AE-690/ IT-590/ ICP-690/ MMA-663/ HADM-640
Quality Operations Management

Dates:	Time:	Location:
Tue 08/25-12/15/2015	6-8:40 pm	139 Meier
Instructor:	Office Hours:	Contact:
Sonja Streuber	MWF 12-1 pm on Google Hangouts F 4-5 pm 212 Gellersen	sonja.streuber@valpo.edu

Introduction
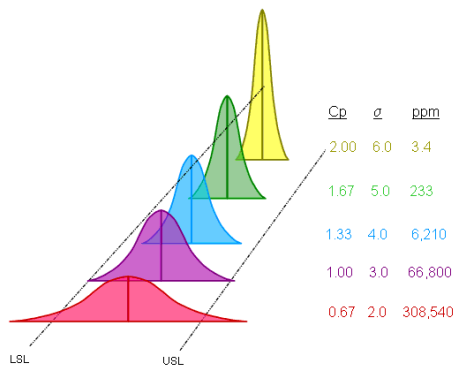
Six Sigma is a methodology of implementing a highly successful project, or producing a high quality product or service, using techniques and principles that ensure excellence. The methodology takes its name from a letter in the Greek alphabet, sigma, which is used by mathematicians to measure variability, i.e. the number of errors in a process. The goal of a Six Sigma implementation is to produce a product or service with fewer than 3.4 errors per million transactions, thereby saving an enterprise both, time and money.

Learning Objectives:

- Communicate using Six Sigma concepts.
- Think about your organization as a collection of processes, with inputs that determine outputs.
- Relate Six Sigma concepts to the overall business mission and objectives.
- Use the concept of a sigma level to evaluate the capability of a process or organization.
- Understand and apply the five-step DMAIC model as a framework to organize process improvement activity.
- Employ a wide range of process improvement techniques, including design of experiments, within the DMAIC model.
- Recognize the organizational factors that are necessary for a successful Six Sigma effort.
- Employ your Six Sigma skills to lead a successful process improvement project and deliver meaningful results to the organization

While this course may qualify students for the Valparaiso University's Six Sigma Greenbelt Certification, it also prepares them for the American Society for Quality (ASQ) "Six Sigma Green Belt" certification. Fulfilling the ASQ prerequisites and passing a separate exam will grant ASQ certification.

Textbooks/ Materials

- MS Windows: Minitab 17 (education version, $29 at http://www.onthehub.com).
- Macintosh: Minitab 17 on Parallels or Minitab Express (education version, $29 at http://www.onthehub.com). Or Minitab Express (less functionality).
- A Windows or Macintosh laptop computer for in-class work with Minitab.
- George, Michael L. et al. (2005), *The Lean Six Sigma Pocket Toolbook*. McGraw Hill.

- Verzuh, Eric (2011). *The Fast Forward MBA in Project Management*. Wiley. eBook available at http://site.ebrary.com.ezproxy.valpo.edu/lib/valpo/docDetail.action?docID=10509840

Reference Materials (on course reserve at the library):

- Roderick Munro et al. (2008) *The Certified Six Sigma Green Belt Handbook*. ASQ.
- Ruffa, Stephen A. (2008). *Going Lean: How the Best Companies Apply Lean Manufacturing Principles to Shatter Uncertainty, Drive Innovation, and Maximize Profits*. eBook available at http://site.ebrary.com.ezproxy.valpo.edu/lib/valpo/docDetail.action?docID=10271800

Workload

This is an INTENSE and fast-paced course which requires SIGNIFICANT work outside of the classroom.

- **Attendance & Preparation**: Much of your grade will depend on your contribution to class discussions and in-class deliverables. Since this is a highly interactive class, you must be present and engaged. Do the readings, watch the videos, and review the slides each week before class.
- **Greenbelt Project**: To earn the Valparaiso University Six Sigma Greenbelt Certification, you must lead (and document) a real-world project for an existing for-profit or non-profit business or organization. This project must focus on improving a business, service, or manufacturing process by applying Six Sigma Tools, then implementing your improvements, and verifying through statistical analysis—confirmed by your project sponsor(s) in the organization—what the financial benefit of your improvements has been. This will occur in two phases:
  - **1**. In-class deliverables: These will ensure that your project stays on track and that the minimum requirements for a Greenbelt project are fulfilled. Each in-class deliverable may be critiqued in class and will become part of the final project presentation.
  - **2**. The final output of your project will be a PowerPoint slideset similar to the examples supplied on the course's Blackboard site, in which you address all elements of the DMAIC lifecycle using at least 5 tools to examine and improve the problem. The in-class deliverables will be the backbone of this project. This is due 12/14/2015 11:59 pm CST

**Not all projects are usually completed within one semester; some take two.
Greenbelt projects are NOT team projects**.

NOTE: If you do not have access to a business or organization, you will not be able to earn the VU Greenbelt Certification, but you can still complete the course with an assigned case study.

