



# Course Overview – Lean Six Sigma Green Belt

## Summary and Objectives

This Six Sigma Green Belt course is comprised of 11 separate sessions. Each session is a collection of related lessons and includes an interactive quiz at the end of the session. Many of the lessons include interactive practice exercises. All course material is available online, and sessions may be started and stopped at any point—content is delivered on-demand according to your schedule.

By completing this course of study, you will gain a solid general knowledge of the theory, composition, and implementation of a Six Sigma initiative. You will also become proficient in all of the analytical tools necessary to define, measure, analyze, improve, and control Six Sigma improvement projects. You will learn team leadership and project management skills. In short, you will master the skills necessary to lead a complex process improvement project that produces bottom-line results.

## Course Structure and Requirements

This course provides content on-demand to offer the highest degree of student flexibility. You can set your own schedule and progress at your own speed, terminating and re-entering sessions whenever you wish.

All course sessions use a mix of multimedia to present material, including text, synchronized audio slide shows, diagrams, charts, audio lectures, and simulations. Links to outside research resources are provided to explore chosen subjects in greater detail. Course access is provided for 270 days beginning at the time of enrollment.

## The student will be asked to demonstrate knowledge and understanding through:

- **Interactive Practice Exercises** will be presented throughout each session so that you can try your new skills and get immediate feedback.
- **Supplemental Exercises** appear at the end of every session and afford the opportunity to practice newly learned concepts. Supplemental exercises are self-graded and may be shared in the Virtual Classroom Discussion area.
- **Quizzes** are included in every session. Quizzes are interactive and close the learning loop by providing immediate feedback.
- **Project:** It is suggested that a meaningful project should accompany this coursework. Practicing concepts and tools by participating as a Green Belt project team member on a real-world project enhances the learning experience.

## Course Sequence

The course is presented in a logical sequence to follow the Six Sigma DMAIC improvement process. We believe the student will learn most efficiently by following the sequence presented. In particular, the first session presents an overview of Six Sigma, which will be helpful to put the remaining sessions in proper context. However, the sessions are modular, and we encourage exploration of the material. The course's navigational tools enable the student to freely move forward and backward throughout the course, enabling the student to skip ahead or go back and review material already covered. The course map feature also allows point-to-point navigation, from anywhere to anywhere. The course map status column will tell you which pages you have not visited.



# Learning Objectives – Lean Six Sigma Green Belt Course

The overarching learning objective of this course is to develop a comprehensive set of skills that will allow you to function effectively as a Six Sigma Green Belt. The Green Belt body of knowledge includes techniques for both quantitative and non-quantitative analysis, as well as the team leadership skills necessary to get projects across the goal line.

After completing this course, you should be able to **DO** the following:

**Communicate** using Six Sigma concepts.

**Think** about your organization as a collection of processes, with inputs that determine the output.

**Relate** Six Sigma concepts to the overall business mission and objectives.

Use the concept of a sigma level to **evaluate** the capability of a process or organization.

Understand and apply the five-step DMAIC model as a framework to **organize** process improvement activity.

**Employ** a wide range of continuous process improvement techniques within the DMAIC model.

**Recognize** the organizational factors that are necessary groundwork for a successful Six Sigma effort.

**Employ** your Six Sigma skills to lead a successful process improvement project to **deliver** meaningful results to the organization.



# Course Content and Outline – Lean Six Sigma Green Belt

**Total Estimated Hours: 93.4**

## **1. Introduction to Six Sigma (4.7 Hours)**

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

## **2. Define I – The Value Stream (7.7 Hours)**

- Introduction to Define
- 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
- Project Selection Toolset
- Project Charter Toolset
- Project Tracking Toolset
- Exercises and Quiz

### **3. Define II – Voice of the Customer (7.4 Hours)**

- Introduction to 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
- Progress Review
- Exercises and Quiz

### **4. Measure I (9.9 Hours)**

- Introduction to Measure
- Measurements
- Discrete vs. Continuous Measurements
- Measurement Subjects
- Measurement as a Process
- 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

### **5. Measure II – Charting Process Behavior (12.4 Hours)**

- Introduction to Measure II
- Trend Chart Toolset
- Histogram Toolset
- Quantifying Process Variability
- 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
- Related Theory
- Process Capability Toolset
- Progress Review
- Exercises and Quiz

## 6. Analyze I – Possible Root Cause (10.2 Hours)

- Introduction to Analyze
- 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

## 7. Analyze II – Hypothesis Testing (13.3 Hours)

- Introduction to Analyze II
- Introduction to Hypothesis Testing
- The Process on Trial
- The Hypothesis – Accept or Reject?
- Types of Error
- Hypothesis Testing
- Confidence Intervals
- Treatment Comparisons – Control Charts
- Comparing Two Proportions – Z-test Toolset
- Comparing Two Means – t-test Toolset
- Comparing Multiple Means – ANOVA/F-test Toolset
- Comparing Two Variances – F-test Toolset
- Confidence Intervals – Least Significant Difference
- Hypothesis Testing Learning Lab
- Exercises and Quiz

## 8. Analyze III – DOE (5.8 Hours)

- Design of Experiments – Introduction
- Design of Experiments
- Design of Experiments – Components
- Design of Experiments – Purpose
- Design of Experiments – Process
- Blocking
- Blocking and Tackling
- Progress Review
- Exercises and Quiz

## 9. Improve (10.7 Hours)

- Introduction to Improve
- Design for Six Sigma (DFSS)
- Benchmarking
- Brainstorming
- Narrowing Down the List of Ideas
- FMEA Toolset
- Error-proofing
- Continuous Flow Toolset
- Quick Changeover Toolset
- Pull Scheduling
- Prioritizing and Selecting a Solution
- 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
- Progress Review
- Exercises and Quiz

## 10. Control (6.5 Hours)

- Introduction to Control
- More on SPC
- The Process Control Plan
- More on FMEA
- Visual Control
- 5-S Approach
- 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
- Progress Review
- Exercises and Quiz

## 11. Leading Teams and Leading Change (4.8 Hours)

- 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