

Six Sigma Foundation



Lean Six Sigma Black Belt (LSSBB)

Certification and Accreditation

The Black belt is an advanced level of competency for a Lean Six Sigma professional. Briefly speaking, an individual with a Black belt must have knowledge about common lean techniques and must demonstrate ability to apply these. Further, a Black belt must have enough core-competencies to be able to accept responsibilities in any phase of a six sigma project and lead most projects by themselves with minimal guidance. Refer the certification and accreditation requirements as well as body of knowledge in this document for details.



Prerequisites:

A Lean Six Sigma Black Belt Certification being an advanced certification may be pursued by professionals with either a strong process quality background (with knowledge of statistical approach to quality and 3-4 yrs. experience) or an LSSGB certification with atleast 1 year experience (with project work). All professionals looking to take their careers and knowledge of process quality and data analyses to the next level should join this program.

Certification and Examination Guidelines:

1. General Requirements: Examination System

- a. SSF Accreditation and compliance mandates an Online Exam System/Format.
- b. Exam Evaluation results need to be processed automatically without human intervention and results to be shared immediately with the candidate after the completion of the exam.
- c. Exam questions need to be randomized per student by the system, i.e.; if 5 students are appearing for the exam from same location/connection they must all be served questions in 5 different orders.
- d. Exam Questions bank needs to comply with SSF Exam focus requirements.
- e. Questions Answer format needs to be MCQ and True/False type.
- f. In Cases of Project Work Evaluation, records of project work must be stored for a duration of 180 days from the final project evaluation with the SSF ATI. (Accredited Training Institute)
- g. Exam results (final score for a candidate) must be stored for a minimum duration of 360 days from the date of examination.

2. General Requirements: Proctoring and others

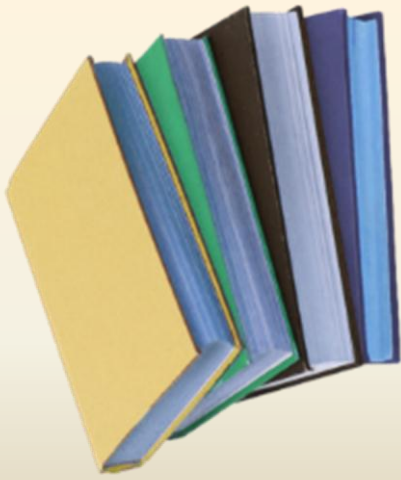
- a. The Examination must be proctored for the entire duration.
- b. Candidate identity must be checked/confirmed prior to examination.
- c. Cell phone use is not to be allowed except for connecting to Wi-Fi hotspot.
- d. Permissible notes allowed are lookup tables and basic reference tables.
- e. Use of calculators and stats software for complex calculations or graphical needs is allowed.
- f. Proctor must confirm that only permissible program types like anti-virus, anti-malware, software firewalls and essential OS services are being run on the

systems of candidates apart from the web-browsers (for connecting to exam portal only; no web-search allowed on the side) for the duration of the exam. Use of any chat-based, social-media platform applications are especially non-permissible during exam.

- g. Proctor must not allow discussions between candidates for the duration of the exam, as must he/she ensure no group-work or cheating methods are being employed by candidates.
- h. Breaks upto 5 mins at a time may be allowed by Proctor per each hour of the exam (but none before first 30 minutes from the start of the exam) **with the express condition** that a candidate will have to forgo the allowance to change/review answers for any/all questions after returning from the break.
- i. In cases where proctoring is having to be done online via a webcam, the candidates must additionally ensure they are not looking off-screen too much or leave web-cam view or interact with other persons for the duration of the exam. A proctor is well within his/her rights to suspend the exam in case of such types of suspicious behavior by candidates. Further the onus for serving a stable web-cam video-feed (minimum 15fps) to the online-proctor from their end is the responsibility of the candidate to comply with remote/online proctoring cases.

3. Specific Requirements: LSSBB Certification and Accreditation

- a. For LSSBB certification, a minimum 100 hours of training is mandated for the SSF approved curriculum considering an average class/batch size of 20 students. Relaxation in this criterion is considered for scenarios with lesser batch sizes for an ATI's accreditation requirements at a standard 10% time reduction allowed for batch size of 10 and less and, similarly a reduction of 20% for batch size of 5 or less (including one-on-one sessions). For example, an ATI accepting a batch size of 9 students must still provision for 90 hours of training.
- b. Modes of Training allowed are purely Offline or purely Online or Blended (online sessions mixed with offline); however, minimum Instructor Led Hours (live training sessions, and not just videos) need to be provisioned for atleast 30% of the total training duration.
- c. Maximum average batch size (3 sessions in a row) considered acceptable by SSF for LSSBB Accreditation is 30 for Offline Training Sessions and 20 for Online Sessions and Blended Sessions.
- d. The LSSBB exam must have 120 questions to be attempted in 180 mins (3 hrs.) at an average/mean time of 90 seconds or 1.5 mins per question.
- e. Pass percentage considered for certification is a score of 60% or above in the exam.



