



CONTINUING EDUCATION

Six Sigma Black Belt for Service

CEQAL 619

This Center for Quality Six Sigma program provides Black Belt candidates with strong knowledge of the Six Sigma methodology along with the statistical tools and methods used within the methodology to drive cost reductions and improvements in productivity, quality and in customer satisfaction. Participants receive twenty days of intensive, workshop-focused instruction.

Who Should Attend: Individuals in transactional organizations or functions who wish to lead Six Sigma improvement teams and utilize Black Belt tools to drive cost reductions and improvements in productivity, quality, and customer satisfaction.

Prerequisite: A basic knowledge of algebra

Duration: 160 Hours – 20-day course (four sessions, non-concurrent weeks)

Course Content: **Introduction to Six Sigma**
This section introduces the Black Belt to the fundamentals of Six Sigma. It creates an understanding of the Six Sigma framework within the organization and the framework of a Six Sigma project.

- Benefits of Six Sigma programs
- Six Sigma Integrated Model – how Six Sigma drives process improvement
- How to effectively implement Six Sigma in an organization
 - Cultural issues
 - Strategic issues
 - Tools issues
- Six Sigma Project Methodology Overview
 - Define
 - Measure
 - Analyze
 - Improve
 - Control
- Project Selection

- How to select appropriate projects
- How to avoid inappropriate projects
- Project Scoping
 - Avoiding scope creep
 - Aligning resources

Define

This section details the initial phase of the Six Sigma methodology.

- Developing a comprehensive Project Charter
 - Problem statement, goal statement, objectives, business case and milestones
 - Base lining the process
- Developing a Process Map
 - Process flow charts
 - Process maps
- Project Management/Project Planning
 - Project management fundamentals
 - Creating a work breakdown structure
 - Creating an effective project plan
 - Using Project Management software to increase efficiency
 - Risk Analysis
 - Resource Analysis
 - Effective project management
 - Communication management
- Failure Mode and Effects Analysis
 - FMEA and Quality Systems
 - Basic FMEA Concepts
 - FMEA Teams
 - Defining the Process
 - Failure Modes
 - Cause-Effect Diagram
 - Controls
 - Risk Analysis
 - Using the FMEA Form
 - Taking Action
 - Keeping the FMEA Alive
 - Control Plans
 - Reaction Plans

Measure

This topic provides coverage of measurement assessment and data collection. Key concepts include understanding measurement systems as processes. Core tools center on the assessment of measurement system accuracy, precision and linearity.

- Identifying Measurements
 - Input/Output matrices
 - Data collection planning tools and check sheets
- Measurement discrimination
 - Attribute vs. measurements data
 - How much discrimination is needed
- Measurement System Assessment
 - Attribute Data
 - Short method
 - 2x2 matrices
 - Logistic regression
 - Long Method (with underlying measurements)
 - Variables data overview
 - Gage R&R
 - Bias studies
- Long-term assessment – trend chart and control chart concepts for measurement systems
- How to collect data
 - Propriety of data collection
 - Collecting data over time
 - “Converting” attribute data to measurements
 - VOC – Kano model and QFD revisited
 - Surveys – structure and use
 - Formulating questions
 - Sampling methods
 - Sample size
 - Logistics

Analyze

This statistically intensive section of the Black Belt training provides the participant with a comprehensive array of tools used to drive to root causes and optimize processes. Participants receive a firm grounding in basic core tools as well as detailed instruction in advanced tools such as designed experiments and applied statistics.

- Core Quality Tools
 - Pareto charts
 - Trend charts
 - Run charts
 - Histograms
 - Box Plots
 - Brainstorming and affinity diagrams
 - Prioritization tools
 - Force field analysis
 - Cause and effect diagrams
 - Check sheets
 - Cause and effect diagram
 - Is/is not analysis

- Scatter plot
 - 5 whys
 - Prioritization tools revisited + decision matrix
- Introduction to Statistics
 - Types of data
 - Location, spread and shape
 - Measures of location
 - Measures of spread
 - Measures of shape
 - Testing for normality
- Statistical Process Control
 - Control chart concepts (process vs. product revisited)
 - Key variation concepts
 - Attribute data charts
 - Shortcomings of attribute data
 - p chart
 - np chart
 - c chart
 - u chart
 - Variables data control charting
 - Advantages of variables data
 - \bar{X} and R_m charts
 - Rational sampling
 - Process capability
 - Capability with attribute data
 - Use of Z values
 - Capability indices
- Analysis of survey data
- Applied Statistics
 - Non-parametric tests
 - Comparing two processes
 - Sign test
 - Mann-Whitney
 - Siegel-Tukey
 - Kolmogorov-Smirnov
 - Comparing more than two processes
 - Kruskal-Wallis
 - Friedman's test
 - Other non-parametric tests
 - Understanding a Single Process
 - Estimating the Center and Spread
 - Confidence Intervals for the Mean, Variance and Proportion
 - Testing a Hypothesized Mean, Variance and Proportion
 - Errors of Type I and II
 - Sample Size Considerations
 - Paired data analysis

- Assessing Differences Between Two Parallel Processes
 - Graphical Techniques
 - Differences in Means
 - Student's t Test
 - Differences in Variation
 - F Test
 - Differences in Proportion
- Assessing Differences Among More Than Two Parallel Process
 - Differences Between Means
 - Analysis of Variance
 - Differences in Variation
 - Differences in Proportion
- Relating Two Variables (Using an Input Variable to Predict an Output Variable)
 - Correlation
 - Fitting a Line
 - Residual Analysis
 - Predicting the Output at a Given Level of the Input
 - Confidence and Prediction Intervals
- Relating More Than Two Variables (Using More Than One Input Variable to Predict an Output Variable)
 - Building the Regression Model
 - Residual Analysis
 - Confidence and Prediction Intervals for Regression Models
- Design of Experiments
 - DOE fundamentals
 - Planning an experiment
 - Full factorial designs
 - Judging the importance of signals
 - Model building
 - Fractional factorial designs

Improve

This phase of the Six Sigma process is focused on selecting and implementing process improvements to achieve or exceed project goals.

- Selecting improvements
 - Utilization of data
 - Brainstorming
 - Prioritization tools
- Risk assessment
 - Force field analysis
- Key improvement tools
- Mistake proofing
- The concept of Mistake Proofing

- Mistake Proofing Methods and Tools
- Transactional, Safety and Environmental Applications of Mistake Proofing
- Mistake proofing examples
- Mistake proofing workshop
- Changing behavior
 - Understanding behavior
 - Understanding culture
 - Changing behavior and culture

Control

Participants receive multiple methodologies to ensure that the project gains remain effective and in place to maximize benefit to the organization.

- Document Control
 - Quality system documents
 - FMEAs
 - Other documents
- Control plans and reaction plans
- Control Charts
- Institutionalizing behavioral change

Each participant will receive a comprehensive manual and a Certificate of Completion at the close of the seminar.