July 2009

Florida Department of Education
Curriculum Framework

Program Title:	**Lean Six Sigma Green Belt Certificate**
Specialization Tract:	**Quality**
Career Cluster:	**Manufacturing**

	PSVC
CIP Number:	0615.070203
Grade Level:	College Credit Certificate
Length:	12 credit hours
SOC Code:	17-3026

I. **MAJOR CONCEPTS AND CONTENT:** The purpose of this certificate is to prepare students for initial employment with an occupational title as a Quality Assurance or Lean Specialist in various specialized areas, or to provide supplemental training for persons previously or currently employed in these occupations.

The content should include, but not be limited to, the concepts, theories, and tools of the Lean Manufacturing and Six Sigma as used in the manufacturing and services industries. The program covers the methods used in Lean and Six Sigma such as continuous flow, overall equipment effectiveness (OEE), Kaizen, process mapping, the 5S's, total productive maintenance (TPM), cellular manufacturing, the DMAIC, self-directed work teams, the kanban system, design for manufacturing, and value steam mapping.

II. **PROGRAM STRUCTURE:** This certificate program requires a minimum of 12 credit hours of specialized courses in Lean Manufacturing. It is part of the Quality 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 this program, the student will be able to perform the following:

12.0 Demonstrate proficiency in Lean Manufacturing.
13.0 Demonstrate proficiency in developing self-directed work teams.
14.0 Demonstrate proficiency in the tools of Lean Manufacturing.
15.0 Demonstrate proficiency in basic Six Sigma concepts.

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Student Performance Standards

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Specialization Tract: **Quality**

12.0 DEMONSTRATE PROFICIENCY IN LEAN MANUFACTURING--The student will be able to:

- 12.01 Describe and explain the concepts of Lean Manufacturing.
- 12.02 Apply the theories of Lean Manufacturing to a manufacturing environment for improvement.
- 12.03 Identify and apply value stream mapping.
- 12.04 Identify and apply just-in-time procedures.
- 12.05 Identify and apply the techniques in continual improvement.
- 12.06 Describe and explain the system of waste–free manufacturing (WFM).
- 12.07 Describe the changes necessary in implementing waste-free manufacturing in a lean environment.
- 12.08 Describe and explain supply chain management.
- 12.09 Describe and explain the use of the 5S's, (sort, set in order, shine, standardize, sustain).
- 12.10 Develop the techniques to manage change in the manufacturing environment.

13.0 DEMONSTRATE PROFICIENCY IN DEVELOPING SELF-DIRECTED WORK TEAMS --The student will be able to:

- 13.01 Describe and explain how teams are developed.
- 13.02 Demonstrate how effective team members operate.
- 13.03 Identify the organization techniques of starting a team.
- 13.04 Identify the limits and expectations of the team.
- 13.05 Describe team problems.
- 13.06 Create work plans.
- 13.07 Identify the steps in ending a project.
- 13.08 Use data effectively in identifying issues.
- 13.09 Implement changes through planning and communications.
- 13.10 Update appropriate documentation in a project.
- 13.11 Identify the steps in ending a project.

14.0 DEMONSTRATE PROFICIENCY IN THE TOOLS OF LEAN MANUFACTURING --The student will be able to:

14.01 Define the tools required to implement and maintain a Lean Manufacturing facility.
14.02 Describe and explain mistake proofing for operators.
14.03 Describe the techniques using zero quality control (ZQC) techniques in manufacturing settings.
14.04 Identify mistake proof devices for eliminating errors in manufacturing.
14.05 Describe and apply the 5S's for efficiency, maintenance, and continuous improvement.
14.06 Describe and explain the visual workplace environment.
14.07 Define the terms associated with the quick changeover process.
14.08 Identify the changeover techniques used in production.
14.09 Describe and explain the streamlining process to reduce changeover time.
14.10 Describe the terms used in overall equipment effectiveness (OEE).
14.11 Describe and explain the process of total productive maintenance (TPM).
14.12 Describe and explain tracking process in improving the effectiveness of the operating equipment.
14.13 Define the terms associated with basic cellular manufacturing concepts.
14.14 Identify production teams to basic cellular manufacturing and teamwork concepts.
14.15 Identify steps required to convert to a cellular arrangement.
14.16 Identify the techniques used in the kanban system for just-in-time (JIT).

15.0 DEMONSTRATE PROFICIENCY IN BASIC SIX SIGMA CONCEPTS--The student will be able to:

15.01 Describe and explain the basic principles and theories of Six Sigma.
15.02 Define the terms associated with Six Sigma.
15.03 Describe the philosophy and methodology of Six Sigma.
15.04 Define the five steps of the DMAIC (define, measure, analyze, improve, and control) model used in Six Sigma for quality improvement.