MERCER
COUNTY COMMUNITY COLLEGE

COURSE OUTLINE

Course Number **NET 103**	**Course Title** **I T Essentials**	**Credits** **3**
Hours: **Lecture/Lab/Other** **2/3/0**	**Co-requisite** **ENG 101**	**Implementation** **Semester & Year** **Fall 2022**

Catalog description:

A continuation of NET 102. Students learn advanced concepts regarding the installation, configuration, diagnosis, and troubleshooting of microcomputer hardware components and operating systems. Includes coverage of terminology and concepts that will assist students preparing for the A+ Certification exams.

General Education Category: Not GenEd	**Course coordinator:** **Winston H. Maddox, Professor** **Networking. I**nformation Technology and Cybersecurity **609.570.3867, maddoxw@mccc.edu**

Required texts & Other materials:
TESTOut Web Material ISBN:(978-1-935080-42-8)

Course Student Learning Outcomes (SLO):

Upon successful completion of this course, the student will be able to:

1. Identify, at an advanced level, the names, purposes, and characteristics, of system modules, and recognize the modules by sight or definition. **[Supports ILGs 2, 4; PLOs 1, 2]**
2. Identify, at an advanced level, the procedures for adding and removing field- replaceable modules for desktop systems and portable systems and, given a replacement scenario, choose the appropriate sequences. **[Supports ILGs 4; PLOs 3, 4]**
3. Identify, at an advanced level, typical IRQs, DMAs, and I/O addresses, and procedures for altering those settings, when installing and configuring devices, and choose the appropriate installation or configuration steps in a given scenario. [**Supports ILGs 4, 11; PLOs 4, 5,]**
4. Identify, at an advanced level, the proper procedures for installing and configuring common IDE and SCSI devices and peripheral devices and choose the appropriate installation or configuration sequences in given scenarios, as well as recognize the associated cables. **[Supports ILGs 4; PLOs 5, 6, 7]**
5. Identify, at an advanced level, the procedures to optimize PC operations in specific situations, and predict the effects of specific procedures under given scenarios. **[Supports ILGs 4, 9; PLOs 6, 8]**
6. Recognize, at an advanced level, common problems associated with each module and their symptoms, identify steps to isolate and troubleshoot the problems, and given a problem situation, interpret the symptoms and infer the most likely cause. **[Supports ILGs 4, 11; PLOs 4, 7, 8]**

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 2. Mathematics. Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.
Institutional Learning Goal 4. Technology. Students will use computer systems or other appropriate forms of technology to achieve educational and personal goals.
Institutional Learning Goal 9. Ethical Reasoning and Action. Students will understand ethical frameworks, issues, and situations.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Program Learning Outcomes for (PLO)

1. Understand, configure, and install hardware and software, including Internet user software;
2. Understand, describe, and apply network protocols and standards;
3. Explain computing practices and procedures found in most organizations;
4. Use printed and online technical documentation;
5. Describe how the Internet works;
6. Work effectively individually and in workgroups to install and implement information technology;
7. Demonstrate written and oral communication skills.
8. Pass industry certifications, including A+, NET+, Linux+, and Security+; Microsoft's MCTS, MCITP, MCSA, and MCSE; and Cisco's CCNA.

Units of study in detail – Unit Student Learning Outcomes:

Unit I [Unit Course PC Hardware] [Supports Course SLO # 1, 2]
Learning Objectives
The student will be able to:

- Locate the power supply unit, system board, system speaker, disk drive unit, and expansion slots.
- Discuss the differences between different PC case styles, and explain the strong and weak points associated with each.
- Describe the function of typical PC power supplies.
- Locate the system's RAM banks and use documentation to determine the amount of RAM installed.
- Identify different types of RAM modules (DIP, SIP, SIMM, and DIMM).
- Identify common microprocessor IC package types.
- Identify a Video Graphics Array (VGA) adapter card.
- Recognize different disk drive types associated with PCs.
- Describe typical external connections.
- Define the functions of the computer's input/output systems.
- Explain the function of the system ROM BIOS.
- Describe the function and purpose of a disk operating system.
- Describe the value of a graphical user interface.
- Describe popular software application programs.
- Explain three classes of software used with computer systems.

