

## Connecticut Community Colleges

### *College of Technology*

2007 – 2008

**Course Title:** Introduction to Lean Manufacturing

**Course Number:** MFG\* 171

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**Course Description:** The purpose of this course is to provide the student with the fundamental knowledge of current continuous process improvement methodologies in use today within competitive manufacturing environments. This introductory course will expose the student to the basic concepts of Lean Manufacturing theory and the various tools and techniques involved with a lean implementation. This course will be presented following the lean-six sigma process methodology of DMAIC (Define, Measure, Analyze, Improve, Control) to ensure that at the completion of the course, the student will be competent to participate effectively as a team member in lean implementation projects.

**Textbook:** None

**Course Outcomes:** At the completion of the course the student will be able to:

1. Identify and utilize DMAIC problem solving methodology components
2. Effectively participate in kaizen events within manufacturing environments
3. Appreciate value in a process and identify and eliminate wasteful activities within a process
4. Calculate and analyze process related data to help drive improvement
5. Maintain and sustain improvements within the manufacturing process area
6. Understand the principles of continuous improvement and the culture associated with it.

**Evaluation Process:**

- Pre-test, Quizzes and Final Exam
- Class Activities
- Team Projects
- Homework

**Course Outline:**

## Unit 1: Overview of Lean Manufacturing – Preparing for the Lean Journey

- History of Lean
- Lessons Learned from Lean Implementations
- Lean Principles
- The Lean Journey
- Key Lean Elements
- DMAIC

## Unit 2: Value Add, Waste and Tools

- 8 Wastes
- Value Add and Non-Value Add
- Basic Lean Tools Overview

## Unit 3: Definition of Customer Needs

- Understanding the Voice of the Customer (VOC)
- VOC Process Steps
- Kaizen History and Philosophy
- Conducting a Kaizen

## Unit 4: Value Stream Mapping

- Basics of Value Stream Mapping

## Unit 5: Value Stream Mapping and Other Analysis Methods

- Applications of VSM
- Spaghetti Charts
- Swimlane Flow Charts
- 5S

## Unit 6: Measuring the Current State

- Takt Time
- Cycle Time
- Work In Process (WIP)
- Inventory Turns

## Unit 7: Identifying Constraints / Bottlenecks Within the System

- Setup Reduction / Quick Changeover (SMED)

## Unit 8: Root Cause Analysis

- 5 Why's Problem Solving

- Cause and Effect Diagrams (Fishbone)
- Sequential Problem Solving

Unit 9: Lean Tools for Continuous Improvement

- Check Sheets
- Histograms
- Pareto Charts
- Scatter Charts

Unit 10: Analyze and Create Flow in the Process

- 'Push' versus 'Pull' Flow Systems
- One Piece and Continuous Flow Processes

Unit 11: Improve the Material Flow / Systematic Inventory Improvements

- Cellular Design
- Material Signals (Kanban)
- Visual Management

Unit 12: Improve the Process

- Standard Work
- Control Charts

Unit 13: Justify the Improvement

- Mistake Proofing
- Zero Defect Quality Control

Unit 14: Calculating and Documenting Improvement

- Benchmarking and Evaluating
- Key Performance Indicators (KPI's)
- Five and Six M's
- Short Interval Control (SIC)

Unit 15: Process / Machine Sustainability

- Total Productive / Predictive Maintenance (TPM)
- Overall Equipment Efficiency (OEE)
- Final Exam