

July 2009

Florida Department of Education
Curriculum Framework

Program Title: Pneumatics, Hydraulics and Motors for Manufacturing
Specialization Tract: Advanced Manufacturing
Career Cluster: Manufacturing

PSVC
CIP Number: 0615.061303
Grade Level: College Credit Certificate
Length: 12 credit hours
SOC Code: 17-3027

- I. **MAJOR CONCEPTS AND CONTENT:** The purpose of this certificate is to prepare students for initial employment with an occupational title as a Mechanical Specialist or Industrial Maintenance Specialist in various specialized areas, or to provide supplemental training for persons previously or currently employed in these occupations.
- II. **PROGRAM STRUCTURE:** This certificate program requires a minimum of 12 credit hours of specialized courses in Hydraulics, Pneumatics and Electromechanical Machinery. It is part of the Advanced Manufacturing Tract of the A.S./A.A.S. degree in Engineering Technology.
- III. **LABORATORY ACTIVITIES:** Laboratory activities are an integral part of the program. The tools, test equipment, materials, processes and safety practices used in these laboratory activities are similar to those used in industry. The activities provide instruction in maintenance techniques, computer aided drafting/design skills, technical communications, maintenance and operation of various industrial components, quality control and testing, material handling protocols, and proper usage of tools and instrumentation.
- IV. **SPECIAL NOTE:** SkillsUSA is the appropriate career student organization (CTSO) for providing leadership training and for reinforcing specific vocational 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.

The cooperative method of instruction may be utilized for this program. Whenever the cooperative method 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 a secondary student with a disability is enrolled in a vocational class for which modifications to the curriculum framework have been made, the particular outcomes and student performance standards that the student must master to earn credit must be specified in the student's Individual Educational Plan (IEP). Additional credits may be earned when outcomes and standards are mastered in accordance with the requirements indicated in subsequent IEPs. The job title for which the student is being trained must be designated in the IEP.

- V. **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.
- VI. **INTENDED OUTCOMES:** After successfully completing the program, the student will be able to:
- 01.0 Demonstrate an understanding of industrial processes and material properties.
 - 03.0 Demonstrate a fundamental understanding of electronics and electricity.
 - 12.0 Operate, troubleshoot, and maintain pneumatic, hydraulic, and electromechanical components and/or systems.

**Florida Department of Education
Student Performance Standards**

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Specialization Tract: Advanced Manufacturing

01.0 DEMONSTRATE KNOWLEDGE OF INDUSTRIAL PROCESSES AND MATERIALS PROPERTIES -- The student will be able to:

- 01.01 Demonstrate knowledge of current manufacturing processes.
- 01.02 Demonstrate knowledge of the use of current manufacturing machines, operating systems and mechanisms.
- 01.03 Estimate manpower needs and skills needed in assembly operations.
- 01.04 Demonstrate knowledge of the criteria for tool design, maintenance, procurement and handling.
- 01.05 Demonstrate knowledge of gage design, usage and limitations.
- 01.06 Analyze and recommend the usage of jigs and fixtures, including effectors and special grippers for automated systems.
- 01.07 Demonstrate knowledge of processes used to ensure that changes do not negatively impact production or product.
- 01.08 Demonstrate knowledge of production timing to ensure customer satisfaction and on-time delivery.
- 01.09 Demonstrate knowledge of time and motion to enhance productivity.
- 01.10 Make continuous adjustments to equipment and procedures that result in improved productivity.
- 01.11 Demonstrate knowledge of how raw materials are moved.
- 01.12 Setup or modify new equipment per engineering specifications and documentations.
- 01.13 Demonstrate an understanding of the importance and impact of routine maintenance of machines and equipment on operations.

03.0 DEMONSTRATE A FUNDAMENTAL UNDERSTANDING OF ELECTRONICS AND ELECTRICITY - The student will be able to:

- 03.01 Use appropriate grounding techniques.
- 03.02 Demonstrate knowledge of AC/DC theory.
- 03.03 Solve circuit problems using unit conversion and scientific notation.
- 03.04 Solve problems involving electric charge, electric current, potential difference, energy and Ohm's Law.
- 03.05 Solve problems in electric circuits involving work and power.
- 03.06 Solve problems involving series and parallel resistance circuits.
- 03.07 Solve problems involving capacitance in DC circuits.
- 03.08 Solve problems involving magnetic circuits.
- 03.09 Solve problems involving inductance in DC circuits.
- 03.10 Solve A.C. problems involving peak value, instantaneous, average value and RMS value of a sine wave.
- 03.11 Solve problems on factors governing reactance in A.C. circuits.
- 03.12 Solve impedance problems in A.C. circuits.
- 03.13 Prepare and complete concise, neat and accurate lab reports.

12.0 OPERATE, TROUBLESHOOT, AND MAINTAIN PNEUMATIC, HYDRAULIC AND ELECTROMECHANICAL COMPONENTS AND/OR SYSTEMS – The student will be able to:

- 12.01 Identify, classify and describe the function of pneumatic, hydraulic and electrical machines and components.
- 12.02 Construct flow diagrams and of pneumatic, hydraulic, and electromechanical systems.
- 12.03 Perform basic operation maintenance of pneumatic, hydraulic and electromechanical components, devices and/or machines.
- 12.04 Troubleshoot errors, faults, and inconsistencies of pneumatic, hydraulic and electromechanical components, machines and/or systems.
- 12.05 Define special applications of electromechanical, hydraulic and pneumatic machines and devices used process sheet metal, plastics, food and beverages, and other materials.
- 12.06 Describe important limitations of electromechanical, pneumatic and hydraulic machinery.
- 12.07 Operate independent pneumatic, hydraulic and electrical machines properly.
- 12.08 Describe the important operating parameters of pneumatic, hydraulic and electrical machines and/systems.
- 12.09 Identify and use appropriate monitoring gages for pneumatic, hydraulic, and electromechanical machines and/or systems.