

Syllabus

6 Sigma Basics OPNS-931

Northwestern University
Kellogg School of Management

Contact Information

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Course Overview

6 Sigma Basics is a combination of theory and practical application of 6 Sigma, Lean, and project management techniques. It introduces a basic problem solving framework and evolves / enhances it during the course using various tools.

The focus for Session A is on some of the most frequently used tools in the 6 Sigma toolset.

Session B is the continuation of 6 Sigma Basics (A).

While additional tools are introduced, the focus for this session is the practical application of the tools and in-depths reviews of the progress on the problem you are attempting to solve.

So, in order for you to gain the most from this course, you are expected to identify an issue you want to analyze with these techniques, preferably a real problem encountered during your job.

If you do not have a problem that will allow you to exercise these tools, you may benefit by deferring Session B to a future quarter, so you will have the time to identify an appropriate problem.

Please note that this is NOT a certification course, and completion of this course will not necessarily lead to certification. However, successful completion of your project can be used to demonstrate 6 Sigma proficiency for any formal certification program, such as the one run by ASQ (American Society for Quality), the de facto industry standard for 6 Sigma certification.

Approach

Since this class is grounded in the practical application of 6 Sigma, Lean, and Project Management, the primary emphasis will be on student participation.

Prerequisites

- DECS 434
- OPNS 430

A working knowledge of Excel, PowerPoint, and Word.

In Session B, there will be a small number of demonstrations using Stata.

I have been told that all students have access to Stata and it is the analytical software used in DECS 434.

Course Materials

There is no required textbook for this course.

Upon the conclusion of Session A, I will make available a list of recommended readings.

All material introduced will have one or more web references for your review.

However, there is required software – Stata.

<http://stata.com/>

In the 6 Sigma community, the primary statistical package is Minitab.

Whenever Stata is used to illustrate a tool, I will also show you what it looks like in Minitab. Minitab has a 30-day trial version. We will not be using it until Session B.

<http://www.minitab.com/en-US/default.aspx>

Attendance

Students are expected to attend all classes. An attendance sheet will be circulated to check attendance. Students who miss more than one class may lose a letter grade.

Grading

Session A

- 20% Mid-Term Exam
- 40% Class Participation & Attendance
- 40% Homework

Session B

- 40% Class Participation & Attendance
- 60% Homework & Application of Session 1 Tools on a Real-World Improvement Opportunity

Mid-Term Exam

The exam will cover the concepts discussed in class to-date. It will be a mix of:

- Fill-in-the Blank
- Multiple Choice
- Some problems that will test your knowledge of concepts introduced in Classes 1-4

The exam is closed book, closed notes, in class.

Class Participation

Class participation / discussion is a very important part of the learning process in this course. That said, grading class participation is necessarily subjective. You are evaluated on the quality of the contributions that you make to class discussion and not on the amount of "air time" you take up.

Please note that you will not be evaluated on questions that you ask to clarify lecture or course material. If you have a question, chances are that the same question is on the minds of some of your classmates as well. Thus, you are doing the class a favor by asking it.

Again, I am assuming that this material is new to most of you. So, please, ask questions. And yes, cold-calling is a possibility.

I will try to gauge / evaluate participation by class using the method outlined below.

- 0 = Not in attendance.
- 1 = In attendance, but little-to-no participation in the discussion.
- 2 = In attendance and moderate participation in the discussion.
- 3 = In attendance and active participation in the discussion.

Again, I understand that this scale is subjective.

Homework

In keeping with the previous scale:

- 0 = Not turned in.
- 1 = Turned in, but with numerous errors and/or omissions.
- 2 = Turned in, but with a small number of errors and/or omissions.
- 3 = Turned in, with no errors and/or omissions.

Application of Session 1 Tools on a Real-World Improvement Opportunity

Similar to the Homework scale:

- 0 = Not turned in or no update from the previous week.
- 1 = Turned in, but with numerous errors and/or omissions, or a nominal update from the previous week.
- 2 = Turned in with minor updates from the previous week (such as evidence that you are moving the project forward, providing new analysis, and/or use of new tools).
- 3 = Turned in with a major updates from the previous week (such as evidence that you are moving the project forward, providing new analysis, and/or use of new tools).