- **Final Exam**: The final exam is a randomized 100-question multiple-choice exam very similar to ASQ's Six Sigma Greenbelt Exam. It is available on Blackboard from 12/17/2015 6:00 pm CST to 12/17/2015 8:00 pm CST. You will have 120 minutes to complete the exam. Links to practice tests are posted on Blackboard. Use them to prepare.

Late Assignments: Assignments are considered late if **not posted to Blackboard** by 11:59 pm CST on Monday evening of the week in which the assignment is due (consult the schedule below). **Submissions by email are not accepted.**

Late assignments lose 50% of the grade.

Performance Evaluation (Grading)

You can earn up to 1000 points in this course.   Distribution is as shown below:

Component	Points	Notes
Participation	10 ea. = 150	Arrive on time and be prepared, participate in discussions with thoughtful comments that foster a learning environment.
In-Class Deliverables	20 ea. = 300	Please upload the deliverable to the Blackboard website before the beginning of the session in which they are due.
Greenbelt Project/ Case Study	350	Will be graded on clarity, comprehensiveness of analysis, mathematical correctness, and interpretation of results. 5-10-minute presentations will be graded on persuasiveness and professionalism.
Course Final	200	100 randomized questions, multiple choice.

Letter Grade Conversion:

A	>93%	A-	90 to 93%	B+	87 to <90%	B	83 to <87%	B-	80 to <83%
C+	77 to <80%	C	73 to < 77%	C-	70 to <73%	F	<70%		

Valparaiso University Honor Code

All work you submit for any course at Valparaiso University—and in any professional environment—must be your own. You may NOT use anyone else's words (from books, blogs, webpages, magazine articles, etc.) without giving a clear source citation in a footnote. If you are unsure, consult http://www.plagiarism.org/ or the Writing Center.

In addition, you must write out and sign with your full name the following statement on all deliverables submitted for academic credit:

I have neither given nor received, nor have I tolerated others' use of unauthorized aid.

For more information about Valparaiso University's Academic Honor Code, case review cycles, and potential penalties, please refer to http://www.valpo.edu/student/honorcouncil/index.php

Diversity and Inclusion

Valparaiso University aspires to create and maintain a welcoming environment built on participation, mutual respect, freedom, faith, competency, positive regard, and inclusion. This course will not tolerate language or behavior that demeans members of our learning community based on age, ethnicity, race, color, religion, sexual orientation, gender identity, biological sex, disabilities (visible and invisible), socio-economic status, or national origin. The success of this class relies on all students' contribution to an anti-discriminatory environment where everyone feels safe, welcome, and encouraged to question, to engage, to challenge, to explore, and ultimately, "to embark on a rewarding personal and professional journey" (President Heckler).

Disability Support Services

As part of its mission for its students, Valparaiso University has developed a nondiscrimination policy which identifies its intention to provide a safe and tolerant environment for all, including those with disabilities. Please contact Sherry DeMik, Director of Disability Support Services, at 6956, or Zebediah Hall, Disability Support Services Coordinator, at 6496, if you believe you have a disability that might require a reasonable accommodation in order for you to perform as expected in this class. More information is on the Disability Support Services website at http://www.valpo.edu/disabilityss/

Academic Support

To get help, use the Academic Success Center (ASC) online directory (valpo.edu/academicsuccess) or contact the ASC (academic.success@valpo.edu) to help point you in the right direction for academic support resources for this course. Valpo's learning centers offer a variety of programs and services that provide group and individual learning assistance for many subject areas. These learning centers include:

- Graduate Tutoring Lab: Serves the academic needs of Graduate students – tutors offer suggestions on organization of papers, assist in research and citations, and help in understanding difficult assignments. Additional one on one tutoring is also available.
- Writing Center: Primarily serves the needs of undergraduate students, but is also available for Graduate students. Writing Consultants provide proofreading and editing assistance for papers and assignments.
- Language Resource Center: Provides tutoring and other resources for language study as well as opportunities for authentic language use through conversation programs, enrichment activities and other exchanges.

Class Cancellations

Notifications of class cancellations will be made through Blackboard with as much advance notice as possible. It will be both posted on Blackboard and sent to your Valpo e-mail address. If you don't check your Valpo e-mail account regularly or have it set-up to be forwarded to your preferred e-mail account, you may not get the message. Please check Blackboard and your Valpo e-mail (or the e-mail address it forwards to) before coming to class.

Please check Blackboard for information about updates to the attached course schedule, office hours, and other administrative changes.

