SAN DIEGO COMMUNITY COLLEGE DISTRICT
CONTINUING EDUCATION
COURSE OUTLINE

## SECTION I

SUBJECT AREA AND COURSE NUMBER

COMP 612

COURSE TITLE

HARDWARE SERVICE TECHNICIAN

TYPE COURSE

NON-FEE                                           VOCATIONAL

CATALOG COURSE DESCRIPTION

This course presents fundamentals in computer theory, maintaining and managing PCs, hardware and software concepts including command line language, and various peripherals. Students will learn through lecture and hands-on application, to effectively use diagnostic tools, troubleshoot and repair computer malfunctions. This course will provide students with the knowledge and skills necessary for an entry-level PC technician. (FT)

LECTURE HOURS                                     LABORATORY HOURS

     54                                                   105

ADVISORIES

COMP 610 or equivalent

RECOMMENDED SKILL LEVEL

10th grade reading level; ability to communicate effectively in the English language; knowledge of math concepts at the 10th grade level; normal color presentation, and above average manual dexterity.

INSTITUTIONAL STUDENT LEARNING OUTCOMES

1. Social Responsibility
   SDCE students demonstrate interpersonal skills by learning and working cooperatively in a diverse environment.
2. Effective Communication
   SDCE students demonstrate effective communication skills.

## INSTITUTIONAL STUDENT LEARNING OUTCOMES (CONTINUED)

3. Critical Thinking
   SDCE students critically process information, make decisions, and solve problems independently or cooperatively.
4. Personal and Professional Development
   SDCE students pursue short term and life-long learning goals, mastering necessary skills and using resource management and self-advocacy skills to cope with changing situations in their lives.

## COURSE GOALS

This course will provide instruction in the diagnosis, troubleshooting and upgrading of computers. Students will learn basic computer and network terminology, the identification and function of key components of a CPU and peripherals and to install and configure a computer and peripherals. Students who successfully complete this course will be prepared to take the A+ Certification Examination.

## COURSE OBJECTIVES

Upon successful completion of this course, students will demonstrate through theory and practical application, problem solving, critical thinking, written and oral communication, and mathematical ability the skills necessary to:

1. Correctly use various test instruments.
2. Assemble and disassemble a computer system.
3. Use diagnostic software to interpret and solve software and hardware malfunctions.
4. Demonstrate the use of command line language.
5. Exhibit the ability to use operating systems.
6. Understand and communicate technical terms orally and in writing.
7. Configure a computer system.
8. Identify and demonstrate the use of troubleshooting peripheral devices associated with a computer system.
9. Describe and manage memory.
10. Demonstrate a basic knowledge of installing, maintaining, and troubleshooting various operating systems.
11. Demonstrate a basic knowledge of networking and the internet.
12. Demonstrate a basic knowledge of multimedia technology.
13. Demonstrate the ability to understand, troubleshoot, and communicate using communication media.
14. Demonstrate professional ethics, personal integrity, good business practices and customer relation's skills.

## SECTION II

## COURSE CONTENT AND SCOPE

The following topics may be included in the framework of the course but are not intended as limits on content.  The order of presentation and relative emphasis may vary with each instructor.

1. Safety And Preventive Maintenance
   1.1. Identify the purpose of various types of preventive maintenance products and procedures and when to use them
      1.1.1. Liquid cleaning compounds
      1.1.2. Types of materials to clean contacts and connections
      1.1.3. Non-static vacuums (chassis, power supplies, fans)
   1.2. Identify issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace
      1.2.1. UPS (uninterruptible power supply) and suppressors
      1.2.2. Determining the signs of power issues
      1.2.3. Proper methods of storage of components for future use
   1.3. Potential hazards and proper safety procedures relating to lasers
      1.3.1. High-voltage equipment
      1.3.2. Power supply
      1.3.3. CRT
   1.4. Special disposal procedures that comply with environmental guidelines
      1.4.1. Batteries
      1.4.2. CRTs
      1.4.3. Toner kits/cartridges
      1.4.4. Chemical solvents and cans
      1.4.5. MSDS (material safety data sheet)
   1.5. ESD (electrostatic discharge) precautions and procedures
      1.5.1. What ESD can do, how it may be apparent, or hidden
      1.5.2. Common ESD protection devices
      1.5.3. Situations that could present a danger or hazard
2. Installation, Configuration, and Upgrading
   2.1. Identify basic terms, concepts, and functions of system modules, including how each module should work during normal operation and during the boot process

