

**Florida Department of Education  
CURRICULUM FRAMEWORK**

**Program Title:** Computer Engineering Technology  
**Occupational Area:** Industrial Education

	<u>PSV</u>
CIP Number	0615040200 (AAS) 1615040200 (AS)
Grade Level	College Credits
Length	AS/AAS Degree
SOC	15-1090
Certification	

- I. **MAJOR CONCEPTS/CONTENT:** This program is designed to prepare students for employment as computer engineering technicians and in related occupations in electronics or to provide supplemental training for persons currently or previously employed in these occupations.

Electronic Technology and/or Electronic Engineering Technology (CORE) are prerequisites for entry into this electronic specialization program. The CORE program prepares individuals to assemble, install, operate, maintain, troubleshoot and repair electronic equipment used in industry. In addition, it also includes content related to the design, theory, and analysis of electronic systems and applications.

This specialization content includes, but is not limited to, computer systems architecture, software, communications, programming and analysis and design of computer systems.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Computer Engineering industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

- II. **LABORATORY ACTIVITIES:** Electronic laboratory activities are an integral part of this program. The tools, test equipment, materials and processes used in this laboratory are similar to those used in industry. Students should be able to use the various types of precision test equipment found in general use throughout the electronics industry for the purpose of analyzing, troubleshooting and repairing computer circuitry.
- III. **SPECIAL NOTE:** The Vocational Industrial Clubs of America, Inc., is the appropriate vocational student organization for providing leadership training and for reinforcing specific vocational skills. Vocational Student Organizations, when provided, shall be an integral part of the vocational instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC.

This general education requirement must have a minimum of 15 semester hours with at least one course in oral and written communication and one course in computational skills. The computational skills should include algebra and trigonometry.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

To be transferable statewide between institutions, this program/course must have been reviewed, and a "transfer value" assigned the curriculum content by the appropriate Statewide Course Numbering System discipline committee. This does not preclude institutions from developing specific program or course articulation agreements with each other.

When content from the Florida common core electronics program (Electronics Technology) is included, the typical length of this program for the average achieving student is an Associate Degree.

IV. **INTENDED OUTCOMES:** After successfully completing the program, the student will be able to:

- 01.0 Demonstrate proficiency in computer systems architecture.
- 02.0 Demonstrate proficiency in software fundamentals.
- 03.0 Demonstrate proficiency in communication interfacing.
- 04.0 Demonstrate proficiency in peripheral equipment.
- 05.0 Demonstrate proficiency in customer site requirements and considerations.
- 06.0 Demonstrate proficiency in customer relations.
- 07.0 Demonstrate proficiency with high-level computer programming languages.
- 08.0 Demonstrate proficiency in computer networking techniques.
- 09.0 Demonstrate proficiency in the use of microcomputer disk operating system services and functions.
- 10.0 Demonstrate proficiency in analysis and design of data communications systems.
- 11.0 Demonstrate proficiency in the analysis and design of peripheral equipment used in computer systems.
- 12.0 Demonstrate appropriate communication skills.
- 13.0 Demonstrate appropriate math skills.
- 14.0 Demonstrate appropriate understanding of basic science.
- 15.0 Demonstrate employability skills.
- 16.0 Demonstrate an understanding of entrepreneurship.

Florida Department of Education  
STUDENT PERFORMANCE STANDARDS

**Program Title:** Computer Engineering Technology  
**Secondary Number:**  
**Postsecondary Number:** 0615.040200

01.0 DEMONSTRATE PROFICIENCY IN COMPUTER SYSTEMS ARCHITECTURE--The student will be able to:

- 01.01 Draw and explain systems configurations in block detail.
- 01.02 Interpret computer acronyms.
- 01.03 Identify and define priorities and interrupts at system level.
- 01.04 Define and list direct memory access handling systems.
- 01.05 Define functions of advanced memory techniques (e.g. virtual, pipeline, cache).
- 01.06 Troubleshoot a microcomputer system.

02.0 DEMONSTRATE PROFICIENCY IN SOFTWARE FUNDAMENTALS--The student will be able to:

- 02.01 Load and run operating system software.
- 02.02 Load and run diagnostic software and utilities.
- 02.03 Construct flow charts.
- 02.04 Analyze flow charts.
- 02.05 Identify and define computer languages and their uses.
- 02.06 Write a simple computer program in BASIC.
- 02.07 Read a PROM.
- 02.08 Erase and program an EPROM.
- 02.09 Analyze firmware concepts.
- 02.10 Troubleshoot firmware using defined hardware.
- 02.11 Analyze firmware writing concepts.

