Bus 459  
Process Analysis and Six Sigma  

Course Information  
Fall 2011  

Instructor: Prof. George Easton  

Notes:  
1. Class starts on Tuesday August 30, at 6:30pm in Room 208  
2. Class is cross-listed with the MBA classes 659 and 659P. The class follows the MBA calendar.  
3. The class will NOT be taught in the spring semester 2012.  

Introduction:  

- Thousands of US companies are implementing Six Sigma (or some part of Six Sigma) as a key strategy for achieving competitiveness. These companies include both manufacturing and service companies and major efforts are underway in healthcare.  
- The primary focus of Six Sigma is on driving cost and waste out of the business while reducing defects and improving customer satisfaction. This is accomplished by application of well-defined improvement strategies and methodologies.  
- Six Sigma methods can be used to aggressively respond to the economic downturn. In fact, the birth of systems like Six Sigma lies in response to previous recessions and the resulting competitive and economic pressure.  
- Understanding Six Sigma and process analysis and improvement is extremely useful in the context of consulting. It is very hard to understand what is happening at many companies, especially in operations, without more than a passing knowledge of the ideas of Six Sigma.  
- Six Sigma was “invented” at Motorola and made famous by GE. GE credits Six Sigma with billions in savings in both their manufacturing and service operations. Many service companies also use Six Sigma. Bank of America and American Express are examples.  
- Six Sigma has role classifications drawn from the martial arts which lends a mystique to Six Sigma systems: Black Belts, Master Black Belts, Green Belts, etc.  
- Some aspect of the quality management has been “hot” for more than 30 years (TQM, BPR, Six Sigma, Lean, etc.). These topics constitute basic knowledge and skills with can be foundational to a career.
Course Objectives

- We will delve in some detail into process analysis and process improvement methods.
- The course will provide you background and specific skills that will make achieving a Black Belt certification easily attainable once you working and gain a little additional experience.
- Important management and leadership topics will be discussed in the course that can fundamentally affect your perspective on management and your career.
- The course will also provide some contextual and historical perspective which is very useful in really understanding Six Sigma.
- This course has a balance of both “hard” (technical) and “soft” topics. We will learn and discuss technical methods (such as process capability analysis and design of experiments) as well as many very important general management and leadership principles.

Syllabus

The course syllabus for Fall 2010 is attached. I am currently revising it for fall 2011, but I do not expect to make significant changes.

Instructor

- Six Sigma is my primary research focus. I have been studying Six Sigma and other quality management systems for about 20 years. I am currently engaged in a major multi-year research project studying Six Sigma improvement projects (DMAIC projects) with Prof. Eve Rosenzweig.

- My experience includes a great deal of practical work including serving as a Senior Examiner for the Malcolm Baldrige National Quality Award and consulting with many leading companies. The key point is that my perspective is not just “academic” or “theoretical” it is also based on a great deal of direct experience with companies.

Certification

This course is an academic course, not industry training. The primary difference is whether “recipes” are taught (what to do) versus understanding (why method are used, what they mean, and so on). You should understand the topics taught in the course much more deeply that you would from industry training on the same topics.

As mentioned above, the topics covered in the course should leave you with a scope of knowledge greater than the Green Belt level and less than the Black Belt level. However, you should be position to obtain a Black Belt very quickly once you have some industry experience, a bit more training, and can work on a few real Six Sigma projects.
Green Belt Certification can be obtained by taking an exam given by the American Society for Quality. There is an exam given on Saturday December 3 in Atlanta and, with a little extra study, you should be ready to take the ASQ Green Belt exam at that time. (Note: you must apply to take the exam by October 14, 2010 (or October 19 with a late fee). The exam and certification is by the American Society for Quality and is entirely outside of the course, the Goizueta Business School, and Emory University. An exam fee is required. Information is available at the following link: http://www.asq.org/certification/six-sigma-green-belt/index.html.

_Six Sigma Greenbelt certification can be a very useful credential, especially in these economic times._

I estimate that over 80% of the students that have taken this course pass the green belt exam on the first try.

**Web Resources:**

If you want to learn a little more about Six Sigma, the Wikipedia web page is reasonably good (although there are some things in it that I do not believe are quite right).

http://en.wikipedia.org/wiki/Six_sigma

The iSixSigma website (http://www.isixsigma.com) is a very useful resource. It has an introductory section designed as an introduction to Six Sigma:

http://www.isixsigma.com/library/content/six-sigma-newbie.asp

The American Society for Quality website is also a useful resource:

http://www.asq.org

On the left-hand side of their home page there is a link “Learn About Quality.”
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Textbooks


Software: ExtendSim LT simulation software will be used extensively in the course. We will also use Microsoft Excel and JMP. Note: Instructions for obtaining the ExtendSim LT and JMP software are later in this syllabus.

Exams: There will be an exam on Tuesday, November 2 during class (first half). Exams are open book and open notes. One or two take-home questions will also be given and will be due by class time one week later (November 9). More details concerning the exam and take-home questions will be given later in the semester.

