

ILLINOIS STATE UNIVERSITY
Department of Technology
TEC 489.39 – Introduction to Six Sigma Methodologies
Date of Proposal: 10/07

Catalog Description:

Management and Application of Six Sigma Methodologies 3 credit hours

Application of the Six Sigma data driven decision making methodologies to gain insight into advanced quality based industrial management techniques. Prerequisites: graduate standing

Course Overview:

Course gives students a broad based understanding of the roles and functions of the Six Sigma data driven decision making methodologies as applied in advanced quality based DMAIC change management environments.

Student Objectives:

Through successful completion of **TEC 489.39**, students have the opportunity to develop and demonstrate knowledge, skills and competencies in the following areas:

1. Describe, select and use the DMAIC change management approach.
2. Apply Six Sigma quality tools.
3. Comprehend and apply Six Sigma measurement techniques.
4. Know of and comprehend quality function deployment.
5. Comprehend and apply statistical process control techniques.

Topical Outline

Session 1	Six Sigma Introduction: 6 σ & DMAIC Change Management
Session 2	Six Sigma Quality Tools – Part 1: Idea Generation & Selection 6 σ Quality Tools – Part 2: Idea Prioritization & Deployment
Session 3	6 σ DMAIC: What is it? 6 σ : Project Management and 6 σ
Session 4	6 σ DMAIC: Measure
Session 5	Quality Function Deployment (QFD) Evaporating Cloud and Other Inventive Thinking Processes
Session 6	6 σ Quality Tools – Part 3: Statistical Tools 6 σ DMAIC: Analyze
Session 7	6 σ – Hypothesis Testing Review

Session 8	6 σ Statistical Process Control and Capability
Session 9	6 σ – Chi-Square Analysis
Session 10	6 σ – Benchmarking
Session 11	6 σ DMAIC: Improve
Session 12	6 σ : DOE Introduction And 2 ^K Factorial Designs
Sessions 13	6 σ DMAIC: Control
Session 14	6 σ SPC – Introduction
Session 15	6 σ – SPC & Probability: Attributes Control Charts 6 σ – SPC & Probability: Variables Control Charts

READINGS

Required Texts

Burton, T. T. & Sams, J. L. (2005). Six Sigma for Small and Mid-Sized Organizations: Success through Scalable Deployment. Milwaukee, WI: ASQ Press

REQUIRED STUDENT TASKS/ASSIGNMENTS

4. Examinations

Midterm Exam	100 points
Final Exam	100 points
Case Study/Projects	200 points

5. Grading Scale

90 – 100%	= A
80 – 89%	= B
70 – 79%	= C
0 – 69%	= F

Six Sigma Innovation Case Study Requirements DMAIC Format Requirements

- VERY carefully and critically consider the *Commercial Six Sigma Case Study*. The link to this case study is provided at the Course Website.
- DEVELOP a case study for EITHER
 - A key process in need of improvement at a company, OR
 - Collaboratively agree upon and “create” a process/product that is key in your “team” company.

FOR THAT PROCESS, MINIMALLY, DO THE FOLLOWING:

- Provide an introduction similar in scope to that in the Case Study.
- Similarly, provide project leadership details.
- Provide the **DEFINE** stage information including, especially:
 - information on the VOC (Voice of the Customer);
 - CTQs (Critical to Quality Characteristics);
 - prioritization of the CTQs; and
 - Integration of the CTQs with Business Strategy.
 - Present your CHARTER.
 - Provide your high level process map and validate the map against the Charter.
- **MEASURE** – identify all possible Ys for the CTQs.
 - Prioritize and select your project Y(s).
 - Develop / Provide Performance Measures for Y.
 - Draft the Project Data Collection Plan.
 - Complete the Measurement System Analysis.
 - Determine / Discuss Process Capability.
 - Present the Improvement Goal for Y.
 - Present the Improvement Methodology.
- **ANALYZE** – capture all possible Xs.
 - Draft a Prioritized List of the Xs.
 - List the Vital Few Xs.
 - If possible, verify Xs with data (contrive if necessary).
 - Finalize the List of Vital Few Xs.
 - Quantify the Financial Opportunity – Estimate Costs associated with the improved process and Identify Intangible Benefits.
- **IMPROVE** – identify the improvement strategy.
 - Experiment to Determine an Appropriate Solution.
 - Plan the Pilot Solution.
 - Collect and Analyze Data as appropriate.
- **CONTROL** – Sustain the Solution by developing a control plan and implementing the solution, then confirming that solution.
 - Document the project.
 - Identify whether and how the solution might be transported to other applications.

Detailed format and other guidelines for your written reports appear on the following page.

REQUIRED: Voice of Customer; Process Map / Flow Chart; Cause-and-Effect Diagram; Brainstorming; Control Chart(s).

