



# Lean Six Sigma Black Belt

## Course Content and Outline

**Total Estimated Hours:** 145.05

**Note:** This outline is identical for the Healthcare, Financial Services, and Services versions. The difference for each course lies in the customized case studies, examples and exercises.

### Session 1: Introduction to Lean Six Sigma (4.75 hrs.)

- Introduction
- Higher Standards for Higher Performance
- Input Determines Output
- Lean Six Sigma Defined
- What's In a Name?
- Success Stories
- The Sigma Level
- The 99.9% Problem
- Calculating the Sigma Level - Toolset
- DNA of a Champion
- Lean Six Sigma Framework
- DMAIC - The Lean Six Sigma Improvement Process
- Lean and DMAIC
- Thought Process Mapping - Toolset
- Organizing for Success
- Working Relationships
- Critical Success Factors
- Exercises and Quiz

### Session 2: Define 1 - The Value Stream (8.85 hrs.)

- Define - Introduction
- Process Thinking
- The Source of Value
- Value Stream Leverage
- Process Mapping - Overview
- Process Mapping (SIPOC) Toolset
- Flow Charts
- Value-Added Flow Charts
- Spaghetti Charts
- Value Stream Mapping Toolset
- Pareto Chart Toolset
- Balanced Scorecard Toolset
- Project Selection Toolset
- Project Charter Toolset
- Project Tracking Toolset
- Stakeholder Analysis - RACI Matrix
- Exercises and Quiz

### Session 3: Define 2 - Voice of the Customer (8.95 hrs.)

- Voice of The Customer
- Focus on The Customer
- Understanding Customer Requirements
- Where to Go For Customer Requirements
- Conducting Surveys
- More on Surveys
- Surveys - Sampling Frame
- Structuring Survey Questions
- The Degree of Uncertainty in Sampling
- Guideline for Margin of Error
- Affinity Diagram Toolset
- CTQC Tree Diagram Toolset
- Operational Definition Toolset
- Voice Of The Customer As Specifications
- QFD Toolset
- Define - Progress Review
- Exercises and Quiz

#### **Session 4: Measure 1 – Measurements and Basic Statistics (4.75 hrs.)**

- Measurements and Basic Statistics
- Business Problem Solving
- Basic Statistical Terms
- Descriptive and Inferential Statistics
- Measurements
- Discrete vs. Continuous Measurements
- Measurement Subjects
- Graphical Summaries
- Histogram Toolset
- Measuring Central Tendency
- Quantifying Process Variability
- The Normal Distribution
- Exercises and Quiz

#### **Session 5: Measure 2 - Measurement System Analysis (8.8 hrs.)**

- Measurement System Analysis – Introduction
- Measurement As A Process
- Cause & Effect Matrix Toolset
- The Analysis of Measurement Systems
- The Requirements of Measurement Systems
- Gage R & R
- MSA - Graphing
- Attribute Measurement System Analysis
- Calibration of Measurement Systems
- Collecting Data
- Developing a Sampling Plan
- Baseline Performance
- Derivative Performance Metrics - Throughput Yield
- Derivative Performance Metrics - Rolled Throughput Yield
- The Sigma Level Revisited
- Exercises and Quiz

#### **Session 6: Measure 3 - Charting Process Behavior (10.9 hrs.)**

- Introduction – Charting Process Behavior
- Trend Chart Toolset
- SPC - Introduction and Background
- SPC - Introduction to Control Charts
- SPC - Control Chart Limits
- SPC - More On Control Limits
- Implementing SPC
- SPC Chart Selection
- Rational Subgrouping Toolset
- X and Moving Range Charts - Toolset
- Attribute Control Chart Toolset
- X-bar and R Chart Toolset
- Process Capability Toolset
- Measure - Progress Review
- Exercises and Quiz

