Syllabus

Implementing Process Improvement

OPNS-932

Northwestern University
Kellogg School of Management

Contact Information

Jack Boepple
j-boepple@kellogg.northwestern.edu
Cell Phone – 630-347-6258
Office Hours – 60 minutes before class or call/e-mail me

Course Overview

Evaluating and improving operating processes is essential for the growth and health of any business. This course introduces a variety of frameworks for assessing performance as well as identifying and prioritizing improvement opportunities. It draws on the most frequently used tools from Six Sigma and Lean as well as project management techniques. The course also emphasizes organizational considerations in implementation. Students will have opportunities to apply these tools in visits to local firms as well as be expected to use them in a final project.

The emphasis of this course is on the practical application (vs. theory) of Six Sigma, Lean, and project management techniques as the best way to learn these techniques is to practice them. **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.**

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 Six Sigma proficiency for any formal certification program, such as the one run by ASQ (American Society for Quality), the de facto industry standard for Six Sigma certification.

Approach

This class is grounded in the practical application of Six Sigma, Lean, Project Management, and Change Management. As such, there is typically at least one in-class exercise for each class.

There will be one mandatory opportunity to conduct observations. A second, optional, opportunity will also be offered.

The focus of the first half of the course is on some of the most frequently used tools in the Six Sigma toolset. While additional tools are introduced, the focus of the second half of the course is the practical application of the tools and in-depths reviews of the real-world problem you are attempting to solve. To help with the understanding of the material, there is an emphasis on student participation.

Student Feedback

- Practical
  - One of the most useful classes I've taken.
    No text book, no calculator, just practical tools.
  - I used every single lecture in my work day.
  - It did not feel like a class. It felt like a guide to solve my work problems.
  - Your class was instrumental in my job hunting process: once I walked them through the DMAIC process and what I would do, they were sold (not a single DECS, Accounting, or Finance question!).
  - It felt like a capstone to my operations major and a combo of MORs & Analytics.

- Instructional
  - I have used many of your tools in order to guide novice project managers.

- Applicability
  - Looking at the variety of projects on which we have been able to use these tools, it is clear to me that they are valuable even on 'non-process improvement' initiatives, such as marketing and fundraising

Prerequisites

OPNS 430 and a working knowledge of Excel, PowerPoint, and Word, and Stata.

Course Materials

There is no required textbook for this course.

All of the concepts and tools are industry-standard and multiple references can be found via a web search.

However, the Case Packet is required. Its contents are:

1. Excel Logistics Services
2. Samsung Electronics: Using Affinity Diagrams and Pareto Charts
3. Analyzing Low Patient Satisfaction at Herzog Memorial Hospital
4. Improving Account Receivables Collections
5. Using Control Charts in Hospitals
6. Tipping Point Leadership

Also, there is required software – Stata (http://stata.com/). I have been told that all students have access to Stata and it is the analytical software used in DECS 434.

In the Six Sigma community, the primary statistical package is Minitab. We will use it starting Class 6.

Whenever Minitab is used to illustrate a tool, I will also show you what it looks like in Stata. *Since Minitab only has a 30-day trial version, please do NOT download it until you are instructed to do so.* http://it.minitab.com/en-US/products/minitab/free-trial.aspx

Attendance

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

Grading

- 35% Class Participation & Attendance
- 30% Homework (Mix of Group & Individual)
- 25% Tool Demonstrations (Individual)
- 10% Mid-Term Case Study (Group)

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 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.

A score of 2 is NOT bad. Your final grade is on a relative scale, not an absolute one.

- For example, if you receive a 2, that is "good" if the average class participation score for that class is a 1.625.
- Alternatively, if you receive a 2, that is "OK" if the average class participation score for that class is a 2.125.