Lean Six Sigma Black Belt

Body of Knowledge

The minimum recommended Body of Knowledge that any ATI needs to be compliant with for Accreditation with the SSF Lean Six Sigma Black Belt Level of Certification. Our unique approach to the BOK was designed as a necessary requirement to our equally unique approach of validating SSF ATI's certification exams to democratize Accredited Lean Six Sigma Certifications by reducing costs incurred in training highly competent people resources by organizations.

Curriculum Focus Areas:

The List of recommended (essential) topics to be covered as part of an SSF ATI's Lean Six Sigma Black Belt certification training curriculum.

1. Lean and Project Management

a. Lean

- i. Lean History and the TPS (Toyota's role)
- ii. Understanding Lean Fundamentals and Importance of Lean
- iii. How Lean and Six Sigma Work together
- iv. Lean Enterprise and Challenges
- v. 7 Wastes of Lean
- vi. 3M in Lean
- vii. 5S with Audits (explore Non-SPC control mechanisms)
- viii. Causal Analysis: Basic techniques like 5-Why, Gemba etc.
- ix. Causal Analysis: 6M with Ishikawa Diagrams
- x. Kaizen, PDCA cycle and concepts of continuous improvements
- xi. Non-SPC Control Technique: Poka-Yoke
- xii. Production Workflow Management
- xiii. SMED
- xiv. JIT Approach (Push vs. Pull)
- xv. TPM with Metrics

b. Project Management

- i. Project Management Fundamentals
- ii. Project Selection Considerations and ROI
- iii. Basics of Modern day Project Management Methodologies with overview of PMI's approach
- iv. Typical Project Management Metrics related to Planning, Monitoring, Quality, Change-Management etc. and how DMAIC fits in
- v. WBS, Gantt-charts, CPM
- vi. Effective Communication: Planning and Mechanisms etc.
- vii. Group Dynamics, Team Management, Motivational Techniques and Best Practices from these Areas

2. Six Sigma via DMAIC Lifecycle

a. Define

- i. Understanding Customer Requirements
- ii. Basics like VOC, VOB, COQ, COPQ etc
- iii. Kano Model
- iv. Prioritization Tools like Decision Matrices, Cost-vs-Benefit Analysis etc.
- v. Understanding the six-sigma breakthrough equation
- vi. Developing CTQs
- vii. Process Mapping Fundamentals
- viii. Process Flowcharts Development
- ix. SIPOC Analysis
- x. Project Charter Development

b. Measure

- i. Data types and Data Distributions
- ii. Continuous vs. Discrete Distributions with examples/use-cases
- iii. Detailed focus on Normal Distribution (3-sigma rule, CLT etc.)
- iv. Situations with Non-Normal Data and how to handle these
- v. Measurement System Analysis: Difference between Accuracy, Precision;
- vi. Measurement System Analysis: Types of Errors viz.: Bias, Linearity, Stability etc. with their impact
- vii. Measurement System Analysis: Gage R&R, Attribute Agreement Analysis
- viii. Data Collection Plan
- ix. Six Sigma History
- x. Six Sigma Levels (Understanding DPMO, DPO, DPU etc.)

- xi. Baselineing Process Performance: Capability and Levels, Sigma Levels and Yield with related Metrics

c. Analyze

- i. Descriptive Statistics*
- ii. Basic Graphical Analysis via simple graphs like Pareto Plots, Scatter Diagrams etc.*
- iii. FMEA
- iv. Hypothesis tests basics and general concepts (significance level, power, alpha, beta, p-value etc)
- v. Hypothesis tests error types
- vi. Hypothesis tests selection process
- vii. Hypothesis tests sampling
- viii. Hypothesis testing on Normal data with common tests
- ix. Hypothesis testing on Non-Normal data with common tests
- x. Contingency tables and using Chi-Square test
- xi. Multi-Variate Analysis

