at least 5 common keyboard problems and develop a list of troubleshooting solutions for each problem listed
10. Be aware of different pointing devices	Students will be asked to develop their own pointing device – using the latest technology available Develop at history timeline of pointing devices used over the last ten years
11. Identify output devices and demonstrate monitors	Reinforce the safety issues involved in never opening up a computer monitor Create a chart comparing at least 5 different monitor characteristics and their descriptions and benefits along with: ▪ Screen size ▪ Refresh rate ▪ Interlaced or non-interlaced ▪ Dot pitch ▪ Resolution In groups of four – demonstrate how a flat panel monitor functions
12. Recognize how video cards interface with the computer and monitor	Compare and contrast VGA, XGA, SVGA video cards to the newest technology available Discuss what applications and current trends in game need the support of which video cards
13. Be able to troubleshoot monitors and video cards	Devise 5 different monitor and video cards problems that a client may be experiencing, then develop a step-by-step plan that could be followed to troubleshoot problems Take an online quiz

14. Be introduced to multimedia technologies	Identify the goal of multimedia technology ▪ To create or reproduce lifelike representations for audio, video, and animation Students will be given the problem of building a computer for a client that has a business in video editing and animation, with sound. Carefully list the best computer components needed such as sound cards and how to install them
15. Explain trouble shooting sound problems	Students are given a problem that the client they just built a computer for, is having sound problems. What should you do?
16. Brief introduction to digital cameras and video cameras	Students will explore hands on different digital and video cameras and be able to identify and define the following: ▪ Charge-coupled device ▪ Jpeg ▪ Flash memory card ▪ Card reader video capture card ▪ Digital video camera – what is the newest generation?

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UNIT #7 Supporting Printers
GOAL: Learn about laser printers, inkjet printers, dot-matrix printers, thermal printers, and solid ink printers; how they work; and how to support them.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Identify printer characteristics and discuss each in detail	Students will identify features that printers are described with and research and compare three different printers from three different companies: ▪ Resolution ▪ Print quality ▪ Speed ▪ Memory ▪ color
2. Be aware of different types of printers to meet different needs	Be able to define impact and non-impact printers. Discuss dot-matrix printers, ink-jet printers, and laser printers Divide class into groups of three and have each group research and prepare a presentation on how each one works, what are the benefits of each type of printer and cost Also, give written directions on how to install and network printers Answer this question: ▪ "I just plugged the printer cable into the port and Windows automatically found the printer and installed the drivers. Is that okay?" Have students review printer properties and set a default printer on their computers
3. Explain how to install a local printer using a wireless connection	In groups of four, list the steps to install a wireless printer. What does Blue Tooth technology have to do with this? Use diagrams to illustrate your steps

4. Discuss sharing and installing a network printer	Students will answer the question: What does it mean to share a network printer. Students will give an example as well as step-by-step directions using printscreens and the drawing toolbar
5. Know how to complete printer maintenance	Students will apply routine maintenance procedures on all the department printers after drawing up an organization chart listing the routine and basic maintenance steps used to isolate a printer problem – be sure to list the don'ts as well.
6. Be able to download printer drivers from a manufacturer's website	Students will demonstrate how to update device drivers for their printers from the manufacturers website
7. Be familiar with basic printer troubleshooting	In groups of four, students will brainstorm solutions to printer problems a client is experiencing, specifically issues with print quality, slow printing, a portion of the paper is not printing and paper jams. Students will present their troubleshooting solutions.
8. Discuss the use of different printers for different media and which paper is best for which printer?	Students will "purchase" the best printer that will meet the needs for a digital imaging class.

