July 2007

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title:	Electronics Technology
Occupational Area:	Technology Education
Program Numbers:	8600900
CIP Number:	0821.010400
Grade Level:	Secondary 9-12, & 30, 31
Standard Length:	3 Credits
Facility Design Code:	241, Related 808, 850, 852
CTSO:	Florida Technology Student Association (FL-TSA)
Certification:	INDUS ARTS @4 @6 I ART-TEC 1 @2 ELECTRONIC @7G ELECTRICAL @4 @7G TEC ELEC @7G GEN SHOP @4 ENG 7G

I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to provide students with a foundation of knowledge and technically oriented experiences in the study of electronics technology. This program focuses on transferable skills and stresses understanding and demonstration of the technological tools, machines, instruments, materials, processes and systems in business and industry.

The content includes, but is not limited to, the theory, use, and technical application of electronics technology. The content and activities will also include the study of entrepreneurship, safety, and leadership skills.

Listed below are the courses that make up this program. Design code 241 is the appropriate laboratory facility for this program.

8600910 - Electronics Technology I
8600920 - Electronics Technology II
8600930 - Electronics Technology III

II. **LABORATORY ACTIVITIES:** Instruction and learning activities are provided in a laboratory setting using hands-on experiences with the tools and materials appropriate to the course content.

III. **SPECIAL NOTE:** The Florida Technology Student Association (FL-TSA) is the appropriate Career Student Organization for providing leadership training experiences and reinforcing specific career skills. Career Student Organizations, shall be an integral part of the career instructional program, and the activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, FAC. FL-TSA information can be obtained from the web site at <http://www.floridatsa.com>.

Advanced Applications in Technology (AAiT) - course number 8601900 is appropriate to be used for content area continuation in this program after all three credits of this program have been completed. The purpose of this course is to provide students with the opportunity to develop a school based project from "vision" to "reality". Working in teams to design, engineer, manufacture, construct, test, redesign, test again; and then produce a finished "project". This would involve using ALL the knowledge previously learned, not only in Technology Education

but also across the curriculum. See the (AAiT) framework for more information.

Work-Based Experience (WBE) - course number 8601800 is the appropriate course to provide Technology Education students with the opportunity, as Student Learners, to gain real world practical, first-hand exposure in broad occupational clusters or industry sectors through a structured, compensated or uncompensated experience. Work-Based Experience is also designed to give the Student Learners an opportunity to apply and integrate the knowledge, skills, and abilities acquired during their School-Based Experience to actual work situations independent of school facilities. At least one credit of a Technology Education program consisting of three credits must be completed before enrolling in WBE. See the (WBE) framework for more information.

The Intermediate and Advanced courses in this program may articulate into post-secondary Tech-Prep 2 + 2 programs when taken in sequence. Tech-Prep 2 + 2 programs require articulation agreements between secondary and post-secondary educational agencies.

Course substitutions as defined in the Comprehensive Course Table for this program area may be used to qualify a student for Florida's Gold Seal Vocational Scholarship, providing all other eligibility requirements are met. The comprehensive course table requirements are available online at <http://nwrdc.fsu.edu/fnbpcm02>. Gold Seal Vocational Scholarship requirements are available online at <http://www.myfloridaeducation.com/brfuture/gsvrequire.htm>.

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify and request such services. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

The student should demonstrate an understanding of prior grade specific knowledge covered in the national *Standards for Technological Literacy** (STL) and the Florida *Sunshine State Standards*. Benchmarks followed by a reference code indicate alignment with one or both of these documents.

* *Standards for Technological Literacy: Content for the Study of Technology*. Copyright 2000 by the International Technology Education Association. Reston, VA.

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

TECHNOLOGICAL LITERACY STANDARDS

01.0 Demonstrate an understanding of the characteristics and scope of technology.
02.0 Demonstrate an understanding of the core concepts of technology.
03.0 Demonstrate an understanding of the cultural, social, economic, and political effects of technology.

