Programming and Web Development
Curriculum Overview - Sophomore
2014-2015 School Year

Programming

The focus of the curriculum is on having students become better programmers rather than to enable them to claim to know a larger number of languages. Students who are only capable of creating a "Hello World" application cannot truly claim to be programmers. Students are expected to complete programming both individually and as members of a team. If possible, students will participate in actual programming competitions.

The year begins with a review of Visual Basic Programming. Students will briefly revisit topics including:

- Classes and Data types
- Strings and String Manipulation
- Decision making
- IF statements and the Select/Case structure
- Loops

Once the Visual Basic review cycle is complete, students will be introduced to new topics in visual Basic including:

- Arrays and array methods
- Error Handling
- Inheritance and interfaces
- File Input and Output

At the start of the second semester, students will complete their study of Visual Basic and begin working with the Python programming language. Students will repeat many of the exercises that they originally completed with Visual Basic, this time using Python. In this way, they will reinforce many of the aspects of the programming mindset that they have begun to develop. Specific topics of instruction that will be covered include:

- Intro to the Python programming language
- Variables, expressions and statements
- Conditionals and recursion
- Functions
- Iteration
- Strings
- Lists
- Dictionaries
- Tuples
- Files
- Classes and objects
- Classes and functions
- Classes and methods
- Inheritance
- Tkinter

Web Design

The year will again begin with a review of material that was covered as part of the freshman curriculum. Students will create simple websites and utilize CSS to customize the layout, colors, and fonts of the site. Once they have demonstrated mastery of the material covered during the freshman year, instruction will transition to Javascript programming in order to allow students to produce dynamic web sites.

Main content areas that are covered include:

1. Introduction to Javascript
2. Variables and Operators
3. Strings
4. Functions
5. Control Structures
6. Loops
7. Arrays

Computer Hardware

Students will be encouraged to pursue an industry certification in Computer Hardware/Operating Systems. The certification covers much the same content as the CompTIA A+ certification. The product that will be utilized to provide this instruction is The TestOut PCPro Online course. The following are the course objectives, as stated on the TestOut website.

PC Pro Objectives

Audio

- Identify audio connectors and cables by sight or name.
- Given an existing system with or without documentation, select a sound card to meet end-user requirements.
- Given an existing system, connect external audio equipment to sound card audio connectors.

CPU

- Given an existing system with or without documentation, select a processor to meet end-user requirements.
- Use correct procedures to install a CPU in a motherboard: thermal pad or paste, heat sink and fan, power connectors.
- View BIOS settings to verify proper installation of the processor.
  - Enable or disable hyper-threading in the BIOS.
  - Enable or disable VT support in the BIOS.
  - Monitor cooling fan speed and CPU temperature.

Expansion slots

- Given an existing system without documentation, identify expansion cards and slots by sight or by name. (ISA; PCI; AGP; PCI Express 1x, 2x, 8x; PCMCIA)
- Given an existing system, select expansion cards based on bus type that meets end-user requirements.

External devices (USB, Firewire, parallel, keyboard/mouse, serial)

- Identify external device connectors and cables by sight or name.
- Connect external devices using the appropriate connectors and cables.
- Install drivers for external devices.
- In the Windows operating system, prepare devices for safe removal.

Memory

- Identify memory module form factors and motherboard memory slots by name or sight (SDRAM, DDR, DDR2, DDR3, Rambus, Sodimm).
- Given an existing system with or without documentation, select and install memory modules to meet end-user requirements. Important characteristics include speed, capacity, parity/ECC, dual or triple channels, and continuity modules.
- Using the BIOS or Windows utilities, identify the amount of installed memory.
- Use a memory module tester to identify malfunctioning memory.
- Given a Windows system, configure virtual memory settings to meet scenario requirements.