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UNIT #8: Installing and Using Operating Systems
GOAL: Operating systems will change as time goes on, currently, students will focus on Windows XP – how it uses memory, hot it manages hard drives using partitions and NTFS. Students will also learn how to install hardware and applications using an OS

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Learn about the features and architecture of the Operating System currently used on their classroom computers.	Students will research on-line to find manufacture's tables listing current features and architecture of their specific O.S.
2. Networking features such as peer to peer, LAN and WAN	Students will become familiar with networking features as they set up their own workstations to the LAN network
3. Installation of Operating System – both upgrade and clean install on a PC with no OS installed	After installing an O.S. onto their classroom computer, students will be asked to determine the CPU speed and the amount of RAM that is on their computer Guest speaker from Intel will speak to class on the newest breakthroughs in CPUs and upcoming O.S. changes
4. Gain knowledge on hard drive partitions and file systems	Students will create a step-by-step manual on how to partition their hard drive and how to decide what file system to use
5. After installing their OS – students must complete several steps to activate the OS and transfer files and user preferences from an old computer to a new one	Students will use printscreens and callouts to detail directions on activating their OS, and transferring files from an old computer to their computer – and then they will actually go through those steps on their classroom lab computer

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UNIT # : 9 – Managing and Supporting the Operating

GOAL: Students will learn to use the software tools included in the Operating System to manage and support it.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
Learn to identify the management tools included in Operating Systems.	Students will view the computer event logs from the MMC of Windows XP Students will use the MMC to view the users allowed to log in to their lap PC
Use the management tools provided by the OS to manage their computer	Students will use the MMC to add a user to their lap PC. In addition, they will make the user a member of the Power Users Group Students will use Disk quota manager to limit the size of the user's files.
Identify and troubleshoot the boot process	Students will install a second OS on their Lab computer and configure the properties of the boot loader. Students will use the recovery console of Windows XP to fix problems with the master boot record. Students will use the task manager to manage active applications and processes.

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UNIT # : 10 – Connecting PCs to Networks and the Internet

GOAL: Introduce students to networking and the internet. Students will be able to make a small home network and connect their PC to the internet.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
Learn network types and networking terminology	Students will explain a given network, using appropriate terminology Students will develop a network scheme, identifying the type, technologies, topology, and protocols using appropriate terms.
How to connect a computer to a network	Students will identify the appropriate hardware needed to connect their lab PC to an existing network. Students will correctly install the hardware and drivers to connect to the network. Students will use the appropriate protocols and configuration to connect to the network.
Learn how to share and utilize network resources	Student will share a folder on their lab PC with their network. Students will save a file to a shared folder Students will share a printer on their network. Students will install and print to a network printer
Learn about various internet connections available. Use this knowledge to conned to the internet.	Students will identify all of the internet connections available at their home. Students will connect a home PC to the internet

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UNIT # : 11 – Purchasing or Building a Personal Computer

GOAL: Students will put into practice the knowledge and skills learned in the preceding chapters by deciding whether to upgrade their existing PC or build a new PC. They will make informed decisions about what parts to purchase and display good technician skills in building a computer

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
Identify existing hardware and software on a given computer	Students will be given a PC to identify existing hardware and software. They will present an informed decision on the advantages and disadvantages of upgrading the existing computer versus building a new computer.
Purchase appropriate parts to upgrade an existing computer or build a new computer.	Students will make a shopping list to upgrade and existing computer or to build a new computer. It is very important that the parts all be compatible with each other Given assorted parts, students will identify the parts and which parts are compatible with each other.
Upgrade an existing computer or build a new computer from scratch.	Students will verify that a set of parts is compatible and then using good tech skills assemble a working computer.

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UNIT # : 12 – Maintenance and Troubleshooting Fundamentals

GOAL: Students will learn safe computing practices and create a preventative maintenance plan for their PC. In addition, students will learn how to troubleshoot PC problems.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
Identify important steps to be taken to maintain a PC	Develop a maintenance schedule and implement it on their home PC.
Become familiar with backup procedures and back a computer up	Back up their lab computer and restore it after a fatal error has been introduced by the instructor
Become familiar with computer software attacks (viruses, Trojan Horses, and worms). Students will learn to use anti-virus software to protect a PC from attack.	Install anti-virus software on their lab computer. Investigate, identify, and remove a virus from their lab computer introduced by the instructor.
Identify the tools (hardware and software) needed by the PC repair technician.	Develop a tool kit to use in the future for diagnosing and repairing PCs.
Understand the techniques used in PC diagnosis and repair.	Diagnose a problem introduced into their lab computer using accepted diagnosis and repair techniques. The diagnosis and repair will be properly documented.