04.0 Demonstrate an understanding of the influence of technology on history.
05.0 Demonstrate an understanding of the attributes of design.
06.0 Demonstrate an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
07.0 Demonstrate the abilities to apply the design process.
08.0 Demonstrate the abilities to use and maintain technological products and systems.
09.0 Demonstrate the abilities to assess the impact of products and systems.
10.0 Demonstrate an understanding of and be able to select and use energy and power technologies.
11.0 Demonstrate an understanding of and be able to select and use information and communication technologies.

TECHNICAL CONTENT STANDARDS

12.0 Demonstrate safe and appropriate use of tools, machines and materials in electronics technology.
13.0 Describe the structure of matter related to electronics.
14.0 Describe, construct, conduct, and analyze experiments with basic DC and AC circuits and with circuits using magnetism.
15.0 Identify, measure, and describe the function of transformers and inductors in electronic circuits.
16.0 Use Ohm's law and Watt's law to analyze and experiment with resistive circuits.
17.0 Describe, construct, analyze, and experiment with capacitive circuits.
18.0 Demonstrate the use of electronic equipment.
19.0 Demonstrate proper electronic assembly methods.
20.0 Demonstrate an understanding of basic electrical circuits and electronic systems.
21.0 Describe and experiment with integrated circuits.
22.0 Demonstrate the use of electronic equipment.
23.0 Describe, conduct, and experiment with circuits using semiconductors.
24.0 Perform advanced study and skills related to electronics technology.
25.0 Demonstrate an understanding of the principles and applications of microcomputer systems.
26.0 Describe, identify, and correct problems in electronic circuits.
27.0 Demonstrate technical knowledge and skills about electronic networks and systems.
28.0 Conduct a research and experimentation project on an electronic system or process.
29.0 Demonstrate an understanding of career opportunities and requirements in the field of electronics technology.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600910
Course Title: Electronics Technology I
Course Credit: 1

COURSE DESCRIPTION: This course provides students with an introduction to the knowledge, human relations, and technical skills of electronics technology.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

01.01 Describe the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
01.02 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

02.01 Identify systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
02.02 Define technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
02.03 Identify resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.04 Identify the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
02.05 Define a management system as the process of planning, organizing, and controlling work. STL.2.EE

03.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

03.01 Identify changes in society caused by the use of technology. STL.4.H
03.02 Describe how the use of technology involves weighing trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4

04.0 DEMONSTRATE AN UNDERSTANDING OF THE INFLUENCE OF TECHNOLOGY ON HISTORY.--The student will be able to:

04.01 Describe how the evolution of civilization has been directly affected by, and has in turn affected, the development and use of tools and materials. STL.7.H, LA.A.1.4, LA.A.2.4, LA.B.2.4, SC.H.3.4, SS.A.2.4
04.02 Describe how technology has been a powerful force in reshaping social, cultural, political, and economic landscapes throughout history. STL.7.I, LA.D.2.4, SS.A.2.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

05.01 Recognize the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
05.02 Describe why design problems are seldom presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4
05.03 Explain why a design must be continually checked and critiqued. STL.8.J, SC.H.1.4
05.04 Give examples of competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

06.01 Define research and development as a specific problem solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace. STL.10.I
06.02 Describe why research is needed to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4
06.03 Explain why some problems have technological solutions while others have non-technological solutions. STL.10.K, SC.H.1.4
06.04 Explain why a multidisciplinary approach is often needed to solve technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

07.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

07.01 Identify the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4
07.02 List criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4
07.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4
07.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4
07.05 Develop a product or system using a design process. STL.11.Q
07.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

08.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

08.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4
08.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M
08.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
08.04 Operate systems so that they function in the way they were designed. STL.12.O
08.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

09.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

09.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
09.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
09.03 Define assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
09.04 Identify forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

10.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

10.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
10.02 Construct a power system having a source of energy, a process, and loads. STL.16.N

11.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

11.01 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
11.02 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N

12.0 DEMONSTRATE SAFE AND APPROPRIATE USE OF TOOLS, MACHINES, AND MATERIALS IN ELECTRONICS TECHNOLOGY.--The student will be able to:

12.01 Select appropriate tools, procedures, and/or equipment.
12.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.
12.03 Follow laboratory safety rules and procedures.

