PeopleCert Lean IASSC

IASSC Six Sigma
Green Belt
certification

Syllabus

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1. Introduction

Lean Six Sigma, also known as Define, Measure, Analyze, Improve, and Control (DMAIC) model, was originally established by Motorola and is a continuous improvement method that is comprised of a process and a series of tools which are implemented on a project basis in order to achieve a desired result, such as defect reduction, process improvement or any other strategically aligned organizational objectives.

The Lean Six Sigma method

Lean Six Sigma is a method that relies on a collaborative team effort to improve performance by systematically removing waste and reducing variation. It combines lean manufacturing/lean enterprise and Six Sigma to eliminate the eight kinds of waste (muda): Defects, Over-Production, Waiting, Non-Utilized Talent, Transportation, Inventory, Motion, and Extra-Processing[1].

Lean Six Sigma is used to reduce process defects and waste, and to provide a framework for overall organizational culture change. Through the introduction of Lean Six Sigma, employers hope to change the mindset of employees and managers to one that focuses on growth and continuous improvement through process optimization. This change in culture and the mindset of an organization can potentially maximize efficiency and increase profitability[1].

Why is it important to hold a Lean Six Sigma certification?

Holding a Lean Six Sigma certification proves the candidate's proficiency with Lean Six Sigma methodology, beyond the mere knowledge of terminology. It shows to employers that the candidate has the potential to be the person they need to cover The Certified Yellow Belt, The Certified Green Belt or The Certified Black Belt role in their teams.

Whether the candidate is a beginner or a seasoned professional, a certification is a significant advantage when aiming to motivate and lead teammates. The Lean Six Sigma credential showcases that the candidate has the skills necessary to achieve the desired results, such as defect reduction, process improvement or any other strategically aligned organizational objectives.

1.1. Lean Six Sigma Qualification Scheme

The Lean Six Sigma qualification scheme has been structured as follows:

- **Lean Six Sigma Yellow Belt** (16 training hours) – Candidates get the essential knowledge needed for the foundational elements of the Lean Six Sigma Methodology and a good understanding of the elementary aspects of the Lean Six Sigma Method including competence in the subject matters contained within the phases of Define, Measure, and Control (DMC).
- **Lean Six Sigma Green Belt** (80 training hours) – Candidates will enhance on all aspects of the core to advanced elements of Lean Six Sigma Methodology and get an in-depth understanding of all aspects of the Lean Six Sigma Method including higher competence in subject matters contained within the phases of Define, Measure, Analyze, Improve and Control (DMAIC).

[1] *Source: https://en.wikipedia.org/wiki/Lean_Six_Sigma*

- **Lean Six Sigma Black Belt** (120 training hours) – Candidates will enhance on all aspects of the advanced elements of Lean Six Sigma Methodology and get a thorough understanding of all aspects of the Lean Six Sigma Method including advanced competence in subject matters contained within the phases of Define, Measure, Analyze, Improve and Control (DMAIC).

The **IASSC Lean Six Sigma Green Belt certification, by PeopleCert** covers **the core to advanced elements** required for a candidate to build their knowledge and skills regarding the Lean Six Sigma Methodology.

The body of knowledge underlying these skills are presented in the official courseware provided by PeopleCert to accredited ATOs. The primary purpose of the syllabus is to provide a basis for accreditation of people involved with the Lean Six Sigma Methodology. It documents the learning outcomes related to the qualification and describes the requirements a candidate is expected to meet to demonstrate that these learning outcomes have been achieved at the specific qualification level.

2. Lean Six Sigma Green Belt

2.1. Purpose of the Lean Six Sigma Green Belt Qualification

The purpose of this qualification level is to confirm that a candidate is well versed in the core to advanced elements Lean Six Sigma methodology in the cognitive levels of knowledge, understanding, application, analysis, evaluation, and be able to implement, perform, interpret and apply the Lean Six Sigma methodology at a high level of proficiency.

2.2. Target Group/Audience

This certification is the **second level** of the IASSC Lean Six Sigma qualification scheme provided by PeopleCert and is aimed at anyone who wishes to become an advanced professional in the Lean Six Sigma methodology and requires candidates to have and demonstrate a thorough **knowledge** and **understanding** of all the Lean Six Sigma terms, principles, tools and practices, as well as demonstrate their **application, analysis** and **evaluation** skills of how to use the methodology efficiently and effectively. The certification can also cater for candidates seeking personal certification.

This certification will provide all the required level of knowledge to its holders and will certify that they have a thorough understanding of all aspects of the Lean Six Sigma methodology using various tools.

3. Learning Objectives

At this qualification level, candidates will be introduced to all concepts, principles and tools used in the Lean Six Sigma methodology as well as the Six Sigma philosophies and principles (including supporting systems and tools) and a high-level understanding of the DMAIC model.

