

# LEAN Six Sigma-Black Belt [Course Catalog]



**PROGRAM DURATION: 8 DAYS**

- **Organization-wide Planning & Deployment**
  - Fundamentals of Six Sigma & LEAN
  
- **Six Sigma, LEAN & Continuous Improvement (CI) methodologies**
  - When to use Six Sigma
  - Aligning Six Sigma objectives with organizational goals
  - Evaluation criteria for Six Sigma projects
  
- **Strategic Planning & Deployment for Initiatives**
  - Importance of Strategic Planning
  - **Hoshin Kanri**
    - Process Flow
    - Four Phases
  - SWOT Analysis
  - PEST Analysis
  
- **Leadership – Roles & Responsibilities**
  - Roles & Responsibilities of Six Sigma team
  - Role of LSSBB certified personnel

- **Organizational Roadblocks & Change Management**
  - Factors impacting Six Sigma projects
  - Common causes for failure of Six Sigma
  - Organizational Readiness Assessment (ORA)
  
- **Organizational Process Management & Measures**
  - Impact of Six Sigma projects
  - **Performance Measures**
    - Balanced Scorecard
    - Key Performance Indicators (KPIs) & Metrics
    - Line of Sight – Measures to Strategies
  
  - **Financial Measures**
    - Net Present Value
    - Return-on-Investment (ROI)
    - Cost-Benefit Analysis (CBA)
    - Hard Cost, Soft Cost & Cost Avoidance

- Learning Objectives
- Key Deliverables
- **Voice of the Customer**
  - **Customer Identification**
    - ❑ Identify Internal & External customers
    - ❑ Project impact on stakeholders
  - **Customer Data Collection**
    - ❑ Data Collections methods
  - **Customer Requirements**
    - ❑ Critical-to-X (CTX)
    - ❑ Critical-to-Quality (CTQ) Tree
    - ❑ Quality Function Deployment (QFD)
    - ❑ KANO Model
- **Business Case & Project Charter**
  - **Project Charter**
    - ❑ Business Case
    - ❑ Problem Statement
    - ❑ Goals & Objectives

- **Business Case & Project Charter**
  - **Project Charter** *(Continued from the previous slide)*
    - Project Performance Requirements
    - Project Charter Review
  
- **Project Management Tools**
  - GANTT Chart
  - Toll-gate Review
  - Work-breakdown Structure (WBS)
  - RACI Model
  
- **Analytical Tools**
  - Affinity Diagram
  - Tree Diagram
  - Interrelationship Graph
  - Process Decision Program Chart (PDPC)
  - Matrix Diagram
  - Prioritization Matrices
  - Activity Network Diagram (AND)

- Learning Objectives
- Key Deliverables
- **Process Characteristics**
  - **Primary Project Metrics**
    - LEAD Time
    - Cycle Time
    - Turnaround Time (TAT)
    - Process Cycle Efficiency (PCE)
    - Yield
  - Impact of Hidden Factories on Project Metrics
- **Process Analysis Tools**
  - Value Stream Mapping (VSM)
  - Spaghetti Diagrams
  - Circle Diagrams
  - GEMBA Walk
- **Data Collection**
  - **Sampling:**
    - Meaning of Sampling

## ▪ Data Collection

- **Sampling** *(Continued from the previous slide)*
  - Methods of Sampling
  - Illustrations

## ▪ Measurement System Analysis

- **Continuous Measurements**
  - Gage R&R (Crossed)
  - Gage R&R (Nested)
  - Gage Run Chart
  - Gage Linearity
  - Gage Accuracy
- **Attribute Measurements**
  - Attribute Gage R&R
- Applicability of Measurement Systems to different organizational functions

## ▪ Statistics

- Central Limit Theorem
- **Probability**
  - Terms & Concepts

## ■ **Statistics**

### ○ **Probability** *(Continued from the previous slide)*

- Probability Distributions:-
  - ❖ Normal Distribution
  - ❖ Poisson Distribution
  - ❖ Binomial Distribution
  - ❖ Weibull Distribution
  - ❖ Student's t

## ■ **Process Capability Studies**

### ○ **Process Capability Indices**

- Basics
- Cp and Cpk
- Pp and Ppk
- Cpm (Taguchi Capability Index)

### ○ **Process Capability for Attribute Data**

- Binomial Capability
- Poisson Capability

### ○ **Process Capability for Non-normal data**

- Box-Cox Transformation



- Learning Objectives
- Key Deliverables
- **Measuring & Modeling Relationships Between Variables**
  - **Correlation Coefficient**
    - Background & Meaning
    - MINITAB Analysis
    - Interpretation
  