12.04 Demonstrate good housekeeping at workstation within total laboratory.
12.05 Identify color-coding safety standards.
12.06 Explain fire prevention and safety precautions and practices for extinguishing fires.
12.07 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

13.0 DESCRIBE THE STRUCTURE OF MATTER RELATED TO ELECTRONICS.--The student will be able to:

13.01 Describe the composition of elements, mixtures, and compounds according to the electron theory.
13.02 List the atomic subparticles.
13.03 Diagram and show the relationship between electrons, protons, and neutrons.
13.04 State the law of electrical charges.
13.05 Describe the classification and characteristics of materials as they apply to conductor, insulators, and semiconductors.
13.06 Demonstrate proficiency in the identification of electronics symbols.

14.0 DESCRIBE, CONSTRUCT, CONDUCT, AND ANALYZE EXPERIMENTS WITH BASIC DC AND AC CIRCUITS AND WITH CIRCUITS USING MAGNETISM.--The student will be able to:

14.01 Solve math problems related to DC and AC circuits.
14.02 Define voltage, current, resistance, power, and energy.
14.03 Set up and test basic circuits.
14.04 Set up and operate multimeters in DC and AC circuits.
14.05 Set up and operate power supplies in DC circuits.
14.06 Describe magnetism, the law of magnetic poles, and the behavior of flux lines.
14.07 Demonstrate electromagnetism.
14.08 Construct simple circuits using a relay.

15.0 IDENTIFY, MEASURE, AND DESCRIBE THE FUNCTION OF TRANSFORMERS AND INDUCTORS IN ELECTRONIC CIRCUITS.--The student will be able to:

15.01 Explain the theory of operation and application of inductance in inductors and transformers.
15.02 Explain what an inductor is and what its purpose is.
15.03 Construct circuits using transformers and inductors.
15.04 Explain inductive reactance.

16.0 USE OHM'S LAW AND WATT'S LAW TO ANALYZE AND EXPERIMENT WITH RESISTIVE CIRCUITS.--The student will be able to:

16.01 Identify resistors by color code.
16.02 Identify and measure resistors.
16.03 Apply Ohm's law to circuits.
16.04 Explain how resistors are constructed.
16.05 Apply Watt's law to circuits.
16.06 Identify different types of resistors, and explain their use and ratings.

17.0 DESCRIBE, CONSTRUCT, ANALYZE AND EXPERIMENT WITH CAPACITIVE CIRCUITS.--The student will be able to:

17.01 Explain how a capacitor stores electrical energy.
17.02 Explain how a capacitor is constructed.
17.03 Explain capacitive reactance.

18.0 DEMONSTRATE THE USE OF ELECTRONIC EQUIPMENT.--The student will be able to:

18.01 Use a VOM to obtain accurate measurements.
18.02 Apply safety rules in the use of electronic instruments and demonstrate proper care and maintenance for the equipment during storage and use.
18.03 Use voltmeters, ammeters, and ohmmeters to obtain accurate measurements.
18.04 Set up and use an oscilloscope to observe waveforms and to determine the voltage of the signal presented.
18.05 Use signal generators to produce waveforms of selected frequencies and shapes.
18.06 Use testers to determine the condition of electronic components.

19.0 DEMONSTRATE PROPER ELECTRONIC ASSEMBLY METHODS.--The student will be able to:

19.01 Exhibit safe soldering techniques.
19.02 Identify proper soldering practices.
19.03 Demonstrate proper soldering applications.
19.04 Identify common electrical and electronics hand tools.
19.05 Demonstrate electronic component assembly.
19.06 Apply electrical tape to a spliced and soldered wire connection.
19.07 Solder and de-solder components and wires.
19.08 Describe the two methods of making a printed circuit board.