Holders of the **IASSC Lean Six Sigma Green Belt certification, by PeopleCert,** will be able to demonstrate their knowledge, understanding and practical application of:

- The Basics of Six Sigma
- The Lean Enterprise
- The DMAIC model

- Six Sigma Statistics
- Advanced Statistics including Hypothesis Testing with Normal/Non-Normal Data, Simple Linear/Multiple Regression, Full/Fractional Factorial Experiments
- Lean Controls, Statistical Process Control (SPC), Six Sigma Control Plans

3.1. Qualification Scheme Level

Through the above learning objectives, candidates will demonstrate relevant knowledge skills in the following phases:

Main Topics
Define Phase
Measure Phase
Analyze Phase
Improve Phase
Control Phase

4. Examination

The **Lean Six Sigma Green Belt** exam focuses on the following **five** (**5**) categories in the cognitive domain of **Bloom's Taxonomy- Revised (2001) model**[2] which is a reference for different levels of learning:

- **Remember**
- **Understand**
- **Apply**
- **Analyze**
- **Evaluate**

The **IASSC Lean Six Sigma Green Belt certification, by PeopleCert** exam is designed to target a cognitive level up to Evaluate.

4.1. Assessment Approach

The assessment approach used for the **IASSC Lean Six Sigma Green Belt certification, by PeopleCert** focuses on the **five cognitive** levels of remember, understand, apply, analyze, evaluate. Those are listed below from the least complex to the most complex:

Remember: Recall or recognize terms, definitions, facts, ideas, materials, patterns, sequences, methods, principles, etc.

Understand: Read and understand descriptions, communications, reports, tables, diagrams, directions, regulations, etc.

[2] *The Bloom's taxonomy defines **six** (6) levels of learning in the **cognitive** domain (remember, understand, apply, analyze, evaluate, create), which are both sequential and cumulative and move from the simple to the complex.*
In order to achieve the 6th level of learning, it must be ensured that the previous five levels have been mastered.

Apply: Know when and how to use ideas, procedures, methods, formulas, principles, theories, etc.

Analyze: Break down information into its constituent parts and recognize their relationship to one another and how they are organized; identify sub-level factors or salient data from a complex scenario.

Evaluate: Make judgments about the value of proposed ideas, solutions, etc., by comparing the proposal to specific criteria or standards.

The assessment incorporates the above learning outcomes as it uses assessment objectives that cater for the above cognitive domain categories.

4.2. Entry Criteria/Training Requirements

For this examination, there **are no** formal entry criteria or training requirements.

To be eligible for the **Lean Six Sigma Green Belt** level examination a candidate must be able to demonstrate an thorough **knowledge** and **understanding** of the Lean Six Sigma, principles, tools and practices, as well as demonstrate their **application, analysis** and **evaluation** skills of how to use the methodology and it is recommended that the candidate has received **Accredited Training** by a PeopleCert accredited training partner.

4.3. Examination Format

The following table details the examination format for the **Lean Six Sigma Green Belt** exam:

Delivery	Computer (web proctored or classroom)
Type	**100 Multiple Choice Questions (MCQ)** *Each question is awarded one (1) mark*
Duration	**3 hours (180 minutes)** *For non-native speakers or candidates with a disability, an additional 45 minutes of extra time is allowed.*
Pass Mark	**70% (70 marks out of 100)**
Invigilator / Supervisor / Proctor	**Yes** *Physical or Online Proctoring*
Open Book	**No** *The provided Reference Document, which contains all formulas and tables that may be needed during the examination, can only be used.*
Prerequisites	**None**
Distinction	**N/A**
Certification validity	**3 years (a recertification exam is required to maintain validity)**

The tests are derived from a regularly updated question test bank (QTB) based on the test specification detailed below. Questions are used interchangeably among test sets. The overall difficulty level of each test is the same with any other test. A candidate is never assigned the same test in the case of multiple examination attempts.

5. Detailed Syllabus

The syllabus is structured into sections relating to the **major subject headings** and numbered with a single digit section number. A total of **eighty (80) training hours** of accredited training is **recommended**.

