

# Lawrence Technological University

A. Leon Linton Department of Mechanical Engineering

**Master of Science in Industrial Engineering (MSIE)**

**EME 6673 – Six Sigma Processes**

**Summer 2012**

## Course Information:

Course No.: EME 6673  
Course Title: Six Sigma Processes  
Lecture: Thursday, 5:30 pm – 9:15 pm  
Classroom: E203  
Office hours: **Tuesday and Friday, 3:00 – 5:00pm or by appointment**  
Internet site: Blackboard [my.ltu.edu](http://my.ltu.edu)

## Faculty Information:

Ahad Ali, Ph.D., Assistant Professor and Director of MSIE Program  
Tel: 248 204 2531, Fax: 248 204 2576, Office: E37  
Email: [aali@ltu.edu](mailto:aali@ltu.edu); Web page: <http://qbx6.ltu.edu/aali/>

## Catalog Description:

The course will cover modern design tools and methods on the Six Sigma paradigm. Topics include tools and methods including process flow diagrams, cause and effect diagrams, gage R&R, organizational leadership, product development, system integration, critical parameter management, quality function deployment, concept generation, and strategy for organizing six sigma techniques in industry among many others. Provide useful tools to conceive new product requirements, design baseline functional performance, optimize design performance, and verify system capability. Project based learning will be used.

## References:

- Antony, J., Kumar, A. and Banuelas, R., World Class Applications of Six Sigma: Real World Examples of Success, Butterworth-Heinemann; 1 edition, 2006.
- Breyfogle, F. W. III, Implementing Six Sigma, John Wiley & Sons, Inc., 2003.
- Cavanagh, R. R., Neuman, R. P. and Pande, P. S., The Six Sigma Way: How GE, Motorola and Other Top Companies are Honing Their Performance.
- Eckes, G., The Six Sigma Revolution. New York: John Wiley and Sons, Inc., 2001.
- Gitlow, H. S. and Levine, D. M., Six Sigma for Green Belts and Champions, Pearson Education, 2005.
- Kubiak, T.M. and Benbow, D. W., The Certified Six Sigma Black Belt Handbook, 2<sup>nd</sup> Edition.
- Munro, R. A., Maio, M. J. and Nawaz, M. B., Govindarajan Ramu, and Daniel J. Zrymiak, The Certified Six Sigma Green Belt Handbook.

Pries, K. H. Six Sigma for the New Millennium: A CSSBB Guidebook, Second Edition.

Pyzdek, T. and Keller, P., The Six Sigma Handbook, Third Edition: A Complete Guide for Green Belts, Black Belts, and Managers at all levels.

### **Objectives:**

By the end of this course, you should be able to:

1. understand and describe the six sigma processes for continuous improvement
2. describe, select and use the DMAIC approach
3. explain and apply six sigma quality tools
4. establish six sigma baseline metrics and perform process improvement
5. comprehend quality function deployment
6. conduct a gauge R&R and do a process capability analysis
7. make effective product and process decisions using six sigma methodologies
8. demonstrate relevant computing technologies applications

### **Six Sigma Topics**

- Introduction to Six Sigma & DMAIC
- Six Sigma Body of Knowledge: Define, Measure, Analyze, Improve, and Control (DMAIC)
- Describe, Idea Generation, select and use the DMAIC approach
- Apply Six Sigma quality tools
- Comprehend and apply Six Sigma measurement techniques
- 6 $\sigma$  SPC, Attributes Control Charts, Variables Control Charts
- Quality Function Deployment (QFD)
- Confidence Level and Hypothesis Tests
- Process Capability
- 6 $\sigma$  – Chi-Square Analysis
- 6 $\sigma$  – Benchmarking
- Gage R&R Analysis
- Visualization of Data

## **SIX SIGMA PROJECT**

### **Six Sigma Project Selection and Planning**

- Outline of Project Expectations/Entitlement
- Project Selection
- Determination of Project Scope
- Development of Project Charter
- Development of Project Business Case
- Team Selection and Development

### **Project Performance**

- Baseline Current Process Performance
- Evaluate and Select Project Methodologies
- Establish Six Sigma Baseline Metrics
- Validate Measuring System

- Collect Data
- Analyze Data
- Perform Process Improvement Experiments
- Implement Improved Process

### **Project Completion and Presentation**

- Determine Six Sigma Control Methodologies
- Implement Methodologies
- Measure Process Performance and Determine Project Financial Benefits
- Develop Written Project Report
- Develop Presentation
- Make Presentation

### **Grading Policy:**

Homework 30%, Case Study Presentations 10%, Midterm 30%, Project 30%

A 90, A- 87, B+ 84, B 81, B- 78, C+ 75, C 72, C- 69, D+ 66, D 63, D- 60, F < 60

### **Course Outlines:**

Week	Topics
1	Introduction to Six Sigma & DMAIC
20	Six Sigma Body of Knowledge: Define, Measure, Analyze, Improve, and Control (DMAIC)
2	Describe, Idea Generation, select and use the DMAIC approach
3	Describe, Idea Generation, select and use the DMAIC approach
	Comprehend and apply Six Sigma measurement techniques, Gage R&R Analysis
4	6 $\sigma$ SPC, Attributes Control Charts, Variables Control Charts
5	Apply Six Sigma quality tools, Visualization of Data
6	Quality Function Deployment (QFD), Confidence Level and Hypothesis Tests
7	Process Capability, 6 $\sigma$ – Chi-Square Analysis, 6 $\sigma$ – Benchmarking
8	Six Sigma Project Selection and Planning
9	Project Performance
10	Project Completion and Presentation

## Six Sigma Related Resources:

- 12th Annual Lean Six Sigma & Process Improvement Summit, 2011
- 2010 Lean and Six Sigma Conference – ASQ, March 8-9, 2010, Phoenix, AZ  
<http://www.asq.org/conferences/six-sigma/>
- American Society for Quality, <http://www.asq.org/index.html>
- ASQ Reliability Division, <http://www.asq.org/reliability/index.html>
- IEEE Reliability Society <http://www.ieee.org/portal/site/relsoc>
- IIE Quality Control/Reliability Division, <http://www.iienet2.org/Landing.aspx?id=898>
- Institute of Industrial Engineers, Six Sigma, Quality and Reliability,  
<http://www.iienet.org/>
- International Journal of Lean Six Sigma
- International Journal of Quality & Reliability Management, Emerald
- International Journal of Quality, Statistics, and Reliability
- International Journal of Reliability, Quality & Safety Engineering, World Scientific Pub.
- International Journal of Six Sigma and Competitive Advantage
- International Society of Six Sigma Professionals (ISSSP), <http://www.issp.com/>
- National Science Foundation (NSF) Industry University Cooperative Research Center for Quality and Reliability Engineering, Rutgers University and Arizona State University,  
<http://coewww.rutgers.edu/~ie/qre/about.html>
- Quality & Productivity Journal
- Six Sigma References from ASQ Store: [http://www.asq.org/quality-press/search-results/index.html?search\\_mode=keyword&search\\_query=six+sigma](http://www.asq.org/quality-press/search-results/index.html?search_mode=keyword&search_query=six+sigma)
- Some real-world applications <http://www.amazon.com/World-Class-Applications-Six-Sigma/dp/0750664592>
- [www.isixsigma.com](http://www.isixsigma.com)