20.0 DEMONSTRATE AN UNDERSTANDING OF BASIC ELECTRICAL CIRCUITS AND ELECTRONIC SYSTEMS.--The student will be able to:

20.01 Identify problems and demonstrate appropriate solutions when dealing with series, series-parallel, parallel, voltage dividers, and network circuits.
20.02 Define electronic systems.
20.03 Describe the importance of electronic systems in today's technology world.
20.04 Define electronics input, process and output of electronic systems.
20.05 Conduct electronic experiments using input, process and output systems.
20.06 Describe, design and conduct experiments with electronic systems.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600920
Course Title: Electronics Technology II
Course Credit: 1

COURSE DESCRIPTION: This course provides students with an intermediate understanding of the knowledge, human relations, and technical skills of electronics technology.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

- 01.01 Discuss the nature and development of technological knowledge and processes. STL.1.J, LA.B.2.4, LA.C.3.4, SC.H.3.4
- 01.02 Explain the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
- 01.03 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
- 01.04 Discuss current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

- 02.01 Apply systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
- 02.02 Discuss technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
- 02.03 Select resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
- 02.04 Identify the criteria and constraints of a product or system and determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
- 02.05 Discuss new technologies that create new processes. STL.2.CC
- 02.06 Organize a management system as the process of planning, organizing, and controlling work. STL.2.EE

03.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

- 03.01 Discuss the cultural, social, economic, and political changes caused by the use of technology. STL.4.H
- 03.02 Illustrate how the use of technology involves weighing trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4
- 03.03 Describe how a transfer of technology from one society to another can result in cultural, social, economic, and political changes to both societies. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

04.0 DEMONSTRATE AN UNDERSTANDING OF THE INFLUENCE OF TECHNOLOGY ON HISTORY.--The student will be able to:

04.01 Illustrate how technology has been a powerful force in reshaping social, cultural, political, and economic landscapes throughout history. STL.7.I, LA.D.2.4, SS.A.2.4
04.02 Explain how the development of many tools and machines was based not on scientific knowledge but on technological know-how. STL.7.J, SS.A.1.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

05.01 Describe the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
05.02 Explain how a design problem is not being clearly presented. STL.8.I, LA.D.1.4, LA.D.2.4
05.03 Critique a design and describe how to improve it by redefining the ideas of the design. STL.8.J, SC.H.1.4
05.04 Analyze the competing requirements of a design and describe how the design might be modified to accommodate the requirements. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

06.01 Describe how research and development is used in business and industry to prepare devices and systems for the marketplace. STL.10.I
06.02 Illustrate how research is used to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4
06.03 Differentiate between problems having technological and non-technological solutions. STL.10.K, SC.H.1.4
06.04 Give examples of technological problems which require a multidisciplinary approach. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

07.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

07.01 Interpret the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4
07.02 Evaluate the criteria and constraints and determine how these will affect the design process. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4

07.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4

07.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4

07.05 Produce a product or system using a design process. STL.11.Q

07.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

08.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

08.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4

08.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M

08.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N

08.04 Operate systems so that they function in the way they were designed. STL.12.O

08.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

09.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

09.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4

09.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4

09.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4

09.04 Design forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

10.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

10.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J

10.02 Construct a power system having a source of energy, a process, and loads. STL.16.N

11.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

11.01 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
11.02 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N

12.0 DEMONSTRATE SAFE AND APPROPRIATE USE OF TOOLS, MACHINES, AND MATERIALS IN ELECTRONICS TECHNOLOGY.--The student will be able to:

12.01 Select appropriate tools, procedures, and/or equipment.
12.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.
12.03 Follow laboratory safety rules and procedures.
12.04 Demonstrate good housekeeping at workstation within total laboratory.
12.05 Identify color-coding safety standards.
12.06 Explain fire prevention and safety precautions and practices for extinguishing fires.
12.07 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

13.0 DESCRIBE THE STRUCTURE OF MATTER RELATED TO ELECTRONICS.--The student will be able to:

13.01 Describe the composition of element, mixtures, and compounds according to the electron theory.
13.02 List the atomic subparticles.
13.03 Diagram and show the relationship between electrons, protons, and neutrons.
13.04 State the law of electrical charges.
13.05 Describe the classification and characteristics of materials as they apply to conductors, insulators, and semiconductors.
13.06 Demonstrate proficiency in the identification of electronics symbols.

