MFE634: Quality Engineering: 2025

General Information:

Course: **Productivity and Quality Engineering** (MFE634)
Instructor: Jorge Luis Romeu, Ph.D. Adjunct Professor. Dept. of Mech. & Aerospace Eng.
Email: jlromeu@syr.edu; Web Page: http://www.linkedin.com/pub/jorge-luis-romeu/26/566/104
Required Textbook: Juran's Quality Planning & Analysis for Enterprise Quality (5th Ed.), by Frank Gryna, Richard Chua, Joseph DeFeo; McGraw-Hill, 2007. *In addition, below is a list of suggested extra materials*: ASQ Certified Quality and Reliability Engineering Manual and the RIAC Quality and Reliability Toolkits.
Classes: Thursdays 6:30 to 9:10 PM(*). *Zoom Office Hours*: Tues/Wed. at 7:00 pm (**), and by appmt.
Instructor's Office: 220 Machinery Hall (***). *Communications*: are only possible via Email/Blackboard.

Course Objectives:

MFE634 surveys the quality assurance (QA) methods used by service and manufacturing organizations to improve organization-wide effectiveness. Emphasis is placed on procedures that foster continuous quality improvement: simple & complex tools, Lean & Six Sigma, Capability Analysis, MSA, SPC, Acceptance Sampling, DOE, Reliability Analysis, FMEA, FTA and other problem-solving approaches. Prerequisites: Probability and Statistics (MAT521, ECS526, or equivalent). Requiring a broad statistics analysis level is obvious from reading the ASQ Quality Certification book: https://www.asq.org/cert/quality-engineer.And for a complete list of all ASQ Professional Certifications, consult: https://www.asq.org/cert/catalog

Course Requirements:

Students are required to have SU computer accounts, for email communication with your Instructor, among Teams, to access Blackboard, and to use Minitab & Quality Companion © SW to solve problems and HW. Additionally, students will work in Study Groups, to prepare and present HW & PPTs collective tasks. A detailed explanation of the required Group HW & PPT Presentations is appended to this Syllabus.

Zero Tolerance: no type of student dishonesty, or of improper or illegal behavior, will be tolerated.

Weekly Class Outline

Week	Topic	Chapter(s)
1	Intro; Basic Concepts; Company-wide Q; Cost of Poor Quality	1, 2
2	Quality Assessments & Audits; ISO/Baldrige/Standards	2, 16
3	Quality improvements: Quality Tools & Process Capability	3, RIAC
4	Six Sigma (DMAIC) improvement; More Process Capability	20, 3, ASQ
5	Design for Quality (DFSS); Matrix Tools; QFD; FMEAs	4, 11
6	Lean Manufacturing/VSM/5Ss; Supply Chains; Outsourcing	12, 13
7	Inspections, Testing and Metrology: MSA/Gage R&R	15; ASQ
8	Quality Companion Artificial. Intelligence, Kaizen.	ASQ
9	Spring Break; no classes	
10	Design of Experiments (DOE) in Quality improvement	18, START
11	Fractional Factorial Design of Experiments. Applications.	ASQ, RIAC
12	Acceptance Sampling; OC function; Sample Size	15, START
13	Statistical Process Control/SPC; Control Charts	20, START
14	Reliability models: FMEAs, Fault Trees; applied data analysis.	5, 19, ASQ
15	Practicum. Final Student Group Project Presentations.	START

(*) Classes may be rescheduled or given via Zoom, due to health, bad weather, or other uncertainties.
(**) The Wednesday evening Zoom Office Hours are group-based, and mandatory for all students.
(***) The Machinery Hall is off-limits, given the sensitive and valuable computer equipment it contains.

Grade Determination:

Student course final grades will be based through their participation in class, homework, PPT presentations, take-home group computer work, and the group final project:

1. Midterm Computer Group Tk-Home Exercise 25%
2. Final Computer Group Take-Home Exercise 25%
3. Zooms, HW & PPT Weekly Presentations 25%
4. Final Group Project PPT Presentation. & Rpt. 25%

Teams, Quizzes and Final Portfolio

Engineers use statistics to solve problems and to take decisions under uncertainty. In addition, engineers often work in multidisciplinary Groups/Teams, and must be able to present their work to peers and non-technical personnel. Toward these goals MFE634 student Study Groups/Teams will be formed the first day of class. Team members will meet periodically and interact via email and zoom to study, solve problems and prepare class presentations and other course assignments.

A Team Leader will be assigned to each group the first day; then an elected one may replace it. Team presentations and HW will be discussed and critiqued by their peers in the zooms, and then graded. The revised Group Power-point presentations constitute a part of their Final Portfolio.

There will be periodical PPT Group project presentations.

At the end of the course, each Team will deliver a complete (hard & computerized) copy of their work (Portfolio). Each team member will keep a copy, as part of the course documentation. There will be a different topic for each Team (*). Each team will work individually but may cooperate.

Teams are assigned a Topic from the list below. Each Team will apply the material learned in class to its topic, and prepare weekly HW & PPT presentations, based on such applications. Project grades depend on the quality and correctness of procedures implemented, and the number of applicable course elements developed. Groups will participate in weekly zoom meetings with the Instructor, to discuss their topic applications to their projects and their PPTS. Weekly PPT class presentations are restricted to 20 minutes. Questions on the methodology used will be asked.

(*) There are Two different team Quality Engineering topics associated with *water*:

1. Systematic lack thereof (seasonal/recuring droughts)
2. Systematic excess thereof (seasonal/recuring floodings)

Teams will use their assigned topics to provide specific examples of the application of different QE/QA methods discussed in class, to the improvement or solution of topic problems. Judgement about project beliefs or other ethical assessments is not a course subject and will be avoided. The objective of the Team Final Project is to *Learn by Doing, as Professor John Dewey stated.*

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