   2.2. Examples of concepts and modules
      2.2.1. Systems board
      2.2.2. Power supply
      2.2.3. Processor/CPU
      2.2.4. Memory
      2.2.5. Storage devices
      2.2.6. Display
      2.2.7. Modem
      2.2.8. Firmware
      2.2.9. BIOS
      2.2.10. CMOS
      2.2.11. LCD (portable systems)

COURSE CONTENT AND SCOPE (CONTINUED)

        2.2.12.  Ports
- 2.3. Identify basic procedures for adding and removing field replaceable modules for both desktop and portable system
- 2.4. Examples of modules
  - 2.4.1. System board
  - 2.4.2. Storage device
  - 2.4.3. Power supply
  - 2.4.4. Processor/CPU
  - 2.4.5. Memory
  - 2.4.6. Input devices
  - 2.4.7. Internal Storage
  - 2.4.8. Keyboard
  - 2.4.9. Video board
  - 2.4.10. Mouse
  - 2.4.11. Network interface card (NIC)
- 2.5. Portable system components
  - 2.5.1. AC adapter
  - 2.5.2. Digital camera
  - 2.5.3. DC controller
  - 2.5.4. LCD panel
  - 2.5.5. PC card
  - 2.5.6. Pointing devices
- 2.6. Identify available IRQs, DMAs, and I/O addresses and procedures for device installation and configuration
  - 2.6.1. Standard IRQ settings
  - 2.6.2. Modems
  - 2.6.3. Floppy drive controllers
  - 2.6.4. Hard drive controllers
  - 2.6.5. USB ports
  - 2.6.6. Infrared ports
  - 2.6.7. Hexadecimal/addresses
- 2.7. Identify common peripheral ports, associated cabling, and their connectors
  - 2.7.1. Cable types
  - 2.7.2. Cable orientation
  - 2.7.3. Serial versus parallel
  - 2.7.4. Pin connections
- 2.8. Examples of types of connectors
  - 2.8.1. DB-9
  - 2.8.2. DB-25
  - 2.8.3. RJ-11
  - 2.8.4. RF-45
  - 2.8.5. BNC
  - 2.8.6. PS2/MINI-DIN
  - 2.8.7. USB
  - 2.8.8. IEEE 1394

COURSE CONTENT AND SCOPE (CONTINUED)

2.9. Identify proper procedures for installing and configuring IDE/EIDE devices
2.9.1. Master/slave
2.9.2. Devices per channel
2.9.3. Primary/secondary
2.10. Identify proper procedures for installing and configuring SCSI (small computer systems interface) devices
2.10.1. Address/termination conflicts
2.10.2. Cabling
2.10.3. Types (example: regular, wide, ultra-wide)
2.10.4. Internal versus external
2.10.5. Expansion slots
2.10.6. Jumper block settings (binary equivalents)
2.11. Identify proper procedures for installing and configuring peripheral devices
2.11.1. Display/video card
2.11.2. Modem
2.11.3. USB peripherals and hubs
2.11.4. IEEE 1284
2.11.5. IEEE1394
2.11.6. External storage
2.11.7. Docking stations
2.11.8. PC cards
2.11.9. Port replicators
2.11.10. Infrared devices
2.12. Identify hardware methods of upgrading system performance, procedures for replacing basic subsystem components, unique components and when to use them
2.12.1. Memory
2.12.2. Internal Storage
2.12.3. CPU
2.12.4. Upgrading BIOS
2.12.5. When to upgrade BIOS
2.13. Portable systems
2.13.1. Battery
2.13.2. Internal Storage
2.13.3. Types I, II, III cards
3. Diagnosing and Troubleshooting
3.1. Identify symptoms and problems associated with each module and how to troubleshoot and isolate the problems
3.1.1. Processor/memory symptoms
3.1.2. Mouse
3.1.3. Floppy drive
3.1.4. Parallel ports
3.1.5. Internal Storage
3.1.6. CD/DVD drive (compact disk/digital versatile disk)
3.1.7. Sound card/audio
3.1.8. Display/video
3.1.9. Motherboards
3.1.10. Modems

