Mar17   Rev Z

Cal Poly
Lean Six Sigma Black Belt Training – Online

Class Meetings: Wed 2:10pm-4:00pm and online at Zoom https://calpoly.zoom.us/j/215381714
Dr. Eric Olsen   Professor of Industrial and Packaging Technology
Bldg 03 Rm 405   Office Hours: 11am-1pm M/W and by appointment
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Email: eolsen@calpoly.edu   Website: http://www.cob.calpoly.edu/faculty/eric-olsen/
Central Coast Lean: **www.cob.calpoly.edu/centralcoastlean/**

TAs for this class are Kara Rutherford krutherf@calpoly.edu and Lara Sly lasly@calpoly.edu

TEACHING AND ONLINE LEARNING APPROACH

We will use a "flipped classroom" approach that emphasizes questions and answers and real world guests in the classroom and access to knowledge content and theory online. We call the class the "Cal Poly Lean Six Sigma Forum" because it combines three categories of students: Green Belts (GBs), Transactional Green Belts (TGBs), and Black Belts (BBs). And just about anyone from the lean six sigma community who wants to join us online. Students can be in a CSU degree program or working professionals. This creates a rich mix of experience and lean learners.

The class meets synchronously in-class and online every Monday and Wednesday from 2:00pm-4:00pm using Zoom http://calpoly.zoom.us/ . Students are encouraged to attend every session to ask questions and interact, but sessions are also recorded for later viewing. Guest speakers will be a regular feature of the Wednesday session and will be the most interactive. The Monday sessions will be a "Movie Day" featuring the greatest hits of lean online movies and videos. Attendance as the Movie Day session is optional, but we will be discussing the movie afterwards and the discussion will **NOT** be available online. Physical seating in the class is "open" to both in-class and online students with priority going to in-class students. Although this approach has yielded plenty of available seats in the past, we are still experimenting. You can always participate online.

Students will be required to complete a "Quiz" for each session. The primary learning elements for the course are the online lectures and guest speakers, weekly online movies, the online MoreSteam training material (see below), and an individual Lean Six Sigma Mini Project.

COURSE DESCRIPTION

This course is designed to familiarize students with the Lean Six Sigma process improvement methodology and to provide them an opportunity to practice using Six Sigma Black Belt tools. It is also the first step in the Cal Poly Lean Six Sigma Black Belt Certification process. A Lean Six Sigma Black Belt is an individual who is skilled in applying basic and advanced process improvement and project management methods in order to complete projects that will result in significant, sustainable improvements within an organization.

Originally developed by Motorola to improve quality in their manufacturing processes, Six Sigma has been adopted by companies throughout the world to improve all types of processes. When applied in business environments, Six Sigma programs have been used to dramatically increase an organization's

ability to improve quality and customer satisfaction while reducing overall costs. Companies such as AlliedSignal and General Electric have used Six Sigma to significantly increase productivity, operating income and cash flow.

In this course, students will gain an understanding of the strategy and deployment of Six Sigma Black Belt methods. After completing this course, you should be able to DO the following:

1. Communicate using Lean Six Sigma concepts.
2. Think about an organization as a collection of processes, with inputs that determine the output.
3. Relate Lean Six Sigma concepts to the overall business mission and objectives.
4. Use the concept of a Sigma Level to evaluate the capability of a process or organization.
5. Understand and apply the five-step D-M-A-I-C model as a framework to organize process improvement activity.
6. Employ a wide range of process improvement techniques, including Design of Experiments, within the D-M-A-I-C model.
7. Recognize the organizational factors that are necessary groundwork for a successful Lean Six Sigma effort.
8. Employ your Lean Six Sigma skills to lead a successful process improvement project delivering meaningful results to the organization.

Please read*: This course requires **ADDITIONAL COST** companion software from MoreSteam.com at* https://www.moresteam.com/university/calpoly.cfm

Note that to get access to the companion software as listed below you will need a discount code from the course instructor (Eric Olsen eolsen@calpoly.edu) AFTER you complete a contract and pay $600 to Cal Poly for the course as a fee. Cal Poly employees receive an adtional discount.

> MoreSteam Companion Software Price Schedule
> CSU Student Black Belt Training and Exam - $500
> CSU Student Black Belt Training and Exam (already completed or paid $300 GB in IT303) - $325
> Professional (non-CSU student) Black Belt Training and Exam - $3,100

For example, the out of pocket cost for a current CSU student is $600 to Cal Poly and $500 to MoreSteam.com or **$1100 TOTAL**. The Cal Poly portion of the cost is always the same ($600). The MoreSteam.com portion adjusts per the category of student per the price schedule above.

