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# Lean Six Sigma Black Belt Certification Training

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Course Length: 10.0 days

This course studies various Lean Six Sigma problem solving techniques from descriptive statistics to complex design of experiments. This focuses on developing a participant's capability to effectively execute Lean Six Sigma techniques to solve problems or improve processes that affect corporate performance in lead time, quality and cost.

Singapore's best Lean Six Sigma Black Belt Training courses are run by Black Belts and Master Black Belts in Singapore.

This Lean Six Sigma Black Belt Certification Training course can be delivered at your premises anywhere in Singapore by one of our expert local or international trainers.

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# Lean Six Sigma Black Belt Certification Training Course Outline

## Foreword

This Lean Six Sigma Black Belt Certification training course prepares you for the IASSC Six Sigma Black Belt certification exam and teaches the essential skills to implement Lean Six Sigma techniques and approaches at the Black Belt level. Organizations utilize Black Belts to implement and manage both large and small scale projects. Six Sigma Black Belts are highly coveted and are generally employed as project team leaders.

The PD Training materials are much more than simple tools training. This curriculum is formatted in such a way that the problem solving strategy is demonstrated throughout the course. By utilizing various Statistical and Business Improvement tools participants can clearly see and communicate the flow and process of the methodology in order to instill both the tactical and strategic aspects of the LSS Black Belt skill set.

The implementation roadmaps within each phase provide a clear line-of-sight for putting into practice the problem solving technology. Various group exercises utilizing training aids, pre-formatted data sets and templates facilitate interactive group learning within a class.

These very training materials are the industry standard used by thousands of industry trainers, coaches and mentors to train Lean Six Sigma Black Belts around the world.

## Outcomes

### During this course, you will develop:

- Understanding and implementation of the concepts of Six Sigma
- Ability to plan projects to achieve maximum process efficiency
- Capability to recognize elements of waste and countering them
- Skill to measure key aspects of a process to collect relevant data
- Ability to create a process map
- Ability to identify and measure process capability
- Ability to analysis data accurately to find cause-and-effect relationship and identify the root cause of errors
- Hypothesis testing knowledge
- Ability to improve processes based on analysis
- Understanding of how to use various industry models for process improvement
- Ability to control processes
- Ability to ensure errors are removed before they can damage a process
- Understanding of capability analysis
- Understanding and use of lean
- Skill to control processes, productivity and waste

## Modules

### Lesson 1: Understanding Six Sigma (Define Phase Module 1)

LSS Black Belt Define Phase - The Define Phase of the DMAIC methodology is constructed to introduce the core fundamentals of Six Sigma.

- Describe the objectives of Six Sigma
- Describe the relationship between variation and sigma
- Recognise some Six Sigma concepts
- Recognise the Six Sigma implementation model
- Describe your role and responsibilities in Six Sigma

## **Lesson 2: Six Sigma Fundamentals (Define Phase Module 2)**

- Describe what is meant by “Process Focus”
- Describe the importance of VOC, VOB, and VOE, and CTQ’s
- Explain COPQ
- Generate a Process Map
- Describe the Basic Six Sigma metrics
- Explain the difference between FTY and RTY
- Explain the difference between DPU and DPMO

## **Lesson 3: Selecting Projects (Define Phase Module 3)**

- Utilise a structured approach to select projects
- Refine and Define the problem into a Project Charter
- Make an initial estimate of your project’s benefits

## **Lesson 4: Elements of Waste (Define Phase Module 4)**

- Have a clear understanding of the specific deliverables
- Have started to develop a Project Plan to meet the deliverables
- Have identified ways to deal with potential roadblocks
- Be ready to apply the Six Sigma method through your project

## **Lesson 5: Wrap Up & Action Items (Define Phase)**

## **Lesson 6: Process Discovery (Measure Phase Module 1)**

LSS Black Belt Measure Phase - The Measure Phase of the DMAIC methodology is constructed to introduce important Six Sigma tools for characterising your business issues.

- Create a high level Process Map
- Create a Fishbone Diagram
- Create an X-Y Diagram
- Describe the elements of a FMEA
- Explain the importance of a FMEA
- Describe why each tool is important

## **Lesson 7: Six Sigma Statistics (Measure Phase Module 2)**

- Explain the various statistics used to express location and spread of data
- Describe the characteristics of a Normal Distribution
- Test for Normality
- Describe the difference between Special Cause and Common Cause Variation
- Generate a variety of graphs for data

## **Lesson 8: Measurement System Analysis (Measure Phase Module 3)**

- Perform the step by step methodology in Variable and Attribute MSA’s
- Identify the various components of variation so corrections can be made and the gage error reduced

- Recognise the differences between Repeatability, Reproducibility, Accuracy and Calibration

## **Lesson 9: Process Capability (Measure Phase Module 4)**

- Estimate Capability for Continuous Data
- Describe the impact of Non-normal Data on the analysis presented in this module for Continuous Capability
- Estimate Capability for Attribute Data

## **Lesson 10: Wrap Up & Action Items (Measure Phase)**

## **Lesson 11: "X" Sifting (Analyse Phase Module 1)**

LSS Black Belt Analyse Phase - The Analyse Phase of the DMAIC methodology is constructed to introduce important Six Sigma tools for isolating critical factors.