COURSE CONTENT AND SCOPE (CONTINUED)

        3.1.11.  BIOS (basic input/output system)
        3.1.12.  USB
        3.1.13.  NIC (network interface card)
        3.1.14.  CMOS
        3.1.15.  Power supply
        3.1.16.  Slot covers
        3.1.17.  POST audible/visual error codes
        3.1.18.  Troubleshooting tools, e.g., multimeter
        3.1.19.  Large LBA, LBA
        3.1.20.  Cables
        3.1.21.  Keyboard
        3.1.22.  Peripherals
    3.2.  Identify basic troubleshooting procedures and how to elicit problem symptoms from customers
        3.2.1.  Troubleshooting/isolation/problem determination procedures
        3.2.2.  Determine whether hardware or software problem
        3.2.3.  Gather information from user regarding, e.g.
        3.2.4.  Customer environment
        3.2.5.  Symptoms/error codes
        3.2.6.  Situation when the problem occurred
4.  Motherboard/Processors/Memory
    4.1.  Distinguish between the popular CPU chips in terms of their basic characteristics
        4.1.1.  Popular CPU chips
        4.1.2.  Characteristics
        4.1.3.  Physical size
        4.1.4.  Voltage
        4.1.5.  Speeds
        4.1.6.  On board cache
        4.1.7.  Sockets
        4.1.8.  SEC (single edge contact)
    4.2.  Identify the categories of RAM (random access memory) terminology, their locations, and physical characteristics
        4.2.1.  Terminology
        4.2.2.  EDO RAM (extended data output RAM)
        4.2.3.  DRAM (dynamic random access memory)
        4.2.4.  SRAM (static RAM)
        4.2.5.  RIMM (rambus inline memory module 184 pin)
        4.2.6.  VRAM (video RAM)
        4.2.7.  SDRAM (synchronous eynamic RAM)
        4.2.8.  WRAM (windows accelerator card RAM)
        4.2.9.  Locations and physical characteristics
        4.2.10.  Memory bank
        4.2.11.  Memory chips (8-bit, 16-bit, and 32-bit)
        4.2.12.  SIMMS (single in-line memory module)
        4.2.13.  DIMMS (dual in-line memory module)
        4.2.14.  Parity chips versus non-parity chips

COURSE CONTENT AND SCOPE (CONTINUED)

    4.3.   Identify the most popular type of motherboards, their components, and their architecture (bus structures and power supplies)

        4.3.1.   Types of motherboards

        4.3.2.   Components

        4.3.3.   Communication ports

        4.3.4.   Memory types

        4.3.5.   Processor sockets

        4.3.6.   Cache memory

        4.3.7.   Bus architecture

        4.3.8.   Bus types

        4.3.9.   Other architecture types

    4.4.   Identify the purpose of CMOS (complementary metal-oxide semiconductor), what it contains and how to change its basic parameters

    4.5.   Example basic CMOS settings

        4.5.1.   Printer parallel port-uni., bi-directional, disable/enable, ECP, EPP

        4.5.2.   COM/serial port-memory address, interrupt request, disable

        4.5.3.   Floppy drive-enable/disable drive or boot, speed, density

        4.5.4.   Internal storage size and type

        4.5.5.   Memory-parity, non-parity

        4.5.6.   Boot sequence

        4.5.7.   Date/time

        4.5.8.   Passwords

        4.5.9.   Plug & play BIOS

5.   Printers

    5.1.   Identify basic concepts, printer operations and printer components

        5.1.1.   Paper feeder mechanisms

        5.1.2.   Types of printers

        5.1.3.   Laser

        5.1.4.   Inkjet

        5.1.5.   Dot matrix

        5.1.6.   Types of printer connections and configurations

        5.1.7.   Parallel

        5.1.8.   Network

        5.1.9.   USB

        5.1.10.  Infrared

        5.1.11.  Serial

    5.2.   Identify care and service techniques and common problems with primary printer types

        5.2.1.   Feed and output

        5.2.2.   Errors (printed or displayed)

        5.2.3.   Paper jam

        5.2.4.   Print quality

        5.2.5.   Safety precautions

        5.2.6.   Preventive maintenance

COURSE CONTENT AND SCOPE (CONTINUED)