As you can see, Session B is heavily weighted to having a viable project to work on.

Classroom Etiquette

Students will abide by the Kellogg Code of Classroom Etiquette in interaction with their fellow students and with the instructor.

Laptops – please leave them off unless we are using them in an exercise.

Cell phones – please turn them off or on vibrate.
And no texting, please.

Nameplates – please bring & display them (thank you).

“Vegas Rules” – class discussion stays in class, please.

Honor Code

The student experience at the Kellogg School is unique because, among other reasons, students trust that their classmates will behave with honesty, integrity, and respect in all academic, professional, and social matters.

Kellogg's Honor Code plays a critical role in engendering this trust. The Honor Code requires that a student not to seek an unfair advantage over other students, including but not limited to giving or receiving unauthorized aid during completion of academic requirements; to truthfully represent fact and self at all times; and to respect the property and personal rights of all members of the Kellogg community.

Students' willingness to abide by this Code serves as the lubricant that allows faculty and students at the Kellogg School to interact with a minimum of rules, regulations, and bureaucracy, which in turn allows all of us to focus on creating an engaging and challenging academic environment.

For each formal course requirement, I will attempt to be clear about my expectations and standards. If you have questions about whether behavior is within the bounds of honorable behavior, please ask. Your mantra should be: when it doubt, ask!

One final word / request – students will not disseminate course materials or their course notes beyond other members of the course.

Sanity Check

This course is grounded in published “best practices”.

Please be wary of anyone pushing (selling) proprietary approaches to improvement.

Creating a culture of engaged problem solvers in your business is not nearly as difficult as it may sound. So, don't leave the tools of process improvement only in the hands of a few “experts”. Become familiar with the basics, as they will help you become part of the solution to any business problem.

Course Outline

A detailed week-by-week agenda is below.

Class	Topic	In-Class Exercises	Tools Introduced	Homework Assignments
0				Identify an Improvement Opportunity
				Survey
1	Introductions		Project Risk Assessment	Quadrant 1 of A4 --> DEFINE
	Expectations - Survey Results		A4	Pareto - Case Study - Pareto
	Icebreaker & "Quick Wins"		Pareto	"Real World" Pareto
	Course Overview		5 Whys	Gemba Walks
	Break		Voice of the Customer (VoC)	Stakeholder Analysis
	A Basic Problem Solving Framework DMAIC --> DEFINE		Process Maps (overview)	Start Daily Tracking of your (a) Commute Time or (b) Weight
	Homework Assignment		Gemba Walks	Form 3-4 member groups
			Spaghetti Diagrams	
			Stakeholder Analysis	
			Consensus / Voting	
			Action Item Tracking	
2	Icebreaker & "Quick Wins"		Histograms	Update Quadrant 1 of A4 (if needed)
	Review of "Real World" Pareto (2-3 students)		Box Plots	Quadrant 2 of A4 --> MEASURE
	Review of Gemba Walk		Scatter Diagrams	Quadrant 4 of A4 --> Project Mgt
	Review of Quadrant 1 of A4 --> DEFINE (2-3 students)		Run Charts	Deming's Red Bead Experiment
	Review of Stakeholder Analysis (2-3 students)		Control Charts	REMINDER - Continue Daily Tracking
	Break			
	Tollgate Review - Define			
	DMAIC --> MEASURE			