Motherboard

- Given a scenario where a new motherboard is required in a new or existing PC system, use system documentation and end-user requirements to select the appropriate motherboard.
- Given motherboard and system case documentation, connect header devices and system case connectors to the motherboard.
- Using the BIOS, enable and disable onboard devices.
- Using manufacturer-supplied documentation and utility, update the BIOS on a motherboard to the latest revision.

Networking

- Identify Ethernet networking cables and connectors by sight or name.
- Given a scenario and networking requirements, select the necessary connectivity hardware (Ethernet and wireless network adapters, networking devices).
- Given basic TCP/IP v4 configuration settings or a network diagram, configure a wired, wireless, and dialup connection in Windows.
- Use the following networking utilities to view the existing network configuration, test network communications, and troubleshoot basic connectivity problems:
  - ipconfig
  - ping
  - traceroute

Power supply

- Identify power supply connectors by sight or name.
- Given a scenario with an existing motherboard and end user requirements, select the appropriate power supply based on power output, the number of available connectors, and the type of connectors used.
- Given motherboard and power supply documentation, install a power supply in an existing case, connecting it to peripheral devices and the motherboard.
- Given motherboard and power supply documentation, test the functionality of a power supply.

Printing

- Given an existing system, select a printer to meet end-user requirements.
- Use Windows utilities to configure printing.
  - Configure local USB and parallel printers.
  - Connect to a shared printer on a network.
  - Share a printer, add printer drivers for other operating systems, and manage printer permissions.
  - Set the default printer.
  - Manage print jobs and the print queue.
  - Start and stop the print spooler.
  - Print a test page.

Security

- Configure BIOS security settings such as configuring drive lock, setting user and administrator passwords, enabling/disabling chassis intrusion detection, and enabling/disabling TPM.
- Configure password and account lockout settings in a local security policy.
- Configure a screen saver and require a password to unlock a Windows workstation.
- Configure the basic Windows Firewall. Open necessary ports to support running services and applications.
- Encrypt files and folders.

Storage

- Given a scenario and a set of user requirements, select the appropriate storage solution (such as flash storage, hard disk, optical disk, or tape drive).
- Identify SATA and IDE/ATA data connectors, power connectors, and cables by name or by sight.
- Given an existing system and hard disk labels, install SATA and IDE/ATA storage devices using the appropriate cables, power connectors, and device/jumper settings.
- Configure BIOS settings for hard disks (including drive detection, SATA mode, and boot order).
- Configure common RAID arrays using motherboard utilities or Windows Disk Management.

- Given a newly installed drive and a set of end-user requirements, use Disk Management to configure the drive for use by Windows.
  - Upgrade to a dynamic disk if required.
  - Create volumes or partitions.
  - Assign a drive letter.
  - Format the drive using an appropriate file system (FAT32, NTFS, FAT64) based on end user requirements.
- Using Disk Management in Windows, add space to an existing volume by extending the volume or configuring a mount point.
- Manage the file system type on an existing drive.
  - Convert the file system to NTFS.
  - Reformat a partition to use the FAT32 file system.
- Use Windows utilities (Explorer, attrib command) to find or set drive, folder, or file attributes.
- Schedule and run Disk Cleanup and Disk Defragmentation in Windows.

System Management

- Use Windows Backup to configure a full system or file backup schedule.
- Enable system restore and configure a restore point.
- Configure Windows Update settings.
- Use Device Manager to update drivers, roll back drivers, and enable or disable devices.
- Configure Power Management settings in Windows.
- Enable and configure Remote Desktop and Remote Assistance.
- Configure local users and groups for a Windows system.
- Configure User Access Control (UAC) settings in Windows 7.

Video

- Given an existing system with an open video slot and documentation, select a video card to meet end-user requirements.
- Identify video connectors and cables by sight or name.
- Given an existing system with one or more installed video cards, select one or more monitor to meet end-user requirements.
- Connect one or more monitors to an installed video card.
- Use Windows utilities to configure display and video adapter settings, including resolution, native resolution, color depth, dual monitor configuration, and refresh rate.