03.0 DEMONSTRATE PROFICIENCY IN COMMUNICATION INTERFACING--The student will be able to:

- 03.01 Identify and define serial and parallel interface standards.
- 03.02 Identify, define and configure sync and async devices.
- 03.03 Demonstrate the use of interface devices.
- 03.04 Identify and define networking levels.
- 03.05 Identify and define protocols.
- 03.06 Troubleshoot and repair network systems.
- 03.07 Identify and define multiuser systems.

04.0 DEMONSTRATE PROFICIENCY IN PERIPHERAL EQUIPMENT--The student will be able to:

- 04.01 Install, analyze and troubleshoot interface controllers.
- 04.02 Install, analyze and troubleshoot display terminals.
- 04.03 Install, analyze and troubleshoot printer.
- 04.04 Install, analyze and troubleshoot magnetic tape equipment.
- 04.05 Install, analyze and troubleshoot disk drive equipment.
- 04.06 Define environmental requirements for peripherals and media.

- 05.0 DEMONSTRATE PROFICIENCY IN CUSTOMER SITE REQUIREMENTS AND CONSIDERATIONS--The student will be able to:
- 05.01 Apply effective customer relations.
  - 05.01 Follow installation procedures.
  - 05.02 Calculate and determine power requirements.
  - 05.03 Calculate and determine environmental requirements.
  - 05.04 List and perform preventative maintenance techniques and requirements.
- 06.0 DEMONSTRATE PROFICIENCY IN CUSTOMER RELATIONS--The student will be able to:
- 06.01 Describe effective listening techniques.
  - 06.02 Describe techniques for instilling customer confidence.
  - 06.03 Describe techniques for keeping the customer informed.
  - 06.04 Demonstrate proper follow-up techniques.
- 07.0 DEMONSTRATE PROFICIENCY WITH HIGH-LEVEL COMPUTER PROGRAMMING LANGUAGES--The student will be able to:
- 07.01 Write a technical program in a high-level programming language (e.g. Fortran, Cobol, Basic, C) and associated system level concepts.
  - 07.02 Identify and define associated system level concepts.
  - 07.03 Apply structured programming such as loop structures, sorting techniques, data structures and arithmetic operations.
- 08.0 DEMONSTRATE PROFICIENCY IN COMPUTER NETWORKING TECHNIQUES--The student will be able to:
- 08.01 Identify and define computer networking techniques.
  - 08.02 Design a system using hardware and software communication protocols.
  - 08.03 Apply management techniques for network software.
- 09.0 DEMONSTRATE PROFICIENCY IN THE USE OF MICROCOMPUTER DISK OPERATING SYSTEM SERVICES AND FUNCTIONS--The student will be able to:
- 09.01 Describe the historical development of computer operating systems.
  - 09.02 Describe the major hardware and related software subsystems of microcomputer DOS (Disk Operating System).
  - 09.03 Describe various disk formats.
  - 09.04 Program using assembly language to access the ROM-BIOS (Read-Only Memory-Basic Input/Output System) feature for peripheral control and serial communications.
  - 09.05 Describe the extended services of enhanced systems.
  - 09.06 Describe design decisions involved in implementing Input/Output (I/O) interfacing using interrupts.
  - 09.07 Program using assembly language to implement I/O device interfacing using interrupts.
  - 09.08 Program using the extended DOS functions.
  - 09.09 Analyze and design software systems using ROM-BIOS, DOS functions and interrupts for use in a multiplexed analog to digital system.
  - 09.10 Analyze and design software systems using ROM-BIOS functions and interrupts for use in a synchronous digital data system.

10.0 DEMONSTRATE PROFICIENCY IN ANALYSIS AND DESIGN OF DATA COMMUNICATIONS SYSTEMS--The student will be able to:

- 10.01 Describe the different types of digital data communications systems.
- 10.02 Describe data formats and transmission rates in serial data communications systems.
- 10.03 Design the connections and programming for a UART (Universal Asynchronous/Synchronous Receiver Transmitter) in a microprocessor-based system.
- 10.04 Identify and define available options for integration of a display terminal in a data communication system.
- 10.05 Identify and define communication signals and protocol for MODEM (Modulator Demodulator) links.
- 10.06 Apply digital modulation techniques including PAM (Pulse-Amplitude Modulation), PCM (Pulse-Code Modulation), PWM (Pulse-Width Modulation) and delta modulation.
- 10.07 Analyze and design circuits for generation and detection of digital modulation.
- 10.08 Apply error detection and correction in digital communication systems.
- 10.09 Define communication protocols.
- 10.10 Design and apply multiplexing techniques for computer.

