ISEN 414 Total Quality Engineering
Spring 2017

Course Description:
Introduction to the principles of total quality engineering; total quality management philosophy, engineering approaches for designing quality into products and processes; off-line experimentation methods for robust design; emphasis on teamwork and continuous quality improvement.

Course Objective:
(1) Learn formulations, concepts, and analytical procedures for designing quality into products and processes; (2) Learn the connection between ISEN 414 to six-sigma program; (3) Learn fundamental principles of robust design and off-line experimentation techniques; (4) Learn to implement robust design tools in industrial applications; (5) Improve team working skill, data-collecting, and experiment planning capability.

Learning Outcomes:
- Understand the importance of designing quality into products and processes, and its role in six-sigma program;
- Understand and appreciate the response surface methodology and its role in total quality engineering;
- Comprehend the concepts and tools in response surface methodology and be able to use them to solve the total quality engineering problems.

Pre-requite: Basic statistics or quality control (ISEN 314 or equivalent)

Instructor Information

Instructor: Ahmed Aziz Ezzat
Email: aa.ezzat@tamu.edu

TA: TBD
Email: TBD

Classroom and Schedule

Lecture:	1005 ETB MW	11:30 am – 12:20 pm.
Lab:	1013 ETB, F	9:10 – 11:40 am.

Office Hours

Instructor: MW 12:30-1:30 pm Room 4036, or by email.

TA: TBD

Textbook and Course Materials

Lecture notes: uploaded to E-campus on a weekly basis.

Reference book: (optional) Myers, R. H. and Montgomery, D. C., 2002, *Response Surface Methodology: Process and Product Optimization Using Designed Experiments*, 2nd edition, John Wiley & Sons.

Software used in this course: MATLAB and Microsoft EXCEL

Grade Distribution

Exam I	30%
Exam II	30%
Homework	20%
Design Exercise:	15%
Lab:	5% (Lab on-time)

Grade/minimum points required: A/90; B/80; C/70; D/60

Tentative Examination Schedule (may change but upon early notification to students)
Exam I: In-lab, 03/03/2017, Friday.
Exam II: In-lab, 04/21/2017, Friday.

Homework Policy

There will be a total of six to seven homework assignments throughout the semester. Homework is due in class on the designated date. You must turn in your homework before the end of the class. Late homework will be docked by 15% per every day it is late. You will share the data with your group members for homework problems related to experiments you did in lab. But you are required to work out the homework problems INDEPENDENTLY and you MUST turn in the solution of your own. A word-by-word duplicate of others' solution is considered cheating. If you would like to have your homework or exam re-graded, you have to do so within 10 days from the time when the homework/exam is returned to you.

Course Topic Breakdown

Chapter 1. Introduction: Typical quality control methods; focus of this course; six-sigma program

Chapter 2. Basic Concepts and Principles: What is a response surface? How to establish a response surface model? Experimental principles; Capability analysis of measurement devices.

Chapter 3. Data Analysis: Natural variable versus coded variable; How to estimate the unknown parameters; ANOVA.

Chapter 4. Full Factorial Design: Factorial design versus one-factor-at-a-time; 2^k full factorial design; Unreplicated experiments; Normal plot and half normal plot.

Chapter 5. Fractional Factorial Design: Principles enabling fractional factorial designs; Design generator and criteria; 2^{k-p} design and use of the design table.

Chapter 6. Second Order Design: Check for curvature; Central composite design (CCD); Steepest ascent/descent; Canonical analysis.

Chapter 7. Robust Design: Concept of design robustness; Robust design via experimentation; Cross array strategy; Taguchi's signal-to-noise (SN) ratio.

Students With Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu.

Academic Integrity

Aggie Honor Code: "An Aggie does not lie, cheat, or steal or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: http://student-rules.tamu.edu/; http://student-rules.tamu.edu/aggiecode; and http://student-rules.tamu.edu/rule20. The complete information of university regulations regarding the handling of academic misconducts (including the appeal process) can be found at http://aggiehonor.tamu.edu/.

I, Ahmed Aziz Ezzat, as the rest of the Industrial & Systems Engineering Faculty, uphold the Aggie Honor Code as an axiom of our academic excellence. We consider its sincere observance to be essential for membership in our department and Texas A&M. We extend you the trust conferred to those who faithfully adhere to our honor code. Abuse of this trust is intolerable, thus I will report and assign an extreme penalty to those who do not stand with us in preserving the integrity symbolized by the Aggie Honor Code, "An Aggie does not lie, cheat, or steal or tolerate those who do."

In this course the penalty for any violation of the Aggie Honor Code, as minimal as it may be, is F*.