At the start of class, everyone starts with a 2 – as I expect everyone to participate in some manner. If I deem your participation to be "active", you will likely be awarded a 3. Expect points to be deducted for:

- Arriving Late
- Nodding Off (or worse, sleeping) – if tired, I would prefer that you stand in the back of the room
- **Smartphone use (e.g., texting or surfing the web)**
  If caught using a cell phone during class, expect to be called out and receive a zero (0) as your participation grade for that class
- Use of your laptops / notebooks for non-class reasons (e.g., e-mail or surfing the web)

- Disruptive Behavior
- Behavior not consistent with the Kellogg Code of Classroom Etiquette

Homework

I will gauge / evaluate homework using the method outlined below.

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

  At my discretion, I may award an additional ½ point if I consider your work to be a model for the other students. Under such circumstances, I may ask you to present your solution to the rest of the class.

Further, I am looking for breadth & depth in the responses (i.e., not just a few words). When using personal examples (drawn from your work experience), I am also looking for reflection / insight.

Business writing skills (aka "presentation") is also considered. Please refer to the "*Hit List of Editing Tips*" for some suggestions. Ideas presented as one long paragraph will get less consideration than those laid out in a manner where the main point "pops out". In short, please make it easy for the reader (me) to understand your main points and the flow of your logic / assessment. If it helps, pretend you are presenting this to your boss's boss.

Observations are to be considered as homework.

Again, there will be two opportunities to conduct observations – both will be on a Saturday. Doing one is mandatory; it does not matter which one. To compensate for "having class" on a Saturday, there will be no class in Week 7.

Note – there may be homework assignments (i.e., case studies) that are worth more points. In those cases, the same scale will be used, but a multiplier used to determine the final score.

Homework is due at the start of class. Points will be deducted on a sliding scale for late turn-ins.

Tool Demonstrations – Application of Process Improvement

You have the option of

(a) Focusing on a single project or

(b) Applying the tools to varying circumstances.

The grading criteria are dependent upon which path you choose to follow.

While similar to the Homework criteria, the grid below attempts to provide further clarification.

Points	Single Project Track	Multiple Tools Track
0	Not turned in	
	No update from the previous turn-in	
1	Turned in, but with numerous errors and/or omissions, or a just a nominal (i.e., insignificantly small; trifling) update from the previous turn-in.	Cursory submission.
2	Turned in with minor updates from the previous turn-in (such as evidence that you are moving the project forward, providing new analysis, and/or use of new tools).	Sound submission.
3	Turned in with a major updates from the previous turn-in (such as evidence that you are moving the project forward, providing new analysis, and/or use of new tools).	Insightful submission.
XC	At my discretion, I may award an additional ½ point if you used a tool in a manner that I would consider it to be a model for the other students.	

Notes	If your project hits a "dead-end", you may switch to the Multiple Tools Track	You may not use the same tool twice.
		One of the submissions must be a process map.
		You may not repeat work previously turned in as homework.

Due	**Regardless of the track selected, all Tool Demonstrations are due two days before class.**
	In other words, if class is on Thursday, homework is due Tuesday at 6:00 PM.
	This will enable me to provide you with more immediate (“real-time”) feedback.

Homework / Tool Demonstrations Format Guidelines

Assume electronic submission unless noted otherwise.

Currently, there is only one assignment that requires a paper submission – the Observation.

In fact, the Observation assignment requires both a paper and electronic submission.

- Electronic (via e-mail)
  - One file - PDF format

- Both Electronic & Paper
  - 12-pt, Times New Roman font
  - Single-space acceptable
  - If a multiple part assignment (e.g., a case study with several questions), then please submit them in the sequential order

- Paper
  - Cover Page - with (a) the name of the assignment and (b) your name
  - Stapled in the upper-left hand corner (unless indicated otherwise)

- Process Map
  - PowerPoint or Visio is preferred
  - Word or Excel is acceptable
  - A (scanned) hand-drawn sketch is NOT acceptable
  - Two pages max

Late Submissions – Homework and Tools Demonstration

Points are deducted on a sliding scale for late submissions.

Submissions that are more than48 hours late will receive a zero (0).

Mid-Term Case Study

The Herzog case is due by the start of Class 6 at 6:00 PM (CT).

Week 11

There is no final exam. Class 11 is optional and will only be held if there are special topics submitted by the students.

