California State University, San Marcos

FORM X (WHITE)

- Authorization To Offer Non-Degree Extension Credit Course Through Extended Learning

1. Desired Term: Fall Semester
   Year of implementation: 2009-2010

2a. Course abbreviation and Number: BUS 1002

2b. Abbreviated Title: Lean Six Sigma, BB Part 1

3. College: Business

4. Number of Units:
   Part 1: 4-5 units; Part 2: 4-5 units

5. Billing Units: 6

6. Allowed Student Levels: UG_X GR_X EE_X (Default is to check all three levels)

7. Grading Method:
   N Normal (N) (Default is Letter Grade +/-, Students may request Credit/No Credit)
   Normal Plus Report-in-Progress (NP) (As for Normal, also allows Report-in-Progress)
   Credit/No Credit Only (C)
   Credit/No Credit or Report-in-Progress Only (CP)
   OR: Pass/Fail

8. Mode of Instruction:
   (See pages 17-23 at http://www.calstate.edu/cim/data-elem-dic/APDB-Transaction-DED-SectionV.pdf for definitions of the Course Classification Numbers)

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Number of Credit Units</th>
<th>Instructional Mode (Course Classification Number)</th>
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</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>5</td>
<td>C-62</td>
</tr>
<tr>
<td>Activity</td>
<td>1</td>
<td>C-13</td>
</tr>
<tr>
<td>Lab</td>
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9. Attributes: Course Requires Consent for Enrollment? X Yes _ No
   X Faculty Credential Analyst Dean Program/Department - Director/Chair
   Prerequisites: Math: Algebra__ Co-requisites: Math: Pre-Cal__

10. Does this course impact other discipline(s)? (If there is any uncertainty as to whether a particular discipline is affected, check "yes" and obtain signature.) X Yes _ No
    If yes, obtain signature(s). Any objections should be stated in writing and attached to this form.

                               Support  Oppose
    discipline                  signature     date
                               Support  Oppose
    discipline                  signature     date

Important: Please Complete

1. Instructor: Salman Taghizadegan

2. Please complete the Extension Course Proposal Form
   http://www.csusm.edu/academic_programs/curriculum_forms/index.html

SIGNATURES: (COLLEGE LEVEL)

1. Program Director/Chair  Date  8/16/09
2. College Dean (or Designee)  Date  7/31/09

SIGNATURES: (UNIVERSITY LEVEL)

3. Dean of Extended Learning (or Designee)  Date  8/24/09
4. Vice President for Academic Affairs (or Designee)  Date  8/25/09
Part I: Lean Six Sigma-A Black Belt Program (BUS-TBA)
Fall 2009-2010

INSTRUCTOR: Dr. Salman Taghizadegan
OFFICE: Craven Hall
PHONE: (760) 304-7208
OFFICE HOURS: Mon.-Thu. 5:00 – 6:00 PM and by appointments
EMAIL: df16s@yahoo.com
staghiza@csusm.edu

TEXT: Essentials of Lean Six Sigma: by Salman Taghizadegan; Publisher: Elsevier
Statistical Software: Minitab

COURSE OBJECTIVES:
Lean Six Sigma is a disciplined, data-driven approach to process improvement aimed at the near-elimination of defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process -- from manufacturing/product to transactional/service, and increased customer satisfaction, increased capacity and output, quality, service reliability, financial results through process improvement, and direct cost reduction per project. This is accomplished through the use of sub-methodology: Part I (Define, Measure, and Analyze-part1), and Part II (Analyze-part2, Improve, and Control). Course emphasizes in topics from Lean, descriptive techniques to multiple regression models and applications relevant to business problems. Use of computer and statistical software will be integrated.

PREREQUISITES: Lower division core/Successful completion of the University Computer Competency. Mathematical skills equivalent to college algebra is required.

GRADING POLICY:
Term Project 30%
Mid-term 25%
Final Exam 30%
Lab/Class participation 10%
Assignments/Quizzes 5%

No make-up exams will be given. Assignments should be completed and submitted on their due date. No late assignments are accepted. Working problems are important to learning how to apply the concepts. Missing a class is not an acceptable excuse for late assignments, and it is the student’s responsibility to find out about the homework assignments.