14.0 DESCRIBE, CONSTRUCT, CONDUCT, AND ANALYZE EXPERIMENTS WITH BASIC DC AND AC CIRCUITS AND WITH CIRCUITS USING MAGNETISM.--The student will be able to:

14.01 Solve electronic math problems related to DC and AC circuits.
14.02 Define voltage, current, resistance, power, and energy.
14.03 Set up and test basic circuits.
14.04 Set up and operate multimeters in DC and AC circuits.
14.05 Set up and operate power supplies in DC circuits.
14.06 Describe magnetism, the law of magnetic poles, and the behavior of flux lines.
14.07 Demonstrate electromagnetism.
14.08 Construct simple circuits using a relay.

15.0 IDENTIFY, MEASURE, AND DESCRIBE THE FUNCTION OF TRANSFORMERS AND INDUCTORS IN ELECTRONIC CIRCUITS.--The student will be able to:

15.01 Explain the theory of operation and application of inductance in inductors and transformers.
15.02 Explain what an inductor is and what its purpose is.
15.03 Construct circuits using transformers and inductors.

15.04 Explain inductive reactance.

16.0 USE OHM'S LAW AND WATT'S LAW TO ANALYZE AND EXPERIMENT WITH RESISTIVE CIRCUITS.--The student will be able to:

16.01 Identify resistors by color code.
16.02 Identify and measure resistors.
16.03 Apply Ohm's law to circuits.
16.04 Explain how resistors are constructed.
16.05 Apply Watt's law to circuits.
16.06 Use a VOM to verify values.
16.07 Identify different types of resistors, and explain their use ratings.

17.0 DESCRIBE, CONSTRUCT, ANALYZE AND EXPERIMENT WITH CAPACITIVE CIRCUITS.--The student will be able to:

17.01 Explain how a capacitor stores electrical energy.
17.02 Explain how a capacitor is constructed.
17.03 Explain capacitive reactance.

20.0 DEMONSTRATE AN UNDERSTANDING OF BASIC ELECTRICAL CIRCUITS AND ELECTRONIC SYSTEMS.--The student will be able to:

20.01 Identify problems and demonstrate appropriate solutions when dealing with series, series-parallel, parallel, voltage dividers, and network circuits.
20.02 Define electronic systems.
20.03 Describe the importance of electronic systems in today's technology world.
20.04 Define electronic input, process and output of electronic systems.
20.05 Conduct electronic experiments using input, process and output systems.
20.06 Describe, design and conduct experiments with electronic systems.
20.07 Define and give an example of a super conductor.

21.0 DESCRIBE AND EXPERIMENT WITH INTEGRATED CIRCUITS.--The student will be able to:

21.01 Explain what integrated circuits (IC's) are and how they are manufactured.
21.02 Explain the advantages of integrated circuits as compared to discrete component circuits.
21.03 Construct electronic circuits that contain ICs.
21.04 Describe the basic types of integrated circuit design, along with their pin numbering systems and dimensions.

22.0 DEMONSTRATE THE USE OF ELECTRONIC EQUIPMENT.--The student will be able to:

22.01 Use a VOM to obtain accurate measurements.
22.02 Apply safety rules in the use of electronic instruments and demonstrate proper care and maintenance for the equipment during storage and use.
22.03 Use voltmeters, ammeters, and ohmmeters to obtain accurate measurements.

22.04 Set up and use an oscilloscope to observe waveforms and to determine the voltage of the signal presented.
22.05 Use signal generators to produce waveforms of selected frequencies and shapes.
22.06 Use testers to determine the condition of electronic components.

