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Cal Poly
ITP 404/464: Lean Six Sigma Green Belt Certification Project

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Central Coast Lean: https://www.purpose-ccl.org/green-belt

Note: Students completing a Green Belt Project in conjunction with an ITP Senior Project must also take the ATMAE Exam.

COURSE DESCRIPTION

Catalog:

Prerequisite: ITP303 with a B minimum and consent of instructor.

Supervised independent completion of a project applicable to Cal Poly Lean Six Sigma Green Belt Certification. Demonstrate ability to apply the tools and concepts required to complete a LSSGB project. Manage self and others to complete a project. Effectively communicate project process and results.

Program Learning Objectives

PLO 1 Demonstrate fundamental knowledge and skills to solve management, technology and applied engineering problems.

PLO 5 Demonstrate effective participation and leadership in teams.

PLO 6 Demonstrate effective writing and speaking skills.

Course Learning Objectives: Demonstrated ability to:

1. Apply the tools and concepts required to complete a LSSGB project.

2. Manage self and others to complete a project.

3. Effectively communicate project process and results.

This course is designed to individually mentor students through the final steps required to complete the **Cal Poly Lean Six Sigma Green Belt Certification**. For certification candidates that meet the prerequisites listed below, this course adds:

1. Verification that the candidate has successfully completed the prerequisite requirements.

2. Coaching on completing the work experience requirement.

3. Real time mentoring as the candidate completes a Lean Six Sigma Green Belt Project.

Upon successful completion of this course, a candidate only needs verification of the 120 hour related work experience to be **Certified** as a **Cal Poly Lean Six Sigma Green Belt**. Overall certification includes:

- IT303 Lean Six Sigma Green Belt Course (taken separately)

- o   80 hours of online training

- o   Completion of a Mini-Project

- o   Successful completion of a 3 hour online exam

- 120 hours of lean six sigma related work experience (completed separately prior to or concurrent with this course)

- A mentored Green Belt level project (this course)

This course may be completed entirely online, although occasional physical meetings with the course instructor are encouraged.

Prerequisites The following prerequisites are minimum requirements for acceptance in this course. It is recommended that potential candidates contact the instructor (eolsen@calpoly.edu) prior to enrolling in the course to make sure all prerequisites are in order. Green Belt projects typically take 3-9 months to complete. Project completion feasibility should be considered prior to enrollment.

1. Successful completion of the **Cal Poly Lean Six Sigma Green Belt Course** with the following **minimum grades**:

   - Online Quizzes: 80% weighted average

   - Mini-Project: 80%

   - Online Final Exam: 80%

   - Course grade overall: B-

2. **Draft Project Charter** for the required Green Belt Project. A Project Charter form is included as Appendix C. This should be reviewed with the Instructor (eolsen@calpoly.edu) prior to registering for this course. *It is the candidate's responsibility to find an acceptable project for this course.*

3. Read the Shingo Model Handbook.

The student may submit a formal appeal to waive select perquisites with the approval of the instructor and demonstration that deficiencies are adequately addressed.

Mentored Lean Six Sigma Green Belt Project For certification, each candidate must complete a significant Green Belt level project. The project is "mentored" and must be completed under guidance of the course instructor. The minimum required elements of the project are listed under "Green Belt Requirements Project 1" in Appendix A. Note that these are the minimum requirements and that additional tools and analyses may need to be applied to properly address the Project Charter.

Project tracking software from MoreSteam (https://www.moresteam.com/traction/index.cfm) is provided to the candidate as part of the certification process.

COURSE MATERIALS

A.   MoreSteam TRACtion provided to students as part of Cal Poly Lean Six Sigma Green Belt Certification process (Note: Fee $450 student and $550 professional).

B.   MoreSteam.com's web-accessed Lean Six Sigma training program. Candidates enrolled in this course can have a 6-month extension to their MoreSteam Green Belt course for free. Additional

annual extensions are available direct from MoreSteam at the student rate of $50 or the professional rate of $250.