Schedule

Session	Date	Topic	Reading ([Handbook is recommended]; handouts available on Blackboard)	Due Monday 11:59 pm CST
1	08/25/15	Six Sigma and organizational goals Lean Principles, DFSS	• Toolbook Chapter 1 • Jack Welch, *Winning*, ch. 15 ("Six Sigma: Better than a Trip to the Dentist") (handout) • Col. F. Hart, "Lean Manufacturing and the Army Industrial Base," p.2-5 and Col. A Raulerson et al. "Lean Six Sigma at Anniston Army Depot" p.6-9 in *Army Logistician* Nov-Dec 2006. nov_dec06.pdf (handout) • "Toward Error Free Lab Work", "Improving Operating Room Patient Flow" (both handouts)	
2	09/01/15	Data Collection Exercise Process and Project Management Basics, Project Charter	• Toolbook Chapter 3,4, 9 • Verzuh 1-2, esp. "Seattle Children's Hospital and Regional Center" • [Handbook Chapters 3-5, 10]	1. Greenbelt project idea (1 pg)
3	09/08/15	**DEFINE** Business Case, Managing Risk, Failure Mode and Effects Analysis (FMEA)	• Toolbook Chapter 3, 11 (FMEA) • Verzuh 5 • "FMEA—the Cure for Medical Errors" (handout) • [Handbook Chapter 9]	2. Project Charter Draft FMEA
4	09/15/15	Document and Analyze Processes, As-Is Financials	• Toolbook Chapter 3 • "Reduce Pre-Analytical Errors at Hospital: A Joint Six Sigma Project with Quest Diagnostics and a Hospital Customer" (handout) • [Handbook Chapters 7, 9]	Draft Process Flowchart 3. FMEA
5	09/22/15	Define Customer Requirements Change Management Building Effective Teams	• Toolbook Chapter 4 • Verzuh 15 • Ruffa, ch. 9 ("A Plan for Action") • [Handbook Chapter 8,9]	4. Process Flowchart, 5. As-Is Financials
6	09/29/15	**MEASURE** Determine Key Performance Indicators, Measurements	• Toolbook Chapter 5 • Stephen Ruffa, "Leading through Measurement" in *Going Lean* • [Handbook Chapters 10, 12,19]	6. SIPOC Template with Requirements 7. Change Management Plan

7	10/06/15	Basic Statistics, Control Charts	• Toolbook Chapters 5, 6 • [Handbook Chapter 11, 12, 19]	8. Measurement Plan
8	10/14/15	Measurement System Analysis, Process Capability	• Toolbook Chapters 5, 7 • [Handbook Chapter 14, 15]	Draft Measurement System Analysis
9	10/20/15	**ANALYZE** Introduction to Analyze Root Cause Analysis and Tools Financials Checkpoint	• Toolbook Chapter 8 • Spack, "Introduction of the Measurement Uncertainty Concept in Nestlé Laboratories" *spack.pdf* (handout) • CE matrix - Active.xls and C&E 8M info sheet.ppt and Fishbone Blank.ppt (handout) • [Handbook Chapter 9]	
10	10/27/15	Process Stratification and Frequency Distributions	• Toolbook Chapter 8 • [Handbook Chapter 13, 17]	9. Measurement System Analysis and Process Capability
11	11/03/15	Confidence Interval Hypothesis Testing, Analysis of Variance (ANOVA)	• Toolbook Chapter 8 • [Handbook Chapter 17]	10. C&E Matrix or Fishbone Diagram 11. As-Is vs. To-Be Financials Breakdown
12	11/10/15	Correlation and Linear Regression	• Toolbook Chapter 8 • [Handbook Chapter 16] • Run Chart Analysis, *Example 2.pdf* (handout)	12. Hypothesis Test &/ or ANOVA
13	11/17/15	Design of Experiments (DOE)	• Toolbook Chapter 8 • "Design of Experiments" (handout) • [Handbook Chapter 18]	13. Correlation/ Regression Analysis and forecast
	11/24/15	**THANKSGIVING**	**THANKSGIVING BREAK**	
14	12/01/15	**IMPROVE AND CONTROL** Generate the Implementation Plan Present Recommendations	• Verzuh 7 • Ruffa, ch. 10 ("Structuring the Transformation") • [Handbook Chapter 19]	14. Project Schedule (use ganttproject.biz)
15	12/08/15	**IMPROVE AND CONTROL** Change Management	Course Summary Project Presentation Deck Peer Review	15. Project Presentation Deck
FINAL	12/17/15	**FINAL EXAM**	**Final Exam OPENS 6:00 pm CST and CLOSES 8:00 pm CST.**	**Final Project Due 12/14**