

July 2010

**Florida Department of Education  
Curriculum Framework**

**Program Title:**        **Alternative Energy Systems Specialist**  
**Career Cluster:**      **Manufacturing**

<b>CCC</b>	
CIP Number	0615000003
Program Type	College Credit Certificate (CCC)
Program Length	18 Credit Hours (Primary), 15 Credit Hours (Secondary)
CTSO	SkillsUSA
SOC Codes (all applicable)	17-3023.01    Electrical Engineering Technicians (In Demand) 47-4099.01    Solar Photovoltaic Installers 47-4099.02    Solar Thermal Installers and Technicians
Targeted Occupation List	<a href="http://www.labormarketinfo.com/wec/TargetOccupationList.htm">http://www.labormarketinfo.com/wec/TargetOccupationList.htm</a>

### **Purpose**

This certificate program is part of the Engineering Technology AS/AAS degree program (CIP 0615000001).

A College Credit Certificate consists of a program of instruction of less than sixty (60) credits of college-level courses, which is part of an AS or AAS degree program and prepares students for entry into employment (Rule 6A-14.030, F.A.C.).

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the manufacturing career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the manufacturing career cluster.

The purpose of this CCC is to prepare students to meet the industry-specific educational needs for technicians in the new and emerging alternative and renewable energy fields, including (but not limited to) occupational titles such as Electrical Engineering Technician, Industrial Engineering Technician, Solar Photovoltaic Installer and Solar Power Plant Technician, Solar Thermal Installer and Technician, Energy Auditor, and Smart Grid Technician. This program also provides supplemental training for persons previously or currently employed in occupations related to energy production and storage, manufacturing and construction.

The content includes but is not limited to electronics, electricity and energy concepts; alternative energy sources and systems; energy storage, distribution and conversion; operation and performance of an alternative energy system; and policies and business practices affecting alternative energy occupations.

## **Laboratory Activities**

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

## **Special Notes**

### **Career and Technical Student Organization (CTSO)**

SkillsUSA is the appropriate career and technical student organization for providing leadership training and reinforcing specific career and technical skills. Career and Technical Student Organizations provide activities for students as an integral part of the instruction offered. The activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065, F.A.C.

### **Accommodations**

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their postsecondary service provider. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. 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.

## **Standards**

After successfully completing this course the student will be able to perform the following:

- 01.0 Demonstrate a fundamental understanding of electronics and electricity.
- 02.0 Demonstrate an understanding of industrial safety, health, and environmental requirements.
- 03.0 Characterize alternative energy sources and technologies.
- 04.0 Characterize the operation and performance of solar energy systems.
- 05.0 Apply policy, regulation and good business practices for alternative energy systems.

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**Florida Department of Education  
Student Performance Standards**

**Program Title:** Alternative Energy Technology Specialist  
**CIP Number:** 061500003  
**Program Length:** 18 Credit Hours (Primary), 15 Credit Hours (Secondary)  
**SOC Code(s):** 17-3023; 47-4099

This certificate program is part of the Engineering Technology AS/AAS degree program (CIP 061500001). At the completion of this program, the student will be able to:

01.0 Demonstrate a fundamental understanding of electronics and electricity - The student will be able to:

- 01.01 Use appropriate grounding techniques.
- 01.02 Demonstrate knowledge of AC/DC theory.
- 01.03 Solve circuit problems using unit conversion and scientific notation.
- 01.04 Solve problems involving electric charge, electric current, potential difference, energy and Ohm's Law.
- 01.05 Solve problems in electric circuits involving power.
- 01.06 Solve problems involving series and parallel resistance circuits.
- 01.07 Solve problems involving capacitance in DC circuits.
- 01.08 Solve problems involving magnetic circuits.
- 01.09 Solve problems involving inductance in DC circuits.
- 01.10 Solve A.C. problems involving peak value, instantaneous, average value and RMS value of a sine wave.
- 01.11 Solve problems on factors governing reactance in A.C. circuits.
- 01.12 Solve impedance problems in A.C. circuits.
- 01.13 Prepare and complete concise, neat and accurate lab reports.