6.  Networking
    6.1.  Identify basic networking concepts, including how a network works and the ramifications of repairs on the network
        6.1.1.  Installing and configuring network cards
        6.1.2.  Network access
        6.1.3.  Full-duplex, half-duplex
        6.1.4.  Cabling-twisted pair, coaxial, fiber optic, RS-232
        6.1.5.  Ways to network a PC
        6.1.6.  Physical network topographies
        6.1.7.  Increasing bandwidth
        6.1.8.  Loss of data
        6.1.9.  Network slowdown
        6.1.10.  Infrared
        6.1.11.  Hardware protocols
        6.1.12.  Wireless

APPROPRIATE READINGS

Appropriate readings may include, but are not limited to, periodicals, magazines, instructor-written materials, manuals, appropriate web resources, and other publications related to computer repair.

WRITING ASSIGNMENTS

Appropriate writing assignments may include, but are not limited to, preparing text for an assigned project, keeping a journal on all laboratory and project work, completing all assigned reports, performing mathematic calculations as assigned, completing all written assignments.

OUTSIDE ASSIGNMENTS

Outside assignments may include, but are not limited to, reading texts, reference resources or handouts, internet sites, and research as needed to complete projects, and organizing and preparing written answers to assigned questions.

APPROPRIATE ASSIGNMENTS THAT DEMONSTRATE CRITICAL THINKING

Assignments which demonstrate critical thinking may include, but are not limited to, analysis and evaluation of reading assigned text and eLearning materials and utilizing this analysis in classroom discussions, writing assignments, and in performing laboratory activities.  Students must select and use appropriate methods and materials needed to complete laboratory assignments.

EVALUATION

A student's grade will be based on multiple measures of performance.  The assessment will measure development of independent critical thinking skills and will include evaluation of student's ability to:

1.  Demonstrate skills related to A+ certification objectives.
2.  Apply theory to laboratory assignments.
3.  Successfully complete written, oral, or practical examinations.
4.  Contribute to class discussions.
5.  Maintain attendance per current policy.

Satisfactory completion of the course requires completion of a culminating activity, which may include, but not be limited to, one of the following:

1.  Written report.
2.  Classroom presentation.
3.  Research project.
4.  Industry involvement.
5.  Skills based assessments.

The culminating activity will require the student to use the new skills that he/she has acquired during the course.

Upon successful completion of each individual course a Certificate of Course Completion will be issued.  Upon successful completion of all courses included in the program a Certificate of Program Completion will be issued.

METHOD OF INSTRUCTION

Methods of instruction will include, but not be limited to, lecture, self-paced lab, demonstration, individualized study, use of multimedia materials, group/team work, tutorials, and other unique instruction requirements, such as outside assignments, field trips, and guided student assignments.  This course, or sections of this course, may be offered through distance education.

TEXTS AND SUPPLIES

Texts:
*Complete Guide to A+ Certification,* Course Technology*, current edition

URLs:
www.comptia.org
www.tomshardware.com
www.totalsem.com/

PREPARED BY:  Nancy Seamster & Cynthia Scott                    DATE _____10/2/01_____

DATA REVISED BY:   Don Aragon, Maria Reyes                    DATE  February 2007

DATA REVISED BY  Instructional Services/SLO's Added          DATE     May 30, 2013

REVISED BY  Richard Gholson_____          DATE      May 5, 2015

REVISED BY  Richard Gholson_____          DATE  September 10,2015


Instructors must meet all requirements stated in Policy 3100 (Student Rights, Responsibilities and Administrative Due Process), and the Attendance Policy set forth in the Continuing Education Catalog.


REFERENCES:

San Diego Community College District Policy 3100
California Community Colleges, Title 5, Section 55002
Continuing Education Catalog