Classroom Etiquette

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

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

Cell phones – please turn them off or on vibrate.

And no texting, please.

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

"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
0	black font = lecture		
	green font = student participation/exercise		
1	Introductions		Project Risk Assessment
	Survey Results - Expectations		Pareto
	Syllabus Review		Voice of the Customer (VoC)
	Icebreaker & "Quick Wins"		Gemba Walks
	Course Overview		Spaghetti Diagrams
	Break		Stakeholder Analysis
	DMAIC --> DEFINE	Pareto	Consensus / Voting
	Groups		Action Item Tracking
	Homework Assignment		
2	Icebreaker & "Quick Wins"		Histograms
	Review of "Real World" Pareto (2-3 students)		Box Plots
	Review of Gemba Walk		Scatter Diagrams
	Tollgate Review - Define	Card Drop Game	Run Charts
	DMAIC --> MEASURE - Card Drop Game	Demining Funnel Experiment (Variation)	Control Charts
	Break		A4
	- Deming Funnel Experiment		
	DMAIC --> MEASURE (continued)		
	A Basic Problem Solving Framework		
	Homework Assignment		
3	Icebreaker & "Quick Wins"		5 Whys
	Review of Deming's Red Bead Experiment		Process Mapping
	Case Study Review - Reducing Delinquent Account Receivables		Affinity Diagram
	Tollgate Review - Measure		Fishbone (Cause & Effect)
	DMAIC --> ANALYZE - Qualitative Data		DOE (overview)
	- Process Mapping	Process Mapping	ANOVA (overview)
	- Affinity Diagram - Class Example - "Thanksgiving" (Entire Class)	Affinity Diagram (2)	
	Break		
	- Fishbone Diagram - Quantitative Data		

Class	Topic	In-Class Exercises	Tools Introduced
	- Affinity Diagram - Class Example - AT&T Wireless Complaints (Group)		
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
4	Icebreaker & "Quick Wins"		Multi-Voting
	Case Study Review - Samsung		Criteria Selection Matrix
	Intro - Herzog Case Study		DOE (overview)
	Tollgate Review - Analyze		
	DMAIC --> IMPROVE		
	- Multi-Voting	Multi-Voting	
	Break		
	DMAIC --> IMPROVE (continued)		
	Tollgate Review - Improve		
	Expectations for Observations		
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
4a	REAL-LIFE Observation #1 (will take place on a Saturday before Class 5)		
5	Icebreaker & "Quick Wins"		VSA
	Review of Observation #1		
	Tollgate Review - Improve		
	DMAIC --> CONTROL		
	Tollgate Review - Control		
	Herzog Case (Part 2)		
	VOC - Survey Methods		
	Lean Revisited		
	Break		
	Lean Simulation - 5S Game	Lean - 5S	
	Lean Revisited (continued)		
	Lean Simulation - Dot Game	Lean - Dot	
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
6	Icebreaker & "Quick Wins"		Minitab
	Case Study Review - Herzog		
	Tollgate Review - Control		
	Plan / Expectations for Observation #2		
	Minitab Overview	Minitab	
	Break		
	Control Charts Revisited		
	Weight Control Chart Exercise	Weight Control	

Class	Topic	In-Class Exercises	Tools Introduced
		Chart	
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
7	REAL-LIFE Observation #2 (no class - as observation will take place on a Saturday)		
8	Icebreaker & "Quick Wins"		
	Review of Applying Lean		
	Case Study Review - Using Control Charts in Hospitals		
	Review of Observation #2		
	MSA Exercise #1	MSA	
	Measurement Systems Analysis (MSA)		
	MSA Exercise #2	MSA	
	Break		
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
9	Icebreaker & "Quick Wins"		
	Guest Speaker		
	Break		
	De-Brief - Guest Speaker		
	Process Improvement Resources		
	Class Critique Prep		
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		
10	Kellogg Class Critique (by Students)		
	Icebreaker & "Quick Wins"		
	Lessons Learned - Review of Expectations from Class 1		
	Break		
	A4 / Tool Demo Review (2-3 students)		
	Homework Assignment		