- Perform a Multi-Vari Analysis
- Interpret and a Multi-Vari Graph
- Identify when a Multi-Vari Analysis is applicable
- Interpret what Skewed data looks like
- Explain how data distributions become Non-normal when they are really Normal

## **Lesson 12: Inferential Statistics (Analyse Phase Module 2)**

- Explain the meaning of the term "Inferential Statistics".
- Describe the basic tenets of the Central Limit Theorem.
- Describe the impact of sample size on your estimates of population parameters.
- Explain Standard Error

## **Lesson 13: Intro to Hypothesis Testing (Analyse Phase Module 3)**

- Articulate the purpose of Hypothesis Testing
- Explain the concepts of the Central Tendency
- Be familiar with the types of Hypothesis Tests

## **Lesson 14: Hypothesis Testing Normal Data Part 1 (Analyse Phase Module 4)**

- Determine appropriate sample sizes for testing Means
- Conduct various Hypothesis Tests for Means
- Properly Analyse Results

## **Lesson 15: Hypothesis Testing Normal Data Part 2 (Analyse Phase Module 5)**

- Be able to conduct Hypothesis Testing of Variances
- Understand how to Analyse Hypothesis Testing Results

## **Lesson 16: Hypothesis Testing Non-Normal Data Part 1 (Analyse Phase Module 6)**

- Conduct Hypothesis Testing for equal variance
- Conduct Hypothesis Testing for Medians
- Analyse and interpret the results

## **Lesson 17: Hypothesis Testing Non-Normal Data Part 2 (Analyse Phase Module 7)**

- Calculate and explain test for proportions
- Calculate and explain contingency tests

## **Lesson 18: Wrap Up & Action Items (Analyse Phase)**

## **Lesson 19: Process Modeling Regression (Improve Phase Module 1)**

LSS Black Belt Improve Phase - The Improve Phase of the DMAIC methodology is constructed to introduce important Lean Six Sigma tools for properly controlling solutions.

- Perform the steps in a Correlation and a Regression Analysis
- Explain when Correlation and Regression is appropriate

## **Lesson 20: Advanced Process Modeling (Improve Phase Module 2)**

- Perform Non-Linear Regression Analysis
- Perform Multiple Linear Regression Analysis
- Determine the reason for experimenting
- Describe the difference between a physical model and a DOE model
- Explain an OFAT experiment and its primary weakness
- Shown Main Effects Plots and interactions, determine which effects and interactions may be significant
- Create a Full Factorial Design

## **Lesson 21: Experimental Methods (Improve Phase Module 3)**

- Be able to Design, Conduct and Analyse an Experiment

## **Lesson 22: Full Factorial Experiments (Improve Phase Module 4)**

- Understand how to Create Balanced & Orthogonal Designs
- Explain how Fit & Diagnose & Center Points factors into an experiment

## **Lesson 23: Fractional Factorial Experiments (Improve Phase Module 5)**

- Explain why & how to use a Fractional Factorial Design
- Create a proper Fractional Factorial Design
- Analyse a proper model with aliased interactions

## **Lesson 24: Wrap Up & Action Items (Improve Phase)**

## **Lesson 25: Advanced Experiments (Control Phase Module 1)**

LSS Black Belt Control Phase - The Control Phase of the DMAIC methodology is constructed to introduce important Lean Six Sigma tools for properly controlling solutions.

- Use the results of a DOE to determine how to further optimise a process using the steepest ascent/descent method

## **Lesson 26: Capability Analysis (Control Phase Module 2)**

- Understand the importance of Capability Analysis as it is applied in the Control Phase
- Select the appropriate method for Capability Analysis based on the type of data distribution of your process

- Interpret the output of MINITABTM's Capability functions
- Understand how the use for Capability Analysis may alter through the DMAIC phases

### **Lesson 27: Lean Controls (Control Phase Module 3)**

- Describe Lean tools
- Understand how these tools can help with project sustainability
- Understand how the Lean tools depends on each other
- Understand how tools must document the defect prevention created in the Control Phase

### **Lesson 28: Defect Controls (Control Phase Module 4)**

- Describe some methods of defect prevention
- Understand how these techniques can help with project sustainability
- Including reducing those outliers as seen in the Advanced Process Capability section
- If the vital X was identified, prevent the cause of defective Y
- Understand what tools must document the defect prevention created in the Control Phase

### **Lesson 29: Statistical Process Control - SPC (Control Phase Module 5)**

- Describe the elements of an SPC Chart and the purposes of SPC
- Understand how SPC ranks in defect prevention
- Describe the 9 Step route or methodology of implementing a chart
- Design subgroups if needed for SPC usage
- Determine the frequency of sampling
- Understand the Control Chart selection methodology
- Be familiar with Control Chart parameter calculations such as UCL, LCL and the Center Line

### **Lesson 30: Six Sigma Control Plans (Control Phase Module 6)**

- Understand the 5 phases of the Control Plan
- Training
- Documentation
- Monitoring
- Response
- Aligning Systems and Structures

### **Lesson 31: Wrap Up & Action Items (Control Phase)**

## **Web Links**

- [View this course online](#)
- [In-house Training Instant Quote](#)