23.0 DESCRIBE, CONSTRUCT, AND EXPERIMENT WITH CIRCUITS USING SEMICONDUCTORS.--The student will be able to:

23.01 Describe the general theory and application of semiconductor devices.
23.02 Explain the difference between N-type and P-type material.
23.03 Explain the precautions necessary when working with solid state devices.
23.04 Demonstrate the proper procedures for the installation of solid state components using thermal release devices (heat sinks).
23.05 Construct and experiment with semiconductor devices.
23.06 Construct and test circuits which contain solid state components such as FET'S, SCR's, UJT's, tunnel diodes, zener diodes, light emitting diodes, etc.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8600930
Course Title: Electronics Technology III
Course Credit: 1

COURSE DESCRIPTION: This course provides students with an advanced understanding of the knowledge, human relations, and technical skills of electronics technology.

01.0 DEMONSTRATE AN UNDERSTANDING OF THE CHARACTERISTICS AND SCOPE OF TECHNOLOGY.--The student will be able to:

01.01 Illustrate the rapid increase in the rate of technological development and diffusion. STL.1.K, LA.B.2.4, LA.D.2.4, MA.B.1.4
01.02 Conduct specific goal-directed research related to inventions and innovations. STL.1.L, LA.A.1.4, LA.A.2.4, LA.B.2.4
01.03 Evaluate current technological developments that are/were driven by profit motive and the market. STL.1.M, SS.D.1.4

02.0 DEMONSTRATE AN UNDERSTANDING OF THE CORE CONCEPTS OF TECHNOLOGY.--The student will be able to:

02.01 Demonstrate systems thinking logic and creativity with appropriate compromises in complex real-life problems. STL.2.W
02.02 Assess technological systems, which are the building blocks of technology and are embedded within larger technological, social, and environmental systems. STL.2.X, LA.D.2.4
02.03 Evaluate the stability of a technological system and its influence by all of the components in the system, especially those in the feedback loop. STL.2.Y
02.04 Compare resources involving trade-offs between competing values, such as availability, cost, desirability, and waste. STL.2.Z, SS.D.1.4
02.05 Evaluate the criteria and constraints of a product or system and then determine how they affect the final design and development. STL.2.AA, MA.A.5.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.3.4, SC.H.1.4
02.06 Propose strategies for optimizing a technological process or methodology of designing or making a product, dependent on criteria and constraints. STL.2.BB
02.07 Evaluate a management system in terms of how work is planned, organized, and controlled. STL.2.EE
02.08 Describe how complex systems have many layers of controls and feedback loops to provide information. STL.2.FF

03.0 DEMONSTRATE AN UNDERSTANDING OF THE CULTURAL, SOCIAL, ECONOMIC, AND POLITICAL EFFECTS OF TECHNOLOGY.--The student will be able to:

03.01 Examine how the use of technology involves weighing the trade-offs between the positive and the negative effects. STL.4.I, LA.B.2.4

03.02 Evaluate the cultural, social, economic, and political changes caused by the transfer of a technology from one society to another. STL.4.K, LA.B.2.4, LA.E.1.4, SC.H.3.4

05.0 DEMONSTRATE AN UNDERSTANDING OF THE ATTRIBUTES OF DESIGN.--The student will be able to:

05.01 Implement the design process; including defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results. STL.8.H
05.02 Restate a design problem that is not presented in a clearly defined form. STL.8.I, LA.D.1.4, LA.D.2.4
05.03 Evaluate a design and revise the idea of the design as needed. STL.8.J, SC.H.1.4
05.04 Assess the competing requirements of a design, such as criteria, constraints, and efficiency. STL.8.K, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4

06.0 DEMONSTRATE AN UNDERSTANDING OF THE ROLE OF TROUBLESHOOTING, RESEARCH AND DEVELOPMENT, INVENTION AND INNOVATION, AND EXPERIMENTATION IN PROBLEM SOLVING.--The student will be able to:

06.01 Examine research and development approaches used in business and industry to prepare devices and systems for the marketplace. STL.10.I
06.02 Evaluate research used to solve technological problems. STL.10.J, LA.A.1.4, LA.A.2.4
06.03 Differentiate between technological and non-technological problems, and identify which problems can be solved using technology. STL.10.K, SC.H.1.4
06.04 Utilize a multidisciplinary approach to solving technological problems. STL.10.L, MA.A.1.4, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.E.1.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

07.0 DEMONSTRATE THE ABILITIES TO APPLY THE DESIGN PROCESS.--The student will be able to:

07.01 Evaluate the design problem to solve and decide whether or not to address it. STL.11.M, SC.H.1.4
07.02 Discriminate among criteria and constraints and adapt the design process accordingly. STL.11.N, MA.A.3.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, MA.D.1.4, MA.D.2.4, MA.E.1.4, SC.H.1.4, SC.H.3.4
07.03 Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product. STL.11.0, SC.H.3.4
07.04 Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed. STL.11.P, MA.A.4.4, MA.B.1.4, MA.B.3.4, MA.B.4.4, SC.H.1.4, SC.H.3.4
07.05 Produce a product or system using a design process. STL.11.Q
07.06 Evaluate final solutions and communicate observations, processes, and results of the entire design process, using verbal, graphic,

quantitative, virtual, and written means, in addition to three-dimensional models. STL.11.R, LA.B.2.4, LA.C.3.4, MA.B.4.4, MA.D.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4, SC.H.1.4, SC.H.3.4

08.0 DEMONSTRATE THE ABILITIES TO USE AND MAINTAIN TECHNOLOGICAL PRODUCTS AND SYSTEMS.--The student will be able to:

08.01 Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques. STL.12.L, LA.B.2.4, LA.B.1.4, LA.C.3.4
08.02 Diagnose a system that is malfunctioning and use tools, materials, machines, and knowledge to repair it. STL.12.M
08.03 Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision. STL.12.N
08.04 Operate systems so that they function in the way they were designed. STL.12.O
08.05 Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. STL.12.P, LA.A.2.4, MA.E.1.4

09.0 DEMONSTRATE THE ABILITIES TO ASSESS THE IMPACT OF PRODUCTS AND SYSTEMS.--The student will be able to:

09.01 Collect information and evaluate its quality. STL.13.J, LA.A.2.4, SC.H.1.4
09.02 Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment. STL.13.K, LA.A.2.4, SC.G.1.4, SC.G.2.4, SC.H.1.4
09.03 Apply assessment techniques, such as trend analysis and experimentation to make decisions about the future development of technology. STL.13.L, LA.A.2.4, MA.E.1.4, MA.E.2.4, MA.E.3.4
09.04 Use forecasting techniques to evaluate the results of altering natural systems. STL.13.M, MA.E.3.4, SC.G.2.4

10.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE ENERGY AND POWER TECHNOLOGIES.--The student will be able to:

10.01 Discuss how energy cannot be created nor destroyed; however, it can be converted from one form to another. STL.16.J
10.02 Construct a power system having a source of energy, a process, and loads. STL.16.N

11.0 DEMONSTRATE AN UNDERSTANDING OF AND BE ABLE TO SELECT AND USE INFORMATION AND COMMUNICATION TECHNOLOGIES.--The student will be able to:

11.01 Classify information and communication systems that allow information to be transferred as human to human, human to machine, machine to human, or machine to machine. STL.17.M
11.02 Use information and communication systems to inform, persuade, entertain, control, manage, and educate. STL.17.N

12.0 DEMONSTRATE SAFE AND APPROPRIATE USE OF TOOLS, MACHINES, AND MATERIALS IN ELECTRONICS TECHNOLOGY.--The student will be able to:

12.01 Select appropriate tools, procedures, and/or equipment.

12.02 Demonstrate the safe usage of appropriate tools, procedures, and operation of equipment.
12.03 Follow laboratory safety rules and procedures.
12.04 Demonstrate good housekeeping at workstation within total laboratory.
12.05 Identify color-coding safety standards.
12.06 Explain fire prevention and safety precautions and practices for extinguishing fires.
12.07 Identify harmful effects/potential dangers of familiar hazardous substances/devices to people and the environment.