#### **Session 7: Analyze 1 - Identifying Root Cause (10.65 hrs.)**

- Analyze I - Introduction
- Finding The Root Cause
- Cause & Effect Diagram Toolset
- Alternative To The Cause & Effect Diagram
- 5-Why, 1-How
- A Combination of 5-Why, Pareto, and Trend Charts
- Scatter Plot Toolset
- Correlation and Regression Analysis
- Multiple Regression Toolset
- Logistic Regression Toolset
- Factors In Determining Sample Size
- Estimating Population Mean
- Exercises and Quiz

## Session 8: Analyze 2 - Hypothesis Testing (23.85 hrs.)

- Analyze II - Introduction
- Introduction to Hypothesis Testing
- The Process On Trial
- The Hypothesis - Accept or Reject?
- Types of Error
- Power Analysis
- Power Analysis - Factors
- Hypothesis Testing
- Confidence Intervals
- Treatment Comparisons - Control Charts
- Comparing One Proportion to a Standard
- Comparing Two Proportions - Z-test Toolset
- Comparing Multiple Proportions - Chi-Square
- Comparing One Mean to a Standard - t-test
- Comparing Two Means - t-test Toolset
- Comparing Multiple Means - ANOVA /F-test Toolset
- Confidence Intervals - Least Significant Difference
- Comparing One Variance to a Std. - Chi-Square
- Comparing Two Variances - F-test Toolset
- Parametric vs. Nonparametric Tests
- Hypothesis Testing Learning Lab
- Exercises and Quiz

## Session 9: Analyze 3 - Design of Experiments (41.55 hrs.)

- Design of Experiments - Introduction
- Design of Experiments - History
- Design of Experiments - Components
- Design of Experiments - Principles
- Design of Experiments - Purpose
- Design of Experiments - Process
- Design of Experiments – Guidelines
- Selecting the Right Design
- Blocking
- Blocking and Tackling
- Faster Deliveries Through Experimentation
- Beyond One-Factor Experiments
- Two Level Full Factorial Toolset
- Two Level Fractional Factorial Toolset
- General Factorial toolset
- DOE Power and Sample Size
- Designing An Experiment To Save The Kingdom
- Better Pizza Through Design of Experiments
- Selling More Coffee with Design Experiments
- Brewing Better Beer Using DOE
- Additional Subjects
- Analyze - Progress Review
- Design of Experiments Exercises and Quiz

## Session 10: Improve (12.10 hrs.)

- Improve
- Design for Six Sigma (DFSS)
- Benchmarking
- Brainstorming
- Narrowing Down The List of Ideas
- FMEA Toolset
- Error-proofing
- Prioritizing and Selecting a Solution
- The A3 One-Page Report
- Continuous Flow Toolset
- Quick Changeover Toolset
- Cellular Processing Toolset
- Pull Scheduling
- Corrective Action Matrix
- Piloting a Solution
- System Dynamics
- Characteristics of Dynamic Systems
- System Dynamics Examples
- Another System Dynamics Example
- System Dynamics Application
- System Dynamics Summary
- Improve - Progress Review
- Exercises and Quiz

## Session 11: Control (6.85 hrs.)

- Control
- More On SPC
- The Process Control Plan
- More On FMEA
- Visual Control
- 5-S Approach
- CHECK Process
- Total Productive Maintenance
- TPM Objectives & Benefits
- TPM Metrics
- TPM Core Elements
- TPM Maintenance Activities
- Best Practices and Lessons Learned
- Documenting Process Changes
- Ending the Project
- Control - Progress Review
- Exercises and Quiz

## Session 12: Leading Teams and Leading Change (4.45 hrs.)

- Leadership Introduction
- Fueling The Improvement Engine
- Leadership Characteristics
- Practice, Study and Reflection - Learning by Modeling
- Leading Teams
- Developing an Effective Team
- Improving Team Development
- Leading Change
- Leading Change - Continued
- Success Factors For Effective Change Management
- Exercises and Quiz
- Course Completion
- The Lean Six Sigma Journey

Updated: 1/1/10