This course consists of the following elements:

1. Complete the 140 hour Lean Six Sigma Black Belt – EngineRoom version online training provided by Moresteam.com. Access is provided for 365 days with permission. A course overview is provided at http://www.moresteam.com/lean-six-sigma/black-belt.cfm
2. Complete the online quizzes from each session – **20% of grade.**
3. Meet weekly or as specified with the course instructor online and on-time completion of course homework. Attending a minimum of 10 of 15 live sessions is required – **10% of grade.**
4. Practice Test in preparation for the final exam **– 5% of grade.**
5. Complete the open book, open note 5-hour final exam with at least a 70%. **The score on this exam determines 40% of your final grade.** Students not hitting the 70% mark will be required

to retake the exam or take an incomplete or F for the class. Note that 80% or better is required to proceed with certification (separate course).

6. Complete a "Lean Six Sigma Mini-Project" as described below with a minimum of 70%. **The grade on this project determines 25% of your class grade.**

COURSE OUTLINE			
Winter Black Belt - Block Plan			**Dec16 Rev Z**
Wk / **Online Session: Title**	**Online Hours**	**Target Complete***	**Week Total**

Wk	Online Session: Title	Online Hours	Target Complete*	Week Total
Win 1	*Session 1: Introduction to Lean Six Sigma*	4.8	1/15/17	**13.1**
	Session 2: Define 1 - Starting a Project and Leading Teams	8.3		
2	*Session 3: Define 2 - Voice of the Customer*	8.1		**11.8**
	Session 4: Define 3 - Mapping the Process	5.3	1/22/17	
	"Electronic Index Card" and Resume Due			
3	*Session 5: Measure 1 - Measurements and Basic Statistics*	5.8	1/29/17	**5.8**
	Mini-Project Ideas Assignment due			
4	*Session 6: Measure 2 - Measurement System Analysis*	8.6	2/5/17	**8.6**
5	*Session 7: Measure 3 - Charting Process Behavior*	9.7	2/12/17	**9.4**
	Mini-Project Draft Charter Due			
6	*Session 8: Analyze 1 - Identifying potential root causes*	10.2	2/19/17	**10.2**
	Tool Plan Assignment Due			
7-9	*Session 9: Analyze 2 - Hypothesis Testing*	23.2	3/12/17	**23.2**
	Quickie Kaizen Due			
	Preliminary Report Outs on Mini-Projects			
	BREAK Weeks: 16March-18April			
Spring 3-6	*Session 10: Analyze 3 - Design of Experiments*	33.2	4/23/17	**33.2**
	Note: this topic will be covered in two class sessions			
7-8	*Session 11: Improve*	12.8	5/7/17	**12.8**
8-9	*Session 12: Control*	7.0	5/21/17	**7.0**
10	**Final Mini-Project due, Practice Test due**		6/4/17	
	Report outs on Mini-Projects			
	Online Exam	5.0	**6/11/17**	**5.0**

Notes: * *Target complete section quiz by Sunday, 11pm.*

1. *Occasionally the course plan may be adjusted to accommodate the pace of the class. I will keep you apprised of adjustments.*

COURSE MATERIALS

Required

1. This course does not have a text. We will be using the same online training material used by over 45% of Fortune 500 Companies. MoreSteam is a premiere supplier of online lean six sigma training material https://www.moresteam.com/elearning/tour/lean-six-sigma-retail-tour.cfm? You need to purchase access for a year. Follow these steps:
    a. Obtain a **Discount Code** from Professor Eric Olsen eolsen@calpoly.edu. This will allow you to **pay the appropriate fee**.

b. Go to the Cal Poly/MoreSteam.com Lean Six Sigma Training website at: **https://www.moresteam.com/university/calpoly.cfm** Select **Cal Poly Lean Six Sigma Black Belt and Exam**. Note that current students you are receiving a significant discount from the list price of $3,100.

c. Click on **ENROLL** for the **Lean Six Sigma Black Belt and Exam**. The price will be adjusted based on your Discount Code at checkout.

d. Login or New Customers to MoreSteam **CREATE MY ACCOUNT**.

e. **Pay** as directed.

2. In line with its mission to "Build a Community of Lean Practice" Central Coast Lean has purchased a site license to Gemba Academy **http://www.gembaacademy.com/enterprise/CCLean/** . This license allows any Cal Poly student, faculty, or staff **free** access the site and its resources. The **username is: CCLean** and the **password is: ABD7andon** (case sensitive). The password will change every quarter. If you are still at Cal Poly in the future and want access to the site, just contact me eolsen@calpoly.edu. Please respect this as intellectual property and do not share this outside Cal Poly. If you do want to share this within Cal Poly, I would appreciate if you cc me or send folks to me for access. That way I can monitor the "community building."

Recommended

It is also recommended you get a free copy of Minitab from Cal Poly or your University's software download channel. This will supplement the statistics software provided free with the MoreSteam training. Minitab also has a "lite" version that runs on a Mac.