11.0 DEMONSTRATE PROFICIENCY IN THE ANALYSIS AND DESIGN OF PERIPHERAL EQUIPMENT USED IN COMPUTER SYSTEMS--The student will be able to:

- 11.01 Design and analyze circuits used in various functions of video display systems.
- 11.02 Analyze various types of disk drives and disk drive controllers.
- 11.03 Analyze various types of printers and plotters and their related interface controllers.
- 11.04 Analyze and design circuits for sweep generation and synchronization in a CRT (Cathode-Ray Tube) display.
- 11.05 Describe the use of RAM (Random-Access Memory) and ROM (Read-Only Memory) for font generation in video display systems.
- 11.06 Design the serial communication interface in a video.
- 11.07 Modulation and interval timing techniques.
- 11.08 Pointing devices for computer systems.
- 11.09 Analyze the operation of mechanical and optical pointing devices used in computer systems.
- 11.10 Describe the functions of the major blocks in a dot matrix printer.
- 11.11 Analyze and design circuits to communicate using a standard Centronics parallel interface in a printer.
- 11.12 Describe the main functional blocks of a roller bed plotter.
- 11.13 Analyze and design subsystems including interfaces for use in a roller bed plotter.

12.0 DEMONSTRATE APPROPRIATE COMMUNICATION SKILLS--The student will be able to:

- 12.01 Write logical and understandable statements, or phrases, to accurately fill out forms/invoices commonly used in business and industry.
- 12.02 Read and understand graphs, charts, diagrams, and tables commonly used in this industry/occupation area.
- 12.03 Read and follow written and oral instructions.
- 12.04 Answer and ask questions coherently and concisely.

- 12.05 Read critically by recognizing assumptions and implications and by evaluating ideas.
- 12.06 Demonstrate appropriate telephone/communication skills.
- 13.0 DEMONSTRATE APPROPRIATE MATH SKILLS--The student will be able to:
  - 13.01 Solve problems for volume, weight, area, circumference and perimeter measurements for rectangles, squares, and cylinders.
  - 13.02 Measure tolerance(s) on horizontal and vertical surfaces using millimeters, centimeters, feet and inches.
  - 13.03 Add, subtract, multiply and divide using fractions, decimals, and whole numbers.
  - 13.04 Determine the correct purchase price, to include sales tax for a materials list containing a minimum of six items.
  - 13.05 Demonstrate an understanding of federal, state and local taxes and their computation.
- 14.0 DEMONSTRATE APPROPRIATE UNDERSTANDING OF BASIC SCIENCE--The student will be able to:
  - 14.01 Understand molecular action as a result of temperature extremes, chemical reaction, and moisture content.
  - 14.02 Draw conclusions or make inferences from data.
  - 14.03 Identify health related problems which may result from exposure to work related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
  - 14.04 Understand pressure measurement in terms of P.S.I., inches of mercury, and K.P.A.
- 15.0 DEMONSTRATE EMPLOYABILITY SKILLS--The student will be able to:
  - 15.01 Conduct a job search.
  - 15.02 Secure information about a job.
  - 15.03 Identify documents which may be required when applying for a job interview.
  - 15.04 Complete a job application form correctly.
  - 15.05 Demonstrate competence in job interview techniques.
  - 15.06 Identify or demonstrate appropriate responses to criticism from employer, supervisor or other employees.
  - 15.07 Identify acceptable work habits.
  - 15.08 Demonstrate knowledge of how to make appropriate job changes.
  - 15.09 Demonstrate acceptable employee health habits.
  - 15.10 Demonstrate a knowledge of the "Florida Right-To-Know Law" as recorded in Florida Statutes Chapter 442.
- 16.0 DEMONSTRATE AN UNDERSTANDING OF ENTREPRENEURSHIP--The student will be able to:
  - 16.01 Identify characteristics of the American enterprise system.
  - 16.02 Define inflation and deflation.
  - 16.03 Illustrate the basic economic questions facing any society.
  - 16.04 Determine the results of a change in demand or a change in supply.
  - 16.05 List factors which contribute to economic growth.
  - 16.06 Identify characteristics of different types of business ownership.
  - 16.07 Choose appropriate action in a situation requiring application of business ethics.