  - **Linear Regression**
    - Background & Meaning
    - Regression Equation
    - P-value, S,  $R^2$ , and adjusted  $R^2$
    - ANOVA Table
    - Predicted Values
    - Residuals
  
  - **Multivariate Tools**
    - Factor Analysis
    - Discriminant Analysis
    - Multiple Analysis of Variance (MANOVA)

## ▪ Hypothesis Testing

- Terminology (Definition & Interpretation)
- Statistical Vs. Practical Significance
- **Power & Sample Size**
  - 1-Sample Z & 1-Sample t
  - 1 Proportion & 2 Proportions
- **Point & Interval Estimates**
  - Confidence Interval & Prediction Interval
  - Efficiency & bias of estimators
- **Test for Means, Variances, and Proportions**
  - 2-Sample t & Paired t
  - 1-Sample Poisson Rate & 2-Sample Poisson Rate
  - Test for Equal Variances (TEV)
- **Analysis of Variance (ANOVA)**
  - One-Way
  - Two-Way
- **Goodness-of-Fit tests**
  - Chi-square Statistic
  - Goodness-of-Fit for Poisson

- **Hypothesis Testing** *(Continued...)*
  - **Contingency Tables**
    - Chi-square and Tests of Contingency Tables
  
  - **Nonparametric Tests**
    - Kruskal-Wallis
    - Mann-Whitney
    - Mood's Median
  
- **Additional Analysis Methods**
  - Gap Analysis
  - **Root Cause Analysis (RCA)**
    - Purpose of RCA
    - Fault-tree Analysis (FTA)
    - Corrective Action-Preventive Action (CAPA) mechanism

- Learning Objectives
- Key Deliverables
  
- **Design of Experiments**
  - Terminology
  - Design Principles
  - Planning Experiments
  - One-factor Experiments
  - Two-level fractional factorial experiments
  - Full factorial experiments
  
- **LEAN Methods**
  - 5S
  - Poka-Yoke / Mistake-Proofing
  - KANBAN
  - Push-Pull System / Strategy
  - Standardized Work
  - JIDOKA
  - Just-In-Time – An Overview

- **Cycle-time Reduction**
  - Continuous Flow
  - Heijunka
  - Single-Minute Exchange of Die (SMED)
  
- **KAIZEN**
  - Meaning & Background of KAIZEN
  - Meaning & Background of KAIZEN Blitz
  
- **Other Improvement Tools and Techniques**
  - Theory of Constraints (TOC)
  - Overall Equipment Effectiveness (OEE)
  
- **Implementation**
  - Developing plans for implementing proposed improvements
  - Conducting Pilot tests or simulations
  - Evaluating results to select the optimal solution

- Learning Objectives
- Key Deliverables
- **Statistical Process Control (SPC)**
  - Objectives of SPC
  - Selection of variables for Control Chart monitoring
  - The principle of Rational Sub-grouping
  - **Control Chart Selection**
    - Decision-making Tree
    - **Control Chart for Continuous Data:-**
      - ❖ X-bar & R-chart
      - ❖ X-bar & S-chart
      - ❖ Individual & Moving Ranges Chart
    - **Control Chart for Discrete Data**
      - ❖ c-Chart (Number of Incidents)
      - ❖ u-Chart (Incidents Per Unit)
      - ❖ p-chart (Percent defective)
      - ❖ np-Chart (Number of Defectives)
    - **Time-weighted Charts**
      - ❖ Exponentially Weighted Moving Averages (EWMA) chart

- **Other Controls**
  - **Total Productive Maintenance (TPM)**
    - Meaning & Background
    - Application
  - **Visual Controls**
    - Meaning & Background
    - Elements
    - Functioning to control the process
  
- **Maintain Controls**
  - Measurement System Reanalysis
  - **Control Plan:-**
    - Introduction to Control Plan
    - What makes an effective Control Plan
    - Components / Attributes of a Control Plan
  
- **Sustain Improvements**
  - **Lessons Learned**
    - Documentation of the lessons learned
    - Replicating improvements

- **Documentation**
  - Standard Operating Procedures (SOPs)
  - Work Instructions
  
- **Training Needs Analysis (TNA)**
  - Introduction to Training Needs Analysis
  - The importance of a TNA
  - Three levels of assessment
  - Purpose and Types of Training
  - Five phases to conduct Training Needs Analysis



Thank You