PERFORMANCE EVALUATION

Quizzes	20
Class participation	10
Mini Project	25
Practice Test	5
Comprehensive 3 hr exam	40
Total	100%

Class participation:

Quantitative measures – complete and on time (162pts - 10% total)

a) Electronic Index card – 3pts
b) Resume – 3pts
c) Mini-Project Ideas Assignment – 6pts
d) Draft project charter – 6pts
e) Movie Quizzes (7 minimum) – 42pts
f) Lecture Quizzes (7 minimum) – 42pts
g) On time completion of online session quizzes – 33pts total (3pts each)
h) "Stand-up" Presentation to the class – 6pts
i) Tool Plan assignment – 6pts
j) MoreSteam Quickie Kaizen assignment – 6pts
k) Mini Project Survey – 3pts
l) Other assignments – 6 pts max

Extra Participation Credit: Additional Poster version of Mini-Project – 12pts

*** Note: If students do not achieve the 80% minimum on the exam required to proceed with certification, the exam may be retaken after a 30-day "cooling off" period. The original test score still deterimes the course grade.***

Because the value of Lean Six Sigma capability is highly valued in the job market, students can list "Completed all courses required for Six Sigma Blackbelt certification" on their resumes upon successful completion of this course.

In addition, students are encouraged to pursue Cal Poly Lean Six Sigma Black Belt certification.   Students successfully completing this class have all the training necessary to pass any reputable certification test in the Six Sigma body of knowledge. The American Society for Quality (ASQ) offers certification as a Blackbelt by taking an exam and completing two projects for less than $500.   Only one project is required with three years of work experience: http://www.asq.org/certification/six-sigma/index.html .

POLICIES AND PROCEDURES

Personal Integrity Policy
Your most valuable asset is your personal integrity. Exercise and develop this important asset in this course. The penalty for cheating is an **F for the course**. Cheating occurs when:
1. A student looks at other students' work during a quiz or exam or obtains help of faculty or students outside their assigned group on assigned homework sets or exams.
2. A student copies large sections of another author's material without referencing it (plagiarism).
3. Students share answers to online quizzes or individual homework assignments.

In contrast to cheating, I believe it is beneficial to work in pairs and groups to study, discuss, and understand the material. This is especially true in addressing "supplemental exercises" at the end of each section. Feel free to discuss the online content and supplemental exercises with your classmates or others to build your understanding of the material.

You are responsible for anything that is said in class or any changes made to assignments. Do not e-mail or call me asking, "What did I miss?" Find a buddy to share coverage responsibility. If your buddy is at a loss, please contact one of our two able Teaching Assistants before going to me. cc me if you like.

You are responsible for managing the inputs into your grade. The points are there. I do not give additional projects to increase one's grade.

INSTRUCTOR CAREER HIGHLIGHTS - ERIC OLSEN

RESEARCH INTERESTS
                        Lean Thinking -- Strategy Deployment – Performance Measurement
EDUCATION
Ph.D. Operations Management – 2004   The Ohio State University
Master of Business Administration - 1987   Virginia Polytechnic Institute & State U
Bachelor of Science, Forest Engineering - 1979   University of Maine at Orono
INDUSTRY
Hewlett Packard / Agilent (Avago Tech)   **1988 - 1999**
Production Manager – Wireless Semiconductor Division   Santa Clara, CA
Worldwide Manufacturing Education Manager - Components Group

Manager, Product Engineering - Optical Communication Div., Fiber Optic Mfg.
Manufacturing Development Engineer - Optical Communication Division, Fiber Optics
Litton - Poly-Scientific   **1982 – 1988**
Manager Fiber Optic Engineering   Blacksburg, VA
Senior Engineer - Slip Ring Products
Caterpillar Tractor Company   **1979 – 1981**
Test Engineer – Product Development Center   Peoria, Illinois

Requirements for Lean Six Sigma Mini-Project

NOTES:
- ***A copy of these instructions is also posted on the course website.***
- ***Consider making a Poster for extra class participation credit.***
- ***Review the grading rubric BEFORE completing this project to maximize your score (and learning).***

Objective and Overview
It is important to exercise your knowledge to own it. This is especially true in the world of lean six sigma. Therefore, one of the requirements of this course is that you apply the concepts and tools that you are learning from the MoreSteam online content to a real project. This is the "learn-by-doing" portion of the course.

You shall select a process to improve and apply the DMAIC steps to that process. In the real world, you would be working with a team and have a great deal of flexibility about which approach and tools you would use to solve a problem. This project is to be completed on your own or possibly with the assistance of people involved in the process that you have selected (not your classmates). To manage and grade the large number of students taking this course, the documentation for the project is standardized. The remainder of this document explains the basic project requirements. Questions will be addressed during the weekly sessions.