Category	Topic	Ref	Knowledge/Task Item
1.0 Define Phase	1.1 The Basics of Six Sigma	1.1.1	Meanings of Six Sigma
		1.1.2	General History of Six Sigma & Continuous Improvement
		1.1.3	Deliverables of a Lean Six Sigma Project
		1.1.4	The Problem Solving Strategy Y = f(x)
		1.1.5	Voice of the Customer, Business and Employee
		1.1.6	Six Sigma Roles & Responsibilities
	1.2 The Fundamentals of Six Sigma	1.2.1	Defining a Process
		1.2.2	Critical to Quality Characteristics (CTQ's)
		1.2.3	Cost of Poor Quality (COPQ)
		1.2.4	Pareto Analysis (80:20 rule)
		1.2.5	Basic Six Sigma Metrics: including DPU, DPMO, FTY, RTY Cycle Time; deriving these metrics
	1.3 Selecting Lean Six Sigma Projects	1.3.1	Building a Business Case & Project Charter
		1.3.2	Developing Project Metrics
		1.3.3	Financial Evaluation & Benefits Capture
	1.4 The Lean Enterprise	1.4.1	Understanding Lean
		1.4.2	The History of Lean
		1.4.3	Lean & Six Sigma
		1.4.4	The Seven Elements of Waste: Overproduction, Correction, Inventory, Motion, Overprocessing, Conveyance, Waiting.
		1.4.5	5S: Sort, Straighten, Shine, Standardize, Self-Discipline
2.0 Measure Phase	2.1 Process Definition	2.1.1	Cause & Effect / Fishbone Diagrams
		2.1.2	Process Mapping, SIPOC, Value Stream Map
		2.1.3	X-Y Diagram
		2.1.4	Failure Modes & Effects Analysis (FMEA)
	2.2 Six Sigma Statistics	2.2.1	Basic Statistics
		2.2.2	Descriptive Statistics
		2.2.3	Normal Distributions & Normality
		2.2.4	Graphical Analysis
	2.3 Measurement System Analysis	2.3.1	Precision & Accuracy

Category	Topic	Ref	Knowledge/Task Item
		2.3.2	Bias, Linearity & Stability
		2.3.3	Gage Repeatability & Reproducibility
		2.3.4	Variable & Attribute MSA
	2.4 Process Capability	2.4.1	Capability Analysis
		2.4.2	Concept of Stability
		2.4.3	Attribute & Discrete Capability
		2.4.4	Monitoring Techniques
3.0 Analyze Phase	3.1 Patterns of Variation	3.1.1	Multi-Vari Analysis
		3.1.2	Classes of Distributions
	3.2 Inferential Statistics	3.2.1	Understanding Inference
		3.2.2	Sampling Techniques & Uses
		3.2.3	Central Limit Theorem
	3.3 Hypothesis Testing	3.3.1	General Concepts & Goals of Hypothesis Testing
		3.3.2	Significance; Practical vs. Statistical
		3.3.3	Risk; Alpha & Beta
		3.3.4	Types of Hypothesis Test
	3.4 Hypothesis Testing with Normal Data	3.4.1	1 & 2 sample t-tests
		3.4.2	1 sample variance
		3.4.3	One Way ANOVA: Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.
	3.5 Hypothesis Testing with Non-Normal Data	3.5.1	Mann-Whitney
		3.5.2	Kruskal-Wallis
		3.5.3	Mood's Median
		3.5.4	Friedman
		3.5.5	Sample Sign
		3.5.6	Sample Wilcoxon
		3.5.7	One and Two Sample Proportion
		3.5.8	Chi-Squared (Contingency Tables): Including Tests of Equal Variance, Normality Testing and Sample Size calculation, performing tests and interpreting results.
4.0 Improve Phase	4.1 Simple Linear Regression	4.1.1	Correlation
		4.1.2	Regression Equations
		4.1.3	Residuals Analysis

Category	Topic	Ref	Knowledge/Task Item
	4.2 Multiple Regression Analysis	4.2.1	Non- Linear Regression
		4.2.2	Multiple Linear Regression
		4.2.3	Confidence & Prediction Intervals
		4.2.4	Residuals Analysis
		4.2.5	Data Transformation, Box Cox
5.0 Control Phase	5.1 Lean Controls	5.1.1	Control Methods for 5S
		5.1.2	Kanban
		5.1.3	Poka-Yoke (Mistake Proofing)
	5.2 Statistical Process Control (SPC)	5.2.1	Data Collection for SPC
		5.2.2	I-MR Chart
		5.2.3	Xbar-R Chart
		5.2.4	U Chart
		5.2.5	P Chart
		5.2.6	NP Chart
		5.2.7	Xbar-S Chart
		5.2.8	CuSum Chart
		5.2.9	EWMA Chart
		5.2.10	Control Methods
	5.3 Six Sigma Control Plans	5.3.1	Cost Benefit Analysis
		5.3.2	Elements of the Control Plan
		5.3.3	Elements of the Response Plan

6. Test Specification

The **Lean Six Sigma Green Belt** examination will consist of **five** (**5**) sections with the following structure:

Category	Description	Exam (%)
1	Define Phase	19.0%
2	Measure Phase	32.0%
3	Analyze Phase	22.0%
4	Improve Phase	8.0%
5	Control Phase	19.0%
	Total	**100.0%**

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