Unit II [Unit Course Advanced System Board] [Supports Course SLO # 1, 2]
Learning Objectives
The student will be able to:

- Name popular Pentium class microprocessors and describe their basic characteristics, such as speeds, voltages, form-factors, and cache capabilities.
- Differentiate between the characteristics of various types of RAM used in a PC system, including the different types of dynamic and static RAM.
- Discuss typical memory organization schemes used with different system board types and, given a specific memory arrangement, identify the types of devices employed.
- Identify the most popular types of motherboards, their components, and their architecture, including ATX as well as full and baby AT designs.
- Identify typical system board components, including COMM ports, memory modules, and processor sockets.
- Describe the characteristics of different expansion bus architectures, including ISA, PCI, AGP, USB, VESA, and PC Card specifications.
- Discuss basic compatibility guidelines for different types of disk drive interfaces used with Pentium system boards, including the various types of IDE and SCSI devices.
- State the purpose of CMOS RAM, typically contains, and how to change its basic parameters.

Unit III   [Unit Standard I/O Systems] [Supports Course SLO # 1, 2]
Learning Objectives
The student will be able to…

- Define the overall function of the computer's input/output system.
- Describe differences between parallel and serial ports.
- Identify the various port connectors used in PC-compatible systems.
- Describe the differences between synchronous and asynchronous transmissions, stating advantages and disadvantages of both.
- Describe the need for parallel/serial conversions.
- Explain the operation of an RS-232C serial communications port and define its signal lines.
- Describe the operation of the Universal Serial Bus (USB).
- List the events that occur when a key is depressed on the keyboard.
- Describe the operation of the PC's keyboard.
- Explain the operation of a mouse.
- Describe the operation of a game port used with joysticks and game paddles.
- Describe the operation of a flat-bed scanner.
- Describe the physical aspects of a cathode-ray tube.
- Explain how a single dot can be positioned anywhere on the face of the CRT, using raster scanning.
- Describe how color displays are created on the screen.
- Define the terms pixel and PEL.
- Describe the function of a shadow mask in a CRT monitor.
- State the characteristics of the VGA video standard, including the type of physical connector specified for this video standard.
- Identify standard PC-compatible resource allocations.
- Differentiate between the operating characteristics of IEEE-1394 and USB ports.

Unit IV   **[Unit Mass Storage Systems] [Supports Course SLO # 3, 7]**

    Learning Objectives

    The student will be able to…

- Differentiate between different types of hard- and floppy-disk drives.
- State reasons for the popularity of magnetic disks as computer data storage systems.
- Describe the format or organization of a typical hard or floppy disk.
- Identify the major physical blocks of the disk drive unit.
- Explain why the DOS software is so important to the operation of a disk drive.
- Differentiate between common connecting cables.
- Define different RAID advisory levels and apply to given applications.
- Install SATA devices.
- Describe the operation of a Writable CD drive.
- Differentiate between different types of CDs.
- Install and configure a CD-ROM drive for operation.

Unit V   **[Unit Data Communications] [Supports Course SLO # 1, 3]**

    Learning Objectives

    The student will be able to:

- Define the term modem.
- Define the term baud.
- Compare hardware- and software-oriented (code control) protocols.
- Describe the operation and hardware of an Ethernet LAN system.
- Differentiate among typical LAN topologies.
- Differentiate among different types of network media.
- Define the term wide area network (WAN).
- Describe the function of routers, hubs, and bridges in network systems.
- Discuss basic concepts relating to Internet access.
- Discuss ISDN, DSL, and cable modem connections.
- Describe FTP operations.
- Discuss common Internet concepts and terminology (e-mail, etc.).
- Discuss the purpose and use of an Internet browser.