* These topics are being provided for reference and need of coverage, but may be covered in an earlier phase as well

d. Improve

- i. General Intro
- ii. Common Ideation and Consensus building Techniques (Brainstorming, NGT etc.)
- iii. Examining Correlation; Regression Analysis and Interpreting Results (including Residuals plot)
- iv. OFAT vs DOE
- v. DOE Terminology (Factors, Levels, Effects, Interaction, Treatment etc.)
- vi. DOE Fundamentals (Screening, Blocking, Confounding, Replication etc.)
- vii. DOE Planning and Execution Considerations
- viii. DOE Factorial Designs and Resolutions
- ix. DOE Cube and Contour Plots
- x. Piloting the Improvements

e. Control

- i. SPC vs. Non-SPC Techniques
- ii. Control Data Monitoring etc.
- iii. Control Charts and their Fundamentals (Center Line, Control Limits)
- iv. Common Variable Control Charts
- v. Common Attribute Control Charts
- vi. Control Charts Selection based on Data types and Sub-group size etc.
- vii. Examining Control Charts for Process Stability
- viii. Control and Response Planning
- ix. Project Handover and Project Closure Best Practices

Exam Focus Areas:

Exam focus areas are those from where questions are deemed mandatory, so as to ascertain a student's comprehension for key (and minimal) expected knowledge areas along with demonstrable practical ability in order to attain a SSF Lean Six Sigma Black Belt Certification from a SSF Accredited Training Institute. This is a less exhaustive list than the Curriculum Focus Area list and is designed primarily to serve as a basic-guideline to validate the exam questionnaires as per SSF norms. On the whole though, the examination system and methodology for SSF ATIs is another area which gets validated separately for accreditation purposes by SSF, which Includes the online examination mechanism, proctoring controls, as well as the Bloom's Taxonomy (cognitive domain) Level expected to be evaluated in an objective manner in addition to the Exam Focus areas (and weightage of questions).

1. Lean and Project Management

a. Lean

- i. Mandatory Question Areas: Lean Methods 5S, A3, Concepts of continuous improvements (PDCA cycle and Kaizen), Kanban, Lean at Enterprise Level, TPM and related Metrics
- ii. Overall Area weightage: 10%
- iii. Bloom's Taxonomy (2001 revision) Level: Apply (Maximum Targeted Level for this Area)

b. Project Management

- i. Mandatory Question Areas: Group Dynamics, Basic Metrics like ROI, Effort & Schedule Variance, Scope Creep etc., Project Selection Considerations, Basic Concepts from Contemporary Project Management Methodologies (PMI's approach etc.), Gantt Charts and CPM (Critical Path Method)
- ii. Overall Area weightage: 15%
- iii. Bloom's Taxonomy (2001 revision) Level: Analyze (Maximum Targeted Level for this Area)

2. Six Sigma via DMAIC Lifecycle

a. Define

- i. Mandatory Question Areas: VOC, VOB, COQ, COPQ etc.; Prioritizing Customer Requirements (Decision Metrics and Kano Model), Developing CTQs, Project Charter Development
- ii. Overall Area weightage: 5%
- iii. Bloom's Taxonomy (2001 revision) Level: Analyze (Maximum Targeted Level for this Area)

b. Measure

- i. Mandatory Question Areas: Baseline Process Performance with questions on Capability and Sigma Levels, Yield (Y, Yft, Yrt etc.), Measurement System Analysis: Mandatory Questions from both Gage R&R (with basic formulas) and Attribute Agreement Analysis, SIPOC and Process Flowcharts Development
- ii. Overall Area weightage: 15%
- iii. Bloom's Taxonomy (2001 revision) Level: Analyze (Maximum Targeted Level for this Area)

c. Analyze

- i. Mandatory Question Areas: Sampling Techniques, Hypothesis Test Selection, Test Power, Significance and Error Types, Practical questions using some common tests, Inference using Multivariate Tools
- ii. Overall Area weightage: 20%
- iii. Bloom's Taxonomy (2001 revision) Level: Evaluate (Maximum Targeted Level for this Area)

d. Improve

- i. Mandatory Question Areas: Regression analysis with Interpretation of Results (including Residuals plots), Factorial Designs and Resolutions, Crossed vs. Nested Factors, Cube and Contour Plots
- ii. Overall Area weightage: 20%
- iii. Bloom's Taxonomy (2001 revision) Level: Evaluate (Maximum Targeted Level for this Area)

e. Control

- i. Mandatory Question Areas: Non-SPC: Poka-Yoke, SPC: Control charts selection, Response Planning
- ii. Overall Area weightage: 15%
- iii. Bloom's Taxonomy (2001 revision) Level: Analyze (Maximum Targeted Level for this Area)

FAQs and Other Info.

For any more info regarding Certification and Accreditation requirements or further BOK related info/guidance please get in touch with SSF at www.sixsigmafoundation.org

For FAQs please visit the SSF FAQ section via the following link:

<https://www.sixsigmafoundation.org/faq>