

2012 – 2013

**Florida Department of Education
Curriculum Framework**

Program Title: Alternative Energy Engineering Technology
Career Cluster: Energy

CCC	
CIP Number	0615050304
Program Type	College Credit Certificate (CCC)
Program Length	18 Credit Hours
CTSO	SkillsUSA
SOC Codes (all applicable)	49-2095
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp

Purpose

This certificate program is part of the Electrical Power Technology AS/AAS degree program (1615030318/0615030318).

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 Energy 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 Energy career cluster.

The content includes but is not limited to DC/AC circuits, power generation, instrumentation and electrical network analysis, design, theory, solid state devices, and analog circuits. Integrated into this content will be communications skills, safe and efficient workplace practices, and technical recording and reporting. This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the Energy and Power industry; planning, management, finance, technical and product skills, underlying principles of technology, labor issues, community issues and health, safety, and environmental issues.

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.

Articulation

For details on articulation agreements which correlate to programs and industry certifications refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Standards

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

- 01.0 Demonstrate proficiency in laboratory practices.
- 02.0 Demonstrate proficiency in DC circuits.
- 03.0 Demonstrate proficiency in AC circuits.
- 04.0 Demonstrate proficiency in solid state devices.
- 05.0 Demonstrate proficiency in technical recording and reporting.
- 06.0 Demonstrate proficiency in principles of power generation systems such as solar, wind, geothermal, Biofuels/biomass, hydroelectric and ocean energy.
- 07.0 Demonstrate proficiency in principles of transformers.
- 08.0 Demonstrate proficiency in principles of power transmission systems.
- 09.0 Demonstrate proficiency in interpretation of electric codes.

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**Florida Department of Education
Student Performance Standards**

Program Title: **Alternative Energy Engineering Technology**
CIP Number: **0615050304**
Program Length: **18 Credit Hours**
SOC Code(s): **49-2095**

This certificate program is part of the Electrical Power Technology AS/AAS degree program (1615030318/0615030218). At the completion of this program, the student will be able to:

01.0 Demonstrate proficiency in laboratory practices --The student will be able to:

- 01.01 Apply proper OSHA safety standards.
- 01.02 Make electrical connections to include power conductor connections.
- 01.03 Identify and use hand tools properly.
- 01.04 Identify and use power tools properly.

02.0 Demonstrate proficiency in DC circuits --The student will be able to:

- 02.01 Identify sources of electricity.
- 02.02 Define voltage, current, resistance, power and energy.
- 02.03 Apply Ohm's Law and Power formula.
- 02.04 Measure properties of a circuit using VOM and DVM meters and oscilloscopes.
- 02.05 Describe magnetic properties of circuits and devices.
- 02.06 Determine the physical and electrical characteristics of capacitors and inductors.

03.0 Demonstrate proficiency in AC circuits -- The student will be able to:

- 03.01 Identify properties of an AC signal.
- 03.02 Identify AC sources.
- 03.03 Analyze and measure AC signals utilizing VOM, DVM, oscilloscope, frequency counter, and function generator.
- 03.04 Define the characteristics of AC capacitive circuits.
- 03.08 Define and apply the characteristics of AC inductive circuits.
- 03.09 Define and apply the principles of transformers to AC.
- 03.10 Define the characteristics of polyphase circuits.
- 03.11 Define the basic motor theory and operation.
- 03.12 Define the basic generator theory and operation.

04.0 Demonstrate proficiency in solid state devices --The student will be able to:

- 04.01 Identify and define properties of semiconductor materials.
- 04.02 Identify and define operating characteristics and applications of junction diodes.
- 04.03 Identify and define operating characteristics and applications of special diodes (xener, MOV for example metal oxide).
- 04.04 Analyze and troubleshoot diode circuits.
- 04.05 Set up and operate a DVM for solid-state devices.

05.0 Demonstrate proficiency in technical recording and reporting --The student will be able to:

- 05.01 Draw engineering electrical sketches, interpret electrical schematics, writing diagrams, charts, graphs and geographical sketches.
- 05.02 Record data and design curves and graphs.
- 05.03 Write reports and make oral presentations.
- 05.04 Maintain test logs.
- 05.05 Make equipment failure reports.
- 05.06 Specify and requisition simple electrical components.
- 05.07 Compose technical letters and memoranda.
- 05.08 Write formal reports of laboratory experiences.
- 05.09 Draft installation preventive maintenance and calibration procedures.

06.0 Demonstrate proficiency in principles of power generation systems --The student will be able to:

- 06.01 Identify the elements of a power generation system.
- 06.02 Solve problems involving alternators.
- 06.03 Discuss emerging and alternative electric power generation technologies and fuel sources.
- 06.04 Explain how solar energy is used to produce electricity in photovoltaic systems and what are its advantages and disadvantages.
- 06.05 Explain how solar energy is used to produce electric energy using steam and what are its advantages and disadvantages.
- 06.06 Explain how wind energy is used to produce electric energy and what are its advantages and disadvantages.
- 06.07 Explain how solar and geothermal energy is used to produce electric energy and what are its advantages and disadvantages.
- 06.08 Explain how biomass energy is used to produce electric energy and what are its advantages and disadvantages.
- 06.09 Explain how ocean energy is used to produce electric energy and what are its advantages and disadvantages.
- 06.10 Explain how fuel cells are used to produce electric energy and what are its advantages and disadvantages.

07.0 Demonstrate proficiency in principles of power transformers --The student will be able to:

- 07.01 Identify the characteristics of power transformers.
- 07.02 Solve problems involving the application of power transformers.

08.0 Demonstrate proficiency in principles of power transmission systems --The student will be able to:

- 08.01 Identify power transmission lines.
- 08.02 Solve problems involving transmission lines.

09.0 Demonstrate proficiency in interpretation of electric codes --The student will be able to:

- 09.01 Understand the need for IEEE (Institute of Electrical, Electronics and Engineers), NEMA (National Electrical Manufacturers Association) and ANSI (American National Standards Institute) codes.
- 09.02 Demonstrate proficiency in interpretation/explanation of the IEEE (Institute of Electrical, Electronics and Engineers), NEMA (National Electrical Manufacturers Association) and ANSI (American National Standards Institute) codes.