C. Student candidates can also download a free copy of Minitab (optional) from the Cal Poly Website.

D. Shingo Model Handbook provided by instructor.

PERFORMANCE EVALUATION

Evaluation based on the candidate's meeting the minimum acceptable performance criteria for the certification elements covered in this course:

1. Completion of stage gate review for each stage of the DMAIC process (i.e. Define, Measure, Analyze, Improve, Control).
2. Demonstrated competency in all the tools indicated in Appendix A.
3. Project Results Report. See Appendix D for requirements.

POLICIES AND PROCEDURES

Time Expectation This is an independent, fixed start course selected by the candidate based on a reasonable expectation that the project can be completed in a specified period of time. Having previously taken the **IT303 Lean Six Sigma Green Belt c**ourse, the student would have a relatively clear view of expectations. They would also do some pre-work and speak to the instructor (mentor) about the feasibility of completing the projects on time. Completing a draft project charter (see Appendix C) is a prerequisite and part of the course admission process. The **course is registered for 1 quarter, however, typical Green Belt project run 3-9 months in duration**. At the end of each quarter the student will either complete the course or receive a "RP" for a grade is reasonable progress is being made.

In a case where the project is not completed prior to graduation, a grade will be assigned based on percent completion and the quality of work to that point.

Certification can be completed while enrolled at Cal Poly or within 5 years of completing the online training course (IT303) if no longer enrolled.

In order to **maintain certification**, the candidate is expected to give back to the lean six sigma community. This may take one of the following forms a minimum of **every 3 years**:

1. Act as a coach on a student LSS Certification Project.
2. Lead a LSS project.
3. Participate in (take or lead) at least 16 hours of LSS training.
4. Other LSS leadership activities as appropriate.

Personal Integrity Policy The penalty for cheating is expulsion from the course. Cheating occurs when your take credit for work that you did not do. Plagiarism occurs when students copy sections of another author's material without referencing it. I am a strong believer in accessing resources and discussing problems outside the course, but be sure to give credit where credit is due.

<u>APPENDIX A</u>

Cal Poly Certification Project Requirements

		Green Belt Requirements Project 1	Black Belt Requirements	
			Project 1	Project 2
Project Results	Summary statement of project results tying metric performance back to Charter statement mission.	X	X	X
Define	Project Charter	X	X	X
	Thought Process Map	X	X	
	S-I-P-O-C Process Flow Map	X	X	
	Pareto Chart	X	X	
	Gantt Chart	X	X	
	CTQC Tree Diagram	X	X	
	CTQCs Identified with Operational Definition	X	X	
Measure	Measurement System Analysis	X	X	
	Trend Chart	X	X	
	Defect Opportunities Identified	X	X	
	DPMO Baseline and sigma Level	X	X	
	Histogram	X	X	
	Statistical Process Control	X	X	
	Capability Analysis	X	X	
Analyze	Hypothesis Testing	X	X	
	Design of Experiments: Full Factorial or Fractional Factorial Design	NA	X	
	Select from the following tools:	**Select 3**	**Select 4**	**NA**
	Cause & Effect Diagram			
	5-Why, 1-How Analysis			
	FMEA - Failure Mode & Effects Analysis			
	Regression & Correlation Analysis			
	One-Way ANOVA			

Improve	**Select from the following tools:** Brainstorming Error-Proofing System Dynamics Solution Selection Matrix Corrective Action Matrix Piloting Changes Set-up Reduction	**Select 4**	**Select 4**	**NA**
Control	Control Plan	X	X	
	Control Chart(s) showing both BEFORE and AFTER data	X	X	
	Select from the following tools: Revised Work Instructions (Standard Work) 5-S Total Productive Maintenance Best Practices - Improvement Integration	**Select 3**	**Select 3**	**NA**
Affidavit	Signed by organization executive		X	X

Tollgate Review Questions[1]
Good questions to direct projects.