GROUP PROJECT:
A group project requires application of concepts learned through course work, discussion of techniques, and assigned reading and problems are requirement for this course. Each group will comprise 2/3 students. Students are strongly advised to form their own groups immediately. Each team member must evaluate the other peers in the group on their participation and contribution to the project. A written report (10-15 pages) is due on the day of the final. All group members should participate in writing of the report. The objective of the group project is to come out with a first-class cooperative effort. Each team will be required to make a 20-minute presentation of the major findings during the last two class meetings.
TOPICS: Fall-Semester

Part I: Process Characterization
Phase 0: Process Definition/Project Selection

Week 1:
1. Introduction to Six Sigma
2. Concepts and Philosophy
3. Project Charter, Scope, and Metrics

Week 2&3:
4. Problem Statement/Selecting Projects
5. Fundamentals of Lean Six Sigma
   5.1 Lean Principles
   5.2 Lean Simulations
   5.3 Business Metrics & Measurement for Lean Performance
   5.4 Value Stream Mapping and Process Flow

Week 4:
6. Project Objectives and Strategies/Planning
7. Process Focus
8. Affinity/Interrelationship Diagram

Week 5:
9. Quality Function Deployment/Model
10. SIPOC (Supplier/Input/Process/Output/Customer)

Week 6:
11. Critical-to-Quality (CTQ’s)/Voice-of-Customer (VOC)
12. Roadmap for Successful Corporate Goals
   12.1 Design for Six Sigma
   12.2 Tools and Techniques
   12.3 Project Management
   12.4 Business Process Management

Week 7:
13. Design for Lean/Kaizen Six Sigma
   13.1 Lean Six Sigma and Principles
   13.2 Elements of Waste

Week 8:
14. Continuous Improvement Tools and Techniques

Project proposal due: One page typed proposal due. The proposal should include a 50-word (maximum) abstract of your project.

Week 9: Midterm Exam-Presentation Part I

Phase I: Process Measurement

Week 10:
15. Statistics and Data Collection
   15.1 Statistical Theory and Concepts
   15.2 Collecting and Summarizing Data

S.T.: Lean Six-Sigma/Handouts

Chapters.1.0-2.0, 5.0-8.0, Handouts
15.3 Discrete and Continuous Numerical Data
15.4 Measurement and Sources of Data
15.5 Graphical Techniques for Quantitative Data: Frequency, Histogram, Pareto Charts, Stem-and Leaf Diagram
15.6 Charts: Bar, Pie, Line, …

Week 11&12:

16. Numerical Descriptive Statistics/ Measures
   16.1 Measures of Central Tendency, Variation, Position, Shape
   16.2 Interpreting X-bar and S
   16.3 Group Data, Box Plot

17. High Level Process Mapping
18. Process Capability
   18.1 Process Data: Continuous/ Non-normal/ Attribute
19. Process Measurement Objectives
20. Measurement System Analysis
   20.1 Various components of variation
   20.2 Repeatability, Reproducibility, Accuracy, and Calibration
21. Six Sigma Measurement Tools and Techniques
22. Six Sigma Process Base Line

Week 13:

23. Statistical Software Analysis (Minitab)

Presentation Part II

Phase II-part1: Process Data Analysis Tools/ Techniques Chapters 2.0, 3.0, 7.0, 8.0, Handouts

Week 14:

24. Cause and Effect of Possible Process Variations
25. Mathematical Concepts of Lean Six Sigma Engineering
26. Probability and Discrete Probability Distributions
   26.1 Probability Concepts
   26.2 Random Variables and probability Distribution
   26.3 Mean and Variance of Discrete Random Distribution
   26.4 Binominal Distribution
   26.5 Poisson Distribution
   26.6 Hypergeometric

Week 15:

27. Continuous Probability Distributions and Statistical Inferences
   27.1 Continuous Probability Distributions
   27.2 Normal Distributions
   27.3 Sampling Distribution of the Mean
   27.4 Central Limit Theorem

Week 16: Report Out

Presentation III

Final Exam (Comprehensive)
GROUP PROJECT

GROUP SIZE:
Groups should consist of 1-3 students.

TEAMWORK:
All members of the group must equally participate on all aspects of the project. Do not assign a task to a single member of the group. Each student must evaluate the other peers in their group on their participation and contribution to the project. This evaluation must be placed in a sealed envelope and attached to the final project.

PRESENTATION:
The presentation should be via an electronic medium, about 10 minutes, and all group members must participate.
• Outline.
• Introduction, definition of the project and the objective.
• A copy of your questionnaire.
• Data collection procedures. Describe difficulties and observations.
• Charts and graphs to show trends and categories in data.
• Statistical tests and the outcomes. Do not explain details.
• Conclusion and what you would have done differently.

EVALUATION:

<table>
<thead>
<tr>
<th>Content and analysis</th>
<th>50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation</td>
<td>40%</td>
</tr>
<tr>
<td>Illustrations/ graphs</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
REPORT FORMAT

ABSTRACT: (1-2 pages)
- The introduction should include a brief but precise definition of the objectives of the study. This also should include of a population definition and the specific characteristic of the population under study.

