MFE634

General Information:

Course: Productivity and Quality Engineering (MFE634)
Instructor: Jorge Luis Romeu, Research Professor. Dept. MAE.
Email: jlromeu@syr.edu; Web Page: http://myprofile.cos.com/romeu
Required Textbook: Juran's Quality Planning & Analysis for Enterprise Quality (5th Ed.), by Frank Gryna, Richard Chua, Joseph DeFeo; McGrawHill, 2007. In addition, there is a suggested list of materials: Companions: Probability and Statistics for Engineers and Scientists, (Walpole, Myers et al.). "Readings" of the ECS526 course (from SU Bookstore/Web). ASQ Certified Quality Engineer Manual. RAC Quality Toolbox. A Practical Guide to Statistial Analysis of Material Property Data (Romeu and Grethlein.)
Classes: are held on Thursdays 6:00 to 8:40 PM. Instructor reserves the right to reschedule a class.
Class Dates: I/18 to IV/26; See Course Description in Web Page: http://web.syr.edu/~jlromeu/
Office Hours: Right after class. Office: 281 Link Hall. Phone: 443-2132

Course Objectives:

This course will present quality assurance systems (QAS) that blend with business information systems and take advantage of enterprise resource planning systems framework to study company wide effectiveness of QAS. Emphasis will be placed on organizational productivity enhancement through continuous quality improvement. Hard and soft quality and productivity improvement tools, as well as Statistical Quality Control, Acceptance Sampling, Reliability Analysis, FMEA, and other problem solving approaches and tools, will be discussed. Prerequisite: Probability and Statistics as in MAT 521 and ECS526, or equivalent.

Requirements:

Students are required to have an account in the SU computer system for email communication with the Instructor and among them. In addition, students will use statistical software to solve problems and do projects. They can either use their own personal computer or SU's system software. Finally, students will work in Teams, to prepare and present (in class and at the final) their collective class projects. A detailed explanation of the required group, in-course and final Portfolioss is appended to this Syllabus.

Course Syllabus (Optimal):

Weekly Class Outline

Week	Topic	Chapter(s)
1	Intro; Basic Concepts; Gurus; Company-wide Quality; COPQ	1, 2, RAC
2	Quality improvements: Roadmap (Juran); Intro Six Sigma	0, 3, ASQ
3	Detailed Six Sigma (DMAIC); Old Tools; Process Capability.	3, QP, ASQ
4	Design for Quality (DFSS); New Tools: QDF & other Matrices	4, 10, 11
5	Advanced Statistical Analysis: Intro to DOE; Case Studies	18, CD, Eco
6	First Midterm; Test review and Course analysis	
7	Supplier Relations: Supply Chain Mgmt., Lean Manuf.	13; ASQ
8	Inspection, tests and measurements: Gage R&R	15; ASQ
9	Winter Break; no classes	
10	Acceptance Sampling; OC function and applications	15, START
11	Statistical Process (SPC) Control: Theory and Organization	5, 20
12	Practical applications of Control Charts; Intro Reliability	20, START
13	Reliability & maintainability: FMEAs & Fault Trees	11, 19, RAC
14	Second Midterm Test; ISO/Baldrige	ASQ
15	Strategic Quality Management; Audits; Assurance.	7, 8, 16

Note: topics in Chapters 17 and 18 are the subject of pre-requisite course MFE526 and hence, are not covered in MFE634. If MFE526 was taken some time ago, we suggest students review it on their own.

Grade Determination:

The course final grade will be based upon the following four components:

1.	First Exam (around 1/3 into the course)	25%
2.	Second Exam (around 2/3 into the course)	25%
3.	Final Portfolio (due the last day of class)	25%
4.	Weekly presentations, quizzes and class participation	25%

Teams and Final Portfolio

Engineers use statistics to solve problems and to take decisions under uncertainty. In addition, engineers often work in pluridisciplinary Teams and must be able to present their work to peers and non-technical personnel. Toward these goals, study groups (Teams) of four to six students, will be formed the first day of class. Team members will work via email and meetings. Students may exchange groups, as long as Teams remain of the same size.

Teams will work collectively and will communicate via email, phone, weekly meetings, etc. There will be a Team Leader assigned to each group the first day and an elected one will replace it after their first meeting. Teams will present assigned material in each class, from assignments given in the previous class. Team presentations are then discussed and critiqued by their peers and graded (for 25% of the final grade). In addition, each Team will deliver a final Portfolio (for 25% of the grade) the last day of class. There is a different topic for each Team (*). Consultation is fine. However, each team works individually.

The objective of the final Portfolio is the utilization of all the course material to solve a "real-life" problem. Each Team will use one of the five different project topics below. Teams will work on stating the problem in engineering terms and in collecting the data and applying as many of the course's quality engineering procedures to it as possible. The final grade of each Portfolio depends (i) on the quality and correctness of the procedures implemented as well as (ii) on the number of applicable course elements developed in the corresponding Portfolios.

At the end of the semester, each Team will deliver their Portfolio, which will consist of a complete computerized, copy of their work which will not be returned. Teams will provide copies for each member, as part of the course documentation. Power point presentations are required.

(*) There are up to FIVE different team project topics, they can choose from, to work on:

1. A Beer factory (e.g. Anheuser-Busch)
2. A Parts factory (e.g. New Process Gear)
3. An Insurance organization (e.g. Blue Cross/Blue Shield)
4. A Health Care organization (e.g. Crouse-Hinds Hospital)
5. A School System organization (e.g. SCSD)

Main Topics of MFE634: Quality and Productivity Engineering

1. Fundamental concepts:
    - Quality principles
    - Ideas of Quality Gurus
    - ISO & Baldrige quality awards

2. Improvement and Change:
    - Juran's Roadmap
    - Six Sigma for Improvement
    - Design for Quality (DFSS)
    - Old and New tools (QFD)
    - Statistical methods (DOE)
    - Examples and Case Studies

3. Control Systems:
    - Quality Control (SPC) systems
    - Quality Control Charts/methods

4. Supplier Relations:
    - Inspections, tests & measurements
    - Acceptance Sampling methods
    - Supply Chain management

5. Reliability in Quality:
    - Reliability models/methods
    - Reliability tools (FMEA, trees)

6. Management issues:
    - Strategic quality management
    - Quality Assurance audits.

Final Portfolio Content:

Portfolios should be delivered in a CD, and will not be returned (each Group member should keep a copy for his/her records). Porfolios should include all course presentation including:

1. Table of contents
2. Q introduction concepts
3. Analysis of COPC
4. Roadmap for Improvements
5. Six Sigma/DMAIC/DFSS analysis
6. Quality Function Deployment
7. Experimental Design discussion
8. Supply Chain and Lean
9. The problem of test/inspections
10. Gage R&R metrology study
11. Acceptance Sampling (one plan, via Nomogram)
12. SPC Chart (one chart with madeup data)
13. Discussion of Reliability within Q
14. Estimation of MTTF and FR (madeup data)
15. Strategic Q management discussion

Updated: IV/07