24.0 PERFORM ADVANCED STUDY AND SKILLS RELATED TO ELECTRONICS.--The student will be able to:

24.01 Select an individual or group project in cooperation with the teacher.
24.02 Develop a written plan of work to carry out the project.
24.03 Show evidence of technical study in support of the project.
24.04 Perform skills related to the project.
24.05 Complete the project as planned.

25.0 DEMONSTRATE AN UNDERSTANDING OF THE PRINCIPLES AND APPLICATIONS OF MICROCOMPUTER SYSTEMS.--The student will be able to:

25.01 Define microcomputer systems.
25.02 Describe the importance of microcomputer systems in today's technology world.
25.03 Describe microcomputer applications in today's technology world.
25.04 Define microcomputer interfacing.
25.05 Conduct microcomputer systems experiments.
25.06 Conduct microcomputer systems interfacing, sensing and control applications.

26.0 DESCRIBE, IDENTIFY, AND CORRECT PROBLEMS IN ELECTRONIC CIRCUITS.--The student will be able to:

26.01 Identify problems when dealing with power supplies, oscillators, and amplifiers.
26.02 Demonstrate solutions to problems with power supplies, oscillators, and amplifiers.

27.0 DEMONSTRATE TECHNICAL KNOWLEDGE AND SKILLS ABOUT ELECTRONIC NETWORKS AND SYSTEMS.--The student will be able to:

27.01 Define and describe telecommunications.
27.02 Conduct telecommunications experiments including receivers, transmitters, wirelines and antennas, telephones and fiber optics.
27.03 Describe the technology and organization of electronic guidance systems.
27.04 Perform technical skills in building, assembling, servicing, or operating one of the above systems.
27.05 Define and describe logic control.
27.06 Conduct a logic control experiment.
27.07 Define and describe digital communications.
27.08 Conduct a digital communications experiment.
27.09 Define and describe industrial controls.

27.10 Conduct an industrial controls experiment.

28.0 CONDUCT A RESEARCH AND EXPERIMENTATION PROJECT ON AN ELECTRONIC SYSTEM OR PROCESS.--The student will be able to:

28.01 Identify a problem.
28.02 State a need to research the problem.
28.03 Form a hypothesis about the problem.
28.04 Plan the procedures for researching the problem.
28.05 Conduct the research following the planned procedures.
28.06 Present the research findings in a seminar.
28.07 State conclusions based on the research findings.

29.0 DEMONSTRATE AN UNDERSTANDING OF CAREER OPPORTUNITIES AND REQUIREMENTS IN THE FIELD OF ELECTRONICS TECHNOLOGY.--The student will be able to:

29.01 Discuss individual interests related to a career in electronics technology. LA.B.2.4
29.02 Explore career opportunities related to a career in electronics technology. LA.A.1.4, LA.A.2.4, LA.B.2.4
29.03 Explore secondary education opportunities related to electronics technology. LA.A.1.4, LA.A.2.4, LA.B.2.4
29.04 Conduct a job search. LA.A.1.4, LA.A.2.4
29.05 Complete a job application form correctly. LA.B.2.4
29.06 Demonstrate competence in job interview techniques. LA.C.1.4, LA.C.3.4, LA.D.1.4
29.07 Create a professional resume and letter of introduction. LA.A.1.4, LA.A.2.4, LA.B.1.4, LA.B.2.4
29.08 Solicit awards, letters of recommendation and recognition. LA.A.1.4, LA.A.2.4, LA.C.3.4, LA.D.1.4
29.09 Organize work samples in a professional, presentable format. LA.B.2.4, LA.C.3.4, LA.D.1.4