Unit VI   **[Unit Printers] [Supports Course SLO #1, 2]**

    Learning Objectives

    The student will be able to:

- Describe the various methods currently used to place computer print on paper.
- Discuss characteristics of dot-matrix characters.
- Discuss the types of paper handling common to different printer technologies.
- Install and configure a printer.
- List special considerations to observe when installing or repairing serial printers.
- Identify a given type of cable connection between the printer and the computer.
- Discuss data flow-control methods as they apply to serial printers.
- Identify the major components of a dot-matrix printer.
- Describe troubleshooting techniques associated with dot-matrix printers.
- Relate symptoms to associated components in a dot-matrix printer.
- Describe general alignment procedures for print head mechanisms.
- Describe the operation of a typical ink-jet printer.
- Identify the major components of an ink-jet printer.
- Describe troubleshooting techniques associated with ink-jet printers.
- Relate symptoms to associated components in an ink-jet printer.

- Describe the process for applying print to a page in a laser printer.
- Identify the major components of a laser printer.
- Describe troubleshooting techniques associated with laser printers.
- Relate symptoms to associated components in a laser printer.

Unit VII   [Unit VII Portable Computer Systems] [Supports Course SLO # 2, 3,]
Learning Objectives
The student will be able to:
- Identify the unique components of portable systems and their unique problems.
- Describe basic procedures for adding and removing FRU modules associated with portable systems.
- Identify proper procedures for installing peripheral devices commonly used with portable systems.
- Describe the applications that the three types of PCMCIA cards can be used to perform.
- Discuss and recognize the different PCMCIA devices currently available.
- Describe the purpose of a docking station.

Unit VIII   [Unit VIII Operating Systems] [Supports Course SLO # 1, 7]
Learning Objectives
The student will be able to:
- Describe the basic functions of an operating system.
- Differentiate between single-process and multiple-process systems.
- Differentiate between multiuser, multitasking, and multiprocessor operations.
- Identify FAT-based operating system functions, structures, and major system files.
- Describe procedures for locating, accessing, and retrieving information in a command-line environment.
- Identify basic concepts and procedures for creating and managing files and directories in a FAT-based system.
- List the events that occur during the bootup process.
- Explain the basic organization of a FAT and NTFS-based disk.
- Describe the operation of the Microsoft command line.
- Identify and use disk-level commands.
- Create, delete, and navigate through various directories.
- Discuss naming conventions as they apply to various types of files.
- Find, copy, rename, delete, and move files.
- Manipulate file attributes from the Microsoft command line.
- Describe the methods used to bypass and correct inoperable startup sequences.
- Describe the sequence of events associated with the configuration during bootup.
- Load driver software for any devices added to the system.

Unit IX   [Unit Basic Desktop Operating Systems] [Supports Course SLO #, 3]
Learning Objectives
The student will be able to:
- Install and upgrade the latest desktop operating systems.
- Describe the bootup sequence.
- Navigate through the operating systems, including the Internet Explorer or equivalent.
- Explain the structure of operating systems.
- List the core files in the various operating systems structures.
- Identify the components of the Registry structure.

- Install and access printers
- Install and access software applications.
- Install and configure hardware devices and drivers.
- Install and configure local area networking functions.
  - Install and configure wide area networking and Internet.

Unit IX   [Unit Advanced Desktop Operating Systems] [Supports Course SLO # 2, 3]
Learning Objectives
The student will be able to:
- Identify the procedures for installing OS and bringing the software to a basic operational level.
- Identify the basic OS boot/startup sequences and alternative ways to boot the system software.
- Identify the steps to create a Startup Disk with helpful utilities installed.
- Identify the procedures for loading/adding device drivers and the necessary software of devices in an operating system.
- Identify procedures for changing options, configuring, and using the printing subsystem.
- Identify the procedures for installing and launching typical applications in system.
- Identify operating system functions, structure, and major system files.
- Describe the major system files, indicating where they are located and how they are used.
- Identify ways of navigating operating systems, and how to acquire needed technical information.
- Describe procedures for locating, accessing, and retrieving information.
- Identify basic concepts and procedures for creating and managing files and folders.
- Identify the local area networking capabilities.
- Describe procedures for connecting to the network.
- Describe procedures for sharing disk drives, and print and file services.
- Identify concepts and capabilities relating to the Internet.
- Describe basic procedures for setting up Internet access.