Assignments: In general, assignments will be given out each week and will be due one or two weeks later as specified in the assignment.

Note: As a special assignment, read the book The Goal by the date of the exam (Nov 2). This book is a novel and I think you will find it easy and fun to read. I do not plan to specifically discuss the book in class, although some discussion may be brought up in our other discussion. I will feel free to ask a question about the book on the exam.

Teams: Each student will be assigned to a team. Most assignments will be team based.

Honor Code: As you know, the GBS has an honor code. All exams and assignments will be conducted in accordance with the honor code. Unless otherwise specified in the assignment,
assignments will be assumed to be team based which means that you can discuss them freely with your team, but not with other teams. The exams are to be individual work.

**Class Participation:** Class attendance is a prerequisite for participation and is therefore considered extremely important. Class participation consists of three components: (1) attendance, (2) in-class participation, (3) electronic participation (questions, discussion, posting articles, etc.).

**Catapult:** Use of a catapult (which represents a production machine) will be used to reinforce a variety of concepts in the course. Each team will be given a catapult to use. The catapults are expensive, so please treat them with great care. They will be handed out to the teams later in the course.

**Project:** In lieu of a final exam, there will be a team-based project which will involve use of the catapult and a catapult shooting competition. Details concerning the project and the competition will be given out later. The competition will be held during the final exam period which is Tues December 7 at the regular class time. In addition to the competition, the project also requires a written paper describing your team’s approach. The paper will be due after the competition (specific date/time to be announced).

**Grades:** Grades will be based on the Exam (40%), the Catapult Project (25%), assignments (20%), and class participation (15%).

**Course Conference on First Class:** The course has a conference folder on First Class. This conference is for announcements, general discussion, and questions relating to the class. Discussion in the conference will count as class participation.

**Office Hours:** By appointment. I will also try to be available before and after class.

**How to Obtain the ExtendSim LT-RunTime v7 Software**

Here are the instructions for obtaining the ExtendSim software:

1) Go to the ExtendSim Store at http://www.extendsim.com/store/
2) Click on 'ExtendSim Software'
3) Click on 'Limited Version'
4) Click on 'Buy Now' for Windows or Macintosh
5) Select to 'Download only' or 'Download and receive CD' option
6) Click 'Add to Cart'
7) Before checking out, enter Coupon Code for $50 discount off purchase in the 'Coupon Code' box under 'Discount Coupon'

Coupon Code = EMORY623912

The software should cost you $50. If there are any problems downloading the software or obtaining the correct price, please let me know immediately.
How to Obtain the JMP Statistical Software

JMP is statistical software created by the SAS Institute (the makers of SAS). It is available for free on the GBS network. To download it, get connected to the GBS network and go to the “swmisc on 'gbsfile'” drive (on my computer it is drive U). You will see folders for WINDOWS and Mac so navigate to the folder corresponding to your computer’s operating system. The location of the JMP software for Windows users is:

U:\WINDOWS\JMP\Windows Installation Files\JMP

For Mac users it is

U:\Mac\JMP\Macintosh Installation Files

Windows uses should double click on the file “setup.exe” and follow the prompts. I am not familiar with the installation method for Mac software. If you have trouble installing the software, please contact the help desk.

NOTE: You are not likely to be able to install this software over the wireless network at the Goizueta Business School. Too many network timeouts occur. You will need to be directly connected to the network. Your home broadband connection will probably also work, but you will have to have a VPN connection to the business school.
SYLLABUS

The following is a tentative syllabus:

**Week 1 (Tue 9/7):** Course Introductions to Six Sigma, Process Analysis, Simulation Modeling; Types of variation.

**Week 2 (Tue 9/14):** Process Model, Types of variation; Model Optimization; Statistical Process Control (SPC)

**Week 3 (Tue 9/21):** Process Model; SPC

**Week 4 (Tue 9/28):** Measurement; Benchmarking; SPC

**Week 5 (Tue 10/5):** Problem Solving; DMAIC; Process Capability

**FALL BREAK:** (Tue 10/12) No Class.

**Week 6 (Tue 10/19):** Problem Solving; DMAIC; Design of Experiments (DOE)

**Week 7 (Tue 10/26):** Toyota Production System, DOE - ANOVA

**Week 8 (Tue 11/2):** **EXAM** during the first half of class. Continue DOE - ANOVA during the second half of class.

**Week 9 (Tue 11/9):** Toyota Production System, DOE - Factorial Experiments

**Week 10 (Tue 11/16):** Lean Six Sigma; Design DOE – Fractional Factorials

**Week 11 (Tue 11/23):** DOE – Screening Experiments, human resource issues.

**Week 12 (Tue 11/30):** Measurement System Evaluation, Course wrap-up.

**Catapult Competition (Tue 12/7):** The competition will be at the regular class time. This is the final exam period. The competition will be held on the 3rd floor of the West Wing.