OBJECTIVES AND FOCUS OF STUDY: (1-2 pages)
- Objectives
- Data Sources
- Survey Questions

HOW STUDY WAS DONE: (8-9 pages)
- Design Choice
- Describe how the data was collected or the survey was concluded.
- Data analysis should consist of two parts:
  1. Descriptive Statistics: Charts, bar graphs, frequency distributions, etc.
  2. Inferential Statistics: Statistical procedures and techniques used to accomplish the objective of the project.

CONCLUSION AND SUMMARY
- State the result of your analysis and critique it. Discuss the possible sources of error.

Note: The UNIVERSITY WRITING REQUIREMENT:
The University writing requirement will be met by the write-ups and the final project.
OFFICE OF EXTENDED LEARNING
EXTENSION COURSE PROPOSAL FORM

In planning the components of our Extended Learning program at Cal State San Marcos, this office consults closely with the academic colleges and departments to determine the suitability of course content, teaching methods and instructor qualifications. To assist us in evaluating your proposed course for credit, please submit this completed form—along with Form X: New Course Non-degree Credit—to our office as soon as possible. Questions before you submit? Call (760)750-4020.

• Course Title:

Process Improvement: Lean and Six Sigma Black Belt Certification

• Course Description: (Please provide a short paragraph describing the purpose, topics and audience for your course. Be sure to include the benefits for students who take your course. An edited version of this description will be used for promotional copy.)

Six Sigma is a disciplined, data-driven approach to process improvement aimed at the near-elimination of defects (driving towards six standard deviations between the mean and the nearest specification limit) in any process—from manufacturing to transactional and from product to service. Unlike previous quality improvement efforts, Six Sigma is designed to provide tangible business results, cost savings that are directly traceable to the bottom line.

• Course Objectives: (Provide specific student learning outcomes and how they will be achieved.)

The fundamental objective of the Lean Six Sigma methodology is reduction in total defects, increased customer satisfaction, increased capacity and output, better product, service reliability, financial results through process improvement, $100,000 to $200,000 direct cost reduction per project. This is accomplished through the use of sub-methodology: Define, Measure, Analyze, Improve, and Control (DMAIC)

1) Define (understand the process and value-stream as related to the customer):
   Identify business drivers, select customer critical processes, define projects, and develop implementation plan.
2) Measure (understand customer requirement, measure what factors effects your process, know your measure is good):
   Develop key process measures, collect and analyze data, identify the vital few that have the highest impact, estimate process capability, measurement systems analysis, and Takt-time analysis.
3) Analyze (create flow, statistically define improvement, look for root causes):
   Understand cause and effects, create Multi-vari analysis, determine variance components, assess correlation, and 5-S to facilitate improvement.
4) Improve (improve specific root cause, implement cellular concepts, standardize process):
   Develop and evaluate solutions, implement variation reduction, standardize process, and assess risk factors.
5) Control (ensure process improvements are sustained):
   Implement process control, implement control charts for key variables, mistake proof processes, evaluate results, and Leverage opportunities for future improvements.

• Evaluation: (What will be the basis for grades? How will you know that the students have achieved the course objectives?)

1) Project completion
2) Four presentations
3) Short tests and final exam
• **Course Length:** *(How many actual contact hours in class? Note: Credit courses must contain a minimum of fifteen 50-minute contact hours for each semester unit of credit, and outside of class work by students is required.)*

Students who wish to earn Black Belt Certification with no Green Belt certification: 192 hrs

• **Proposed Date(s):**
  Fall Semester, 2009

• **Location:** *(Indicate if you are proposing this course to be scheduled and offered in our facilities, or if this course is to be held at an off-campus location, such as a school, district or county office, company, etc.)*

  Location:
  Hunter Industries, Inc.
  1943 Diamond St.
  San Marcos, CA 92078
  760-744-5240

• **Support Needs:** *(Please indicate any special services you will need, such as audio-visual equipment, photocopying, room set-up, etc.)*

  Audio-visual equipment with computer [PowerPoint Presentation], photocopying

• **Comments:** *(Please add any other relevant information, such as whether or not the course has been taught elsewhere successfully, why the course is needed in our area, marketing suggestions, etc.)*

  *This course is taught at UCSD Extension, and USD due to high demand from healthcare and industries.*
  UCSD: Six Sigma Black Belt 9.0 Units ; Course number 40132. On campus.
  UCSD: Lean Six Sigma Black Belt 9.0 Units ; Course number 40004. On campus.

*When completed, please return this form, along with an up-to-date resume (with teaching references) to: Eric Bullard, Office of Extended Learning, Cal State San Marcos, 333 S. Twin Oaks Valley Rd., San Marcos, CA 92096; FAX: (760)750-3138; E-mail: ebullard@csusm.edu*