

**Six Sigma Black Belt**

**Course Number:** SIX-106  
**Duration:** 8 days

**Overview**

This live, instructor-led Lean Six Sigma Black Belt training course teaches attendees how to lead successful improvement teams and achieve strategic objectives in any function or department in their organization. Participants learn how to extend the depth of methods across the various phases of the DMAIC (Define, Measure, Analyze, Improve, and Control) roadmap. This course also prepares learners for the [Certified Six Sigma Black Belt Exam](https://www.sixsigmacouncil.org/six-sigma-black-belt-certification/).

Note: This Black Belt course is conducted over two 4-day sessions (8 full training days in all) of training with a 3-4 week break between sessions.

**Prerequisites**

All students should have some basic statistics knowledge and have taken our [Six Sigma Green Belt course](file:////training/six-sigma-green-belt) or have the equivalent knowledge.

**Materials**

All attendees receive comprehensive courseware.

**Software Needed on Each Student PC**

Each student should have Minitab software installed (or use the [free 30-day trial)](https://www.minitab.com/en-us/products/minitab/free-trial/).

**Objectives**

* Understanding the Central Limit Theorem
* Overcome unusual measurement system challenges
* Apply transformation techniques to data for accurate analysis of capability as well as how to evaluate single-sided specifications
* Determine which factors provide the best response prediction
* Work with non-linear relationships
* Evaluate and select the dominant factors to predict the response
* Understand the critical aspects of designing effective and efficient experiments
* Incorporate and evaluate sources of uncontrolled variability during the experiment
* Include and evaluate the impact of a noise factor within an experiment
* Design, analyze, and interpret Factorial Design
* Understand the pros and cons of fractionating a design
* Evaluate the effects of varying levels of multiple factors on a response
* Establish the optimum process settings for multiple factors to maintain goals/targets for multiple performance measures simultaneously
* Optimize processes while they are in use
* Transform two styles of qualitative response data
* Understand specialized Control Chart methods for attribute data and sampling methods for continuous data
* Change how processes function for optimal performance
* Provide closure to the project

**Outline**

* Introduction
* Central Limit Theorem
  + Estimating the mean
  + The Central Limit Theorem and its applicability to sampling theory
* Advanced Measurement Systems Analysis
  + Methods for measuring process performance
* Advanced Capability Studies
  + The conditions where a standard Capability Analysis does not apply
  + Data transformation techniques
  + for accurate analysis of capability
  + Evaluating single-sided specifications
* Multiple Regression
  + Situations where a process performance measure is affected by more than one continuous factor
  + Multiple regression techniques to determine the best prediction of the response
  + Non-linear relationships
* Nested ANOVA
  + Occurrences where process performance is affected by more than one discrete factor
  + Evaluating and selecting the dominant factors in combination with one another to predict the response
* DOE Planning
  + The critical aspects of designing effective experiments
  + Uncontrolled variability during the experiment
* Randomized Block Design
  + Unavoidable yet predictable noise factor in experiments
  + The impact of a noise factor within an experiment.
* Full Factorial Experiments
  + Full Factorial design: the methods for designing, analyzing, and interpreting these designs
* Fractional Factorial Designs
  + Knowing factors to investigate with Full Factorial methods
  + Fractionating a design and the DOE roadmap
* General Factorial Designs
  + Methods for designing and analyzing
  + The pros and cons of designed experiments
* Sample Size Calculation
  + The relationship between the factor(s) and the response
  + How the sample size can impact confidence in the decision based on the data
* Optimization Designs
  + Optimizing the performance of the process.
  + Techniques for determining the optimum
* Multiple Response Optimization
  + Optimizing a single process performance measure
  + Establishing the optimum process settings for multiple factors
* Evolutionary Operations (EvOp)
  + Optimizing processes
  + Apply for radical change where slow, steady improvement is desired and supported
* DOE with Qualitative Responses
  + Overcoming challenges for statistically evaluating the significance of factors on the performance
* Intermediate SPC
  + The most common and most versatile Control Chart
* Change Management
  + Dealing with resistance at various levels within the organization
  + The common signs of resistance
  + Methods to aid in overcoming these forces
* Control Methods
  + Instilling appropriate and effective methods of controlling the process
* Conclusion