DEFINE

1. What are we trying to accomplish (Mission)?
2. What is the project scope? Is the project scope broad enough to be important, but narrow enough to be do-able?
3. Why are we working on this project? What is the business case for this activity?
4. Who is the customer, and what output (Y) is important to the customer? What are the Critical-To-Quality Characteristics?
5. What are the Operational Definitions for all Critical-To-Quality Characteristics (CTQCs)?
6. How does the current process flow? What are the current inputs to the process?
7. If this project is focused on material or information flow (Lean) has the value stream been mapped? Have cycle times, inventory levels, changeover times, and Takt time been calculated?
8. What resources are required to complete the project? Who is going to work on the project? When must the project be completed?
9. Is the Lean Six Sigma team functioning as effectively as possible?

MEASURE

1. Can the CTQCs be objectively measured?
2. Has the success target been determined - in customer terms?
3. Have potentially significant process inputs (Xs) been identified for further screening?
4. Has a data collection plan been developed for the process output(s), or CTQC(s), and those process inputs, which may be deemed significant?
5. Is the Measurement System capable of providing valid and reliable values with an acceptable degree of error?
6. What is the baseline performance (capability) of the process?
7. Are the relevant metrics visible and widely accessible?
8. Are there any opportunities for "Quick Hits" (Kaizen Blitzes or Rapid Improvement Events)?
9. If the process is not capable, have containment actions been implemented to prevent customers from experiencing defects?

ANALYZE

1. What improvement actions are necessary to achieve targeted performance levels?

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[1] Adapted form MoreSteam.com

2. Has a process been established to track implementation - with defined responsibility and target dates?
3. Are there any obstacles to improvement? Unintended consequences? Indirect effects?
4. How might the system push back?
5. Is continuous process flow being established?
6. Is the process moving from "Push" to "Pull"?
7. Have improvement action alternatives been evaluated for relative attractiveness?

IMPROVE

1. What improvement actions are necessary to achieve targeted performance levels?
2. Has a process been established to track implementation - with defined responsibility and target dates?
3. Are there any obstacles to improvement? Unintended consequences? Indirect effects?
4. How might the system push back?
5. Is continuous process flow being established?
6. Is the process moving from "Push" to "Pull"?
7. Have improvement action alternatives been evaluated for relative attractiveness?

CONTROL

1. Have mechanisms been put in place to provide ongoing feedback and prevent backsliding?
2. Are significant characteristics (inputs and process variables) being monitored and improved over time using statistical methods?
3. Are appropriate preventive actions in place to ensure that work processes are performed in a consistent fashion?
4. Has the Process Owner accepted responsibility for the process changes and ongoing process management?
5. Are improvements, lessons learned, and best practices being shared in a systematic fashion?
6. Have you recognized the team's efforts and celebrated success?

APPENDIX C

PROJECT CHARTER

Project Name: *(1)*	**Business/Location:** *(2)*
Enter Project Name	Enter Business Unit, Location, Division, or other identifier.

Team Leader: *(3)*	**Champion:** *(4)*
Enter your name	Individual responsible for directing efforts of the team. Works with team leader to develop strategies, set direction and goals, acquire necessary resources and resolve barriers or conflicts. Monitors progress of team and makes adjustments as appropriate.

Project Description/Mission: *(5)*
Describe the project that the team is expected to complete. What is the team expected to accomplish or deliver.

Problem Statement: *(6)*
Describe the problem or opportunity prompting this project activity - in customer terms. Outline what the team is expected to develop or remedy

Business Case: *(7)*
Why undertake this project vs. some other activity?

Deliverables: (8)	**Goals/Metrics:** *(9)*
List the project deliverables - the process or product changes to be implemented.	Qualify or quantify the desired outcome of the team's process or recommendations

Process & Owner: *(10)*
Describe the process affected by this project and identify the process owner.

Project Scope Is: *(11)*

Qualify or describe the geographic, organizational, physical or other boundaries of the teams reach and solution
Project Scope Is Not:

Key Customers: *(12)*	**Expectations:** *(13)*
Who are the various internal or external customers of the team's process or impacted by the team's recommendations	To the extent known, what outcomes or metrics do the customers expect?