02.0 Demonstrate an understanding of industrial safety, health, and environmental requirements - The student will be able to:

- 02.01 Communicate any new or revised safety procedures.
- 02.02 Update personnel about current safety guidelines.
- 02.03 Wear appropriate Personal Protective Equipment (PPE).
- 02.04 Follow area-posted safety guidelines.
- 02.05 Demonstrate knowledge of, and follow applicable safety laws and regulations and the environment (e.g., Occupational Safety and Health Administration (OSHA)).
- 02.06 Maintain a clean and safe work environment.
- 02.07 Maintain personal protection equipment.
- 02.08 Report unsafe conditions/practices.
- 02.09 Locate emergency exits and alarms.
- 02.10 Comply with company-established safety practices.
- 02.11 Use appropriate fire fighting procedures.
- 02.12 Apply Occupational Safety Health Administration (OSHA) safety standards properly.
- 02.13 Demonstrate knowledge of when a machine or a process should be stopped to investigate or correct a hazard.

- 02.14 Demonstrate knowledge of regulatory agency fines and requirement for corrective actions.
- 02.15 Demonstrate knowledge of government and company procedures, rules and regulations concerning incident investigations.
- 02.16 Demonstrate knowledge of incident reporting procedures.
- 02.17 Use and evaluate information resources such as MSDS (Material Safety Data Sheets).
- 02.18 Demonstrate knowledge of National Institute of Occupational Safety and Health (NIOSH), Environmental Protection Agency (EPA) and other regulatory agencies recommendations, guidelines and best practices.
- 02.19 Demonstrate knowledge of how to safely identify, handle, monitor and measure hazardous materials.

03.0 Characterize alternative energy sources and technologies - The student will be able to:

- 03.01 Describe alternative and renewable energy sources used for power production.
- 03.02 Define basic energy terms.
- 03.03 Differentiate between alternative and renewable energy sources.
- 03.04 Discuss the feasibility of emerging energy resources.
- 03.05 Describe the major sources, scale, and impacts of alternative and renewable energy.
- 03.06 Draw and label a diagram of an alternative and renewable energy system.
- 03.07 Draw and label a diagram of energy production systems that uses various alternative energy sources.
- 03.08 Distinguish between various alternative energy sources and energy potential.
- 03.09 Describe the social and environmental impact of alternative energy technologies vs. traditional energy sources.
- 03.10 Explain the difference between passive solar and active solar systems.
- 03.11 Evaluate advantages and disadvantages of various alternative energy sources.
- 03.12 Compare site selection requirements for various alternative energy installations.

04.0 Characterize the operation and performance of solar energy systems - The student will be able to:

- 04.01 Describe the operation of various solar energy systems.
- 04.02 Site a solar energy system for optimal production based on the sun's position.
- 04.03 Specify components of solar energy systems.
- 04.04 Calculate the energy produced, efficiency, and power derived from an installed system.
- 04.05 Demonstrate proper safety practices in solar energy system installations and operations.
- 04.06 Interpret basic schematics and sketches of various solar energy design configurations.
- 04.07 Adapt the designs of solar energy systems for stand-alone and connected systems.
- 04.08 Practice proper installation of solar energy system components.
- 04.09 Demonstrate standard practices in system checkout, maintenance and troubleshooting a solar energy system.
- 04.10 Determine appropriately sized components for a solar energy system.

05.0 Apply policy, regulation and good business practices for alternative energy systems -  
The student will be able to:

- 05.01 Define current US energy and natural resources policies and regulations.
- 05.02 Compare US energy and natural resources policies and regulations to others around the world.
- 05.03 Calculate carbon footprints for various building types.
- 05.04 Read and interpret facility energy utilization data.
- 05.05 Use cost-benefit analyses to analyze various primary sources of energy.
- 05.06 Discuss the effects of financial, technical, and economic trends on the past, current, and future energy industry.
- 05.07 Demonstrate best practices for minimizing energy utilization.
- 05.08 Apply best practices based for energy production and resources utilization.
- 05.09 Determine how different climatic, geological, atmospheric, and human activities influence energy production and utilization.
- 05.10 Identify conservation practices for natural resources used for energy production.
- 05.11 Explain the environmental impacts of energy extraction, conservation, and storage systems.
- 05.12 Discuss how the conversion to alternative energy affects various business sectors.
- 05.13 Discuss the need for governmental regulations and policy for energy production and utilization.