GREENBELT SUBSET (AT LEAST TWO OF): Affinity Diagram; Matrix Diagram; Force Field Analysis; Descriptive Statistics.

BLACKBELT SUBSET (AT LEAST TWO OF): ANOVA; Factorial / Fractional Factorial Design; Screening Design; Contingency Table Analysis; Regression Analysis; Hypothesis Testing with Confidence and / or Tolerance Intervals.

PROJECT FORMAT GUIDELINES

- All paper margins are: 1" (or 25mm).
- Pages are numbered.
- The paper begins with a title in a mixture of upper and lower case letters in 12 pt. Times New Roman, and centered on the page. Titles are limited to 10 words.
- A single blank line follows the title.
- This is followed by the following details for each author, also centered, but in 12 pt. Times New Roman:
 - Name, Title, Affiliation with full international postal details, e-mail address, telephone and facsimile numbers.
 - These are single-spaced, but with one blank line after the information for each author and prior to the beginning of the next section.
- This is followed by the word Abstract centered in 12 pt. Times New Roman, followed by a single blank line and then an abstract of 100-150 words in length in 12 pt Times New Roman font. The abstract is not indented.
- This should be followed by a single blank line and then Key Words & Phrases: in 12 pt Times New Roman font followed by a minimum of one and a maximum of four keywords and phrases that encapsulate the principal subjects covered by the article. This is followed by a single blank line, after which the main body of the article follows.
- Section titles are mixed capital and lower case letters, flush with the left margin of the column in 12 pt. Times New Roman font. A single blank line should both precede and follow each section title.
- The text of each section should be double-spaced in 12 pt. Times New Roman font. Paragraphs are indented, with a double-spaced blank line between paragraphs.
- As a guide, your project reports should range between 2,500 and 7,500 words in length and should in no instance exceed 25 pages (exclusive of tables, graphs and appendices).
- Notes or Endnotes SHOULD NOT be used.
- Figures, charts, diagrams, photos and illustrations should be kept to a minimum. If possible, they should be black and white with minimum shading and numbered consecutively using Arabic numerals with a brief title and labeled axes. These should appear as near to first reference in the text as possible.

- Tables should be kept to a minimum. They must be numbered consecutively with roman numerals and a brief title. As with figures, these should appear as near to first reference in the text as possible.
- The last principal section of the project is the Reference section. References within the text of the manuscript should be in the APA style. That is, shown within the text as the first author's name followed by a comma and year of publication all in round brackets, e.g. (Meier, 2008).
- In the reference section, the word Reference should be 12 pt Times New Roman font and should be both preceded and followed by a blank line.
- References then follow in 12 pt Times New Roman font and are to be in alphabetical order, single-spaced, with a blank lines between references.
- The format of references should be:
- For books: surname, initials, (year), title, publisher, place of publication, e.g.
- Brown, D. (1999), *Project Leadership*, Macmillan, London.
- For journals: surname, initials, (year) "title", journal, volume, number, pages, e.g.
- Meier, R. (2007), "An Exploratory Study to Identify a Common Managerial/Professional Core Curriculum for NAIT Baccalaureate Programs", *Journal of Industrial Technology*, Vol. 24 No. 1, pp. 1-13.
- The final reference is to be followed by a single blank line
- The manuscript concludes with Autobiographical Note(s) in 12 pt Times New Roman font and flush with the left margin of the column. This is followed by a single blank line and then a brief autobiographical note of maximum 100 words for each author in 12 pt Times New Roman font. In the case of multiple authors, a single blank line should be left between the autobiographical notes of successive authors.

Final manuscripts should be submitted in duplicate and with an accompanying electronic copy. The author must ensure that it is complete, grammatically correct and without spelling or typographical errors. Please use *MS Word*.

DISHONESTY POLICY STATEMENT:

“Students are expected to be honest in all academic work. A student’s placement of his or her name on any academic exercise shall be regarded as assurance that the work is the result of the student’s own thought, effort, and study.” Academic dishonesty is considered an offense to the department and university. Cases will be handled consistent with university policy, which specifies that “faculty members are to report all instances of academic dishonesty to Student Dispute Resolution Services.” Also, consistent with university policy, “faculty members retain authority to determine grade penalties in cases of academic dishonesty.” Departmental policy specifies that, at a minimum, a grade of zero will be issued for assignments involving academic dishonesty and additional grade penalties can be imposed including failing the course, or being removed from the program. In keeping with university policy, the incident will be reported to the Student Dispute Resolution Services office. (The complete academic honesty policy is located at www/ilstu/depts/sdrs/code_of_conduct.htm. All quoted statements in the departmental policy are from that document.)

DISABILITY CONCERNS:

Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns at 350 Fell Hall, 438-5853 (voice), 438-8620 (TTY).