Milestones: *(14)*	**Completion Dates:** (15)
Project Start: List the steps that the team is expected to complete as part of the project.

Project Completion: | Indicate preliminary dates for completion of the project milestones. |

Expected Business Benefits: *(16)*	Quantify		Explanation
	1-Time	Annual	What are the expected business benefits, both tangible and intangble? Identify the categories impacted with a checkmark, then quantify if possible. Distinguish between one-time benefits and ongoing annual annual benefits. Provide a description to explain the projected benefits and their calculation.
☐ Hard Cost ☐ Soft Cost ☐ Revenue ☐ Speed ☐ Compliance ☐ Intangible			

Team Members: *(17)*
List the participants on the team or the people involved in the process.

Expected Resource Needs (Internal/External): *(18)*
List the nature, time period and intensity of any auxiliary resources likely to be needed as the team progresses in its work. Estimate cost of any external resources required, e.g. consultants

Risk Assessment: *(19)*
Describe any material risks associated with the project

Prepared By: *(20)*	**Date (Last Revision):** *(21)*
Who created/revised the Charter?	Note the date of creation and any revisons. Revisions should be approved and signed-off by the Project Champion.

Project Results Report

A. Create a **checklist with references** to show you have completed all the tool requirements in the certification course syllabus (Appendix A). By references, I mean at least the e-names of the individual tool files. Attach as an appendix to your Project Results Report below. Note that this NOT required for Independent BB Projects.

B. For your **Project Results Report** requirement, please create a brief document with **at least** the following elements. Feel free to reuse or paraphrase the work you have completed on TRACtion or as part of your independent project (BB only). One purpose of this report is to answer the following questions for people not familiar with your work: *What did this person do for a project?* and *Why was it a significant improvement?*

1. **Project Title**

2. **Your Name and contact info**

3. **Headshot photo** (1x2" minimum)

4. **Date Range for the project**

5. **Project description** (50 words or less)

6. **Sponsoring organization**

7. **Champion or sponsor with title and contact info**

8. **Problem Statement**

9. **Results:** Summary statement of project results tying key improvements and metric performance back to Charter statement mission.

10. **Summary of Define of Define Phase** (1 page max plus figures)
Key actions taken to address this phase?
What were the key findings?
What were the key lessons learned?

11. **Summary of Measure Phase** (1 page max plus figures)
Key actions taken to address this phase?
What were the key findings?
What were the key lessons learned?

12. **Summary of Analyze Phase** (1 page max plus figures)
Key actions taken to address this phase?

What were the key findings?
What were the key lessons learned?

13. **Summary of Improve Phase** (1 page max plus figures)
Key actions taken to address this phase?
What were the key findings?
What were the key lessons learned?

14. **Summary of Control Phase** (1 page max plus figures)
Key actions taken to address this phase?
What were the key findings?
What were the key lessons learned?

15. **Appendix**
   a. Check List of Project files per requirements.
   b. Additional figures and graphs not included above that make a significant contribution to your "Green Belt Project Story."
   c. Shingo Model Assessment – complete online and include in report. https://goo.gl/forms/wxd501ApnShzFvj52
   d. List of Certification Requirements Completed and Dates:
      1. Completed 80 hours of online training with MoreSteam.com – Month, Year?
      2. Received ???% average on the On-line Quizzes (80% minimum required) – Month, Year?
      3. Completed LSS Mini-Project (80% minimum required) – Titled "*?????*" for Organization?????, completed Month, Year?
      4. Received ???% on MoreSteam Final Exam (80% minimum required) – Month, Year?
      5. Completed over 120 hours of LSS Related Work Experience (120 hours minimum required) – with Organization?????, supervised by ???????
      6. Successfully completed a mentored LSS Green Belt Project titled "*?????*" for Organization?????, completed Month, Year?