Step 1: Select a Process to Improve
I suggest you complete at least the first four online sessions before you select a process. The best process to select involves a real world problem that you have a vested interest in solving. This is especially true of work processes in your job or at an internship. Alternatively, you can propose any process that you are familiar with and have access to. **Select a process that has an "outside" sponsor (not you) to work with.** Consider whether the improvement of this process would look good on a resume or make the work life of you or associates better. Would you be able to use this an example of how you have applied the DMAIC process in a job interview? Consider whether this process would help others beside you. Ultimately, you need to strike a balance between doing a significant project that may be big and complex, with a project that is simple enough to use as an explanation of the DMAIC process.

Once you have decided on a candidate process or two, be sure to review the rest of the project requirements to be sure you have an idea how the project will roll out and which specific tools you might use. **Note that you may have to expand the scope of your project to apply all 10 tools.** Also note that applying all 10 tools may not necessary solve the problem you have identified. This is okay. That is why we call it a "mini" project. If you don't achieve a "solution," at least you should achieve a better understanding of the problem. Your report and recommednations should still help the sponsor.

Step 2: Draft a Project Charter and Get Instructor Approval

One key tool in the Define stage of a project is the "Project Charter." You are required to provide the instructor with a **rough draft Project Charter** of your proposed project **by the week specified in the block plan** of the class. You will not necessarily be able to insert all the required fields in the online form (see MoreSteam), but you should provide enough information to demonstrate to the instructor that you have a high likelihood of success. Submit your Draft Project Chart as directed.

Step 3: Create a Project Plan

Review the "Lean 6 Sigma DMAIC Map (SIX SIGMA PROCESS IMPROVEMENT FLOWCHART)" in the sidebar of the MoreSteam training. You are required to apply a minimum of **two tools to each DMAIC stage**. Fortunately, the **Project Charter** counts as one tool in the Define stage. **You are also required to apply at least one "statistical tool" in your project**. Examples of statistical tools include control charts, hypothesis tests, correlation analysis, capability analysis, and regression analysis.

> **Project Plan Outline**
> Executive Summary
> Recommendation(s)
> Define
>> 1. Tool – Project Charter
>> 2. Tool - ???
> Measure
>> 1. Tool – ???
>> 2. Tool – ???
> Analyze
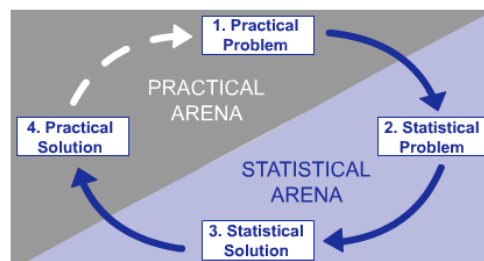>> 1. Tool – ???
>> 2. Tool – ???
> Improve
>> 1. Tool – ???
>> 2. Tool – ???
> Control
>> 1. Tool – ???
>> 2. Tool – ???

Aside from executing each tool in your plan, you will also provide **a brief, clear statement on:**
1. **Why you applied that particular tool to your SPECIFIC project** and
2. **Your interpretation is of the result to your SPECIFIC project** *(see "Thought Process Map" Session 1, Lesson 15).*

The project you will submit will consist of a total of 10 tools, 10 "why" statements and 10 corresponding "interpretation" statements.

A good "lean" approach that reduces muda for your instructor is to have **every new tool begin on a new page clearly indicating the DMAIC stage, the title of the tool and your "why", and "interpretation" statements.**

Step 4: Execute your Project
During the execution of the project, bring your observations and questions to the weekly sessions. Help is usually available at the end of each weekly session.

Step 5: Compile your results
Put all your tools and statements into *one* pdf document. Make sure:

1. The tools and statements are **all in DMAIC process order**.
2. The **file name includes your name**.
3. All **pages are numbered**.
4. Include a **footer with the file name and your name**.
5. Include an **executive summary and recommendation** as the **first** page of your project.

Step 6: Submit your results
Submit your pdf as specified by the instructor.

Mini-Project Grading Criteria – See the grading rubric on the course portal.

The following is a breakdown summary of the criteria that will be used in assessing your project:

Points	Percent	
5	4%	Project report submitted on time.
5	4%	Format and submission directions followed.
10	8%	Picture or organization logo included.
10	8%	Executive summary included, well executed, extra effort evident.
8	6%	Recommendations included, well executed, extra effort evident.
5	4%	Statistical analysis applied in one or more tools.
10	8%	All ten why statements included, well-executed, extra effort evident.
60	45%	All ten tools submitted, well executed, extra effort evident.
20	15%	All ten interpretation statements included, well executed, extra effort evident.
133	**100%**	