Unit XI   [Unit Hardware Troubleshooting] [Supports Course SLO # 1, 2, 3, 8]
Learning Objectives
The student will be able to:
- Describe the characteristics of a good workspace.
- Outline steps for using a digital multimeter to perform voltage, resistance, and current checks on a system, as well as identify common DMM tests associated with personal computers.
- List preliminary steps for diagnosing computer problems.
- Perform visual inspections of a system.
- Describe the three general categories of problems into which symptoms can be grouped, and differentiate between them.
- Differentiate between software- and hardware-based troubleshooting.
- Use disk-based diagnostic tools to isolate system problems.
- Describe the function of a POST card.
- Describe quick checks used to determine the nature of system hardware problems.
- Describe FRU-level troubleshooting.
- Describe the steps for isolating power supply problems.
- Outline checks to isolate problems that produce a dead system.
- Discuss the methods of dealing with symptoms not defined well enough to point to a particular component.

Unit XII   [Unit OS Troubleshooting] [Supports Course SLO # 6, 7, 8]
Learning Objectives
The student will be able to:
- Identify and solve Setup problems.
- Locate and solve startup problems.
- Locate and solve operational problems.
- Describe system tools, disk management tools, and TCP/IP tools.
- Use the Policy Editor to change policy settings.
- Use the various Safe Mode startup scenarios.
- Use the Automated System Recovery and System Restore functions.
- Use log files to determine the location of operating system problems.
- Employ Microsoft On-line Help utilities.

Unit XIII   [Unit Preventative Maintenance] [Supports Course SLO # 3. 6, 7, 8]
Learning Objectives
The student will be able to:
- Demonstrate proper cleaning procedures for various system components.
- Describe electrostatic discharge hazards and methods of preventing ESD.
- List the steps for proper IC handling.
- Describe the two types of uninterruptible power supplies (UPS) and state their qualities.
- State typical precautions to observe when working on computer equipment.
- Perform generic preventative maintenance routines as required (remove excess toner, defragment hard drives, create backup copies).
- Detail routine preventative maintenance procedures as they apply to hard and floppy disks.
- Perform basic disk management functions on a hard drive, including using ScanDisk, CHKDSK, and Defrag utilities.
- Use backup software to create backups of important data.
- Use software utilities to identify and remove viruses from computer systems.
- List precautionary steps taken when handling floppy disks.
- List steps to clean dot matrix, ink-jet, or laser printer.
- Differentiate between various UPS specifications and state how they apply to a given situation.
- Prepare for certification exams.

Evaluation of student learning: [Evaluates SLOs #1, 2, 3, 4, 7]

Students' achievement of the course objectives will be evaluated through the use of the following:

- TESTOut Lab assignments assessing students' computer hardware comprehension skills related to the unit objectives.
- TESTOut Lab Chapter quizzes assessing students' comprehension of software computer concepts related to the unit objectives.
- Research and Final Research presentation assessing students' comprehension through the use of word, PowerPoint and graphics to demonstrate knowledge,
- Basic programming Labs and Quizzes assignments assessing students' basic comprehension of hardware functions and skills related to the unit objectives.
- Exams and Final Research Presentation assessing students' comprehension of computer concepts and applications related to the unit objectives.

Grade Criteria

Item	Percent	Description
TESTOut Labs	10%	Activity-based lab Assignment in Excel
TESTOut Quizzes	10%	15 Question quiz for each unit of Computer Concepts
Exams	35%	3 Assignment based on your IT Topics leading to the final project
Final Research Presentation	45%	Professional Presentation