Class	Topic	In-Class Exercises	Tools Introduced	Homework Assignments
	DMAIC --> MEASURE - Deming Funnel Experiment	Deming Funnel Experiment (Variation)		
	Homework Assignment			
3	Icebreaker & "Quick Wins"		Process Mapping	Quadrants 2 & 3 of A4 --> ANALYZE Update other A4 Quadrants (as needed)
	A4 Review (2-3 students)		Affinity Diagram	Process Map
	Review of Deming's Red Bead Experiment		Fishbone (Cause & Effect)	Affinity Diagram
	DMAIC --> MEASURE - Measurement Systems Analysis (MSA)		ANOVA (overview)	REMINDER - Continue Daily Tracking
	Tollgate Review - Measure			
	DMAIC --> ANALYZE - Qualitative Data			
	Break			
	DMAIC --> ANALYZE - Process Mapping	Process Mapping		
	DMAIC --> ANALYZE - Affinity Diagram	Affinity Diagram		
	DMAIC --> ANALYZE - Affinity Diagram HOMEWORK			
	DMAIC --> ANALYZE - Fishbone Diagram			
	DMAIC --> ANALYZE - Quantitative Data			
	Homework Assignment			
4	Icebreaker & "Quick Wins"		Multi-Voting	Update A4 (as needed)
	A4 Review (2-3 students)		Criteria Selection Matrix	Affinity & Pareto - AT&T Wireless Complaints

Class	Topic	In-Class Exercises	Tools Introduced	Homework Assignments
	DMAIC --> ANALYZE - Process Map		DOE (overview)	Prepare for Class 5 Lessons Learned Discussion
	DMAIC --> ANALYZE - Affinity Diagram HOMEWORK (If not done in Class 3)		Lessons Learned	REMINDER - Continue Daily Tracking
	Tollgate Review - Analyze			
	DMAIC --> IMPROVE			
	Break			
	DMAIC --> ANALYZE - Multi-Voting	Multi-Voting		
	Tollgate Review - Improve			
	DMAIC --> CONTROL			
	Tollgate Review - Control			
	Exam Expectations			
	Homework Assignment			
5	Icebreaker & "Quick Wins"			Update A4 (as needed)
	Review of Affinity & Pareto - AT&T Wireless Complaints			REMINDER - Continue Daily Tracking
	A4 Review (2-3 students)			
	WRAP-UP & NEXT STEPS - Plan for Classes 6-10 - Six Sigma Resources			
	Review of Expectations from Class 1			
	Lessons Learned			
	Class Critique (by Students)			
	Break			
	Exam			
	Homework Assignment			

Class	Topic	In-Class Exercises	Tools Introduced	Homework Assignments
6	Icebreaker & "Quick Wins"		VSA	Update A4 (as needed)
	Student Feedback (on experience using tools)			Submit Special Topics for Review
	Mid-Term Review			REMINDER - Continue Daily Tracking
	A4 Review (3-4 students)			
	Break			
	SPECIAL TOPIC - Planning a Value Stream Analysis (VSA)			
	Homework Assignment			
7	REAL-LIFE Observations			Need to Pick a Day
				Download & Install Trial Version of Minitab
8	Icebreaker & "Quick Wins"		SIPOC	Update A4 (as needed)
	A4 Review (3-4 students)			Case Study - Process Maps & SIPOC
	Review of Observations			Submit Special Topics for Review
	Break			REMINDER - Continue Daily Tracking
	SPECIAL TOPIC - SIPOC	SIPOC		
	Homework Assignment			
9	Icebreaker & "Quick Wins"		Minitab	Update A4 (as needed)
	A4 Review (5-6 students)			Control Charts - Weight - Case Study
	Review of Case Study			Submit Special Topics for Review
	Break			

Class	Topic	In-Class Exercises	Tools Introduced	Homework Assignments
	Minitab Overview	Minitab		
	SPECIAL TOPIC - Control Charts			
	Homework Assignment			
10	Icebreaker & "Quick Wins"			Update A4 (as needed)
	A4 Review (5-6 students)			Submit Special Topics for Review
	Review Control Charts			Submit Special Topics for Review
	Break			
	SPECIAL TOPIC - Project Management – Process to Develop a Workplan			
	Homework Assignment			
11	Icebreaker & "Quick Wins"			
	A4 Review (5-6 students)			
	Review of Expectations from Class 1			
	Lessons Learned			
	Class Critique (by Students)			
	Break			
	SPECIAL TOPIC(S) - Student's Choice			