

Columbia University

[Department of Industrial Engineering & Operation Research]

[IEOR 4412] [Quality Control and Management]

[Spring 2017]

Instructor: Ikhmeis, Sufian, PhD.IE

Teaching Assistant: TBA

[M & W 05:00 – 06:55 PM]; [420 Pupin Lab]

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Office hours: [M, W] [5:00 –5:30], or by appointment

Course Pre-requisites:

Students need to have good concepts of probability and statistics.

Course Description

This course provides students with a solid foundation in the cost of quality, quality assurance, and quality management. Emphasis is on the basic tools of quality control such as control charts and their use, the concept of “out of control,” acceptance sampling, variables and attributes charts and producer’s and consumer’s risk. A unique aspect of this course is the demonstration of the power of teams of people with different expertise to improve quality. The course will require a term project that includes a detailed analysis and contains materials from the lectures covered during the semester.

Course Objectives

The course is intending to prepare students for understanding and applying quality control methods, also, applying Improvements techniques for both service and manufacturing industries, as well as health care industry. By the end of the course, the students should be able to:

- Understanding the general principles underlying the various types of control charts and, why it works, how to interpret results and how to decide which method to use in any particular case.
- Understanding the sampling theory and the uses of sampling table and be able to define the right sampling plan for any particular area.
- Understanding the principles of Design of Experiments, how it is used for process design, development, and improvements
- Define the Quality system components (Quality Control and Improvements, and Quality Assurance)

Course Structure

A series of lectures and discussion in Quality Control and methods of improvements, in addition to case studies are the tools to cover the assigned material in this course. The course focuses on manufacturing, services and health care industries. Students are responsible for reading the associated chapters and assigned cases and reviewing key concepts, terms, definitions, discussion questions and topics in the chapters. There will be a team project toward the end of the semester focuses on the covered topics.

- **COURSE MGT Announcements, notes, resources, assignments, schedules and due dates will be posted to coursework.**

Readings

The required text for the course is:

“**Fundamentals of Quality Control and Improvement**,” 4th editions 2015, Amitava Mitra

ISBN: 978-1-118-70514-8

“Health Care Quality Management” 1st edition, ThomasK. Ross

ISBN: 978-1-118-50553-3

Reference textbooks: (Should be found in School Library)

1. “Introduction to Statistical Quality Control” 7th Edition, Douglas C. Montgomery ISBN: 978 – 1 – 118 – 70514 – 1
2. “Statistical Quality Control” 7th edition, E. Grant, R. Leavenworth ISBN: 0 – 07 – 043555 – 3
3. “Modern Methods for Quality Control and Improvement” 2nd edition, H. Wadsworth, K. Stephens, A. Godfrey), ISBN: 0 – 471 – 29973 – 1
4. “Design and Analysis of Experiments” 8th Edition, Douglas C. Montgomery ISBN: 978 – 1 – 118 – 14692 – 7
5. “Introduction to HealthCare Quality Management” Patrice Spath ISBN 978-1-56793-323-9

Additional Reading Sources and software: (database available through library)

American Society for Quality (ASQ) website

IIE Transactions / Quality Journal

Software Package available ator (www.e-academy.com)

1. Minitab 17 (latest Edition), or
2. JMP 12 (Latest Edition)

“Lean Six Sigma Pocket” (Tool Book) By; Michael L. George, David Rowlands, Mark Price, John Maxey

Course requirements

All course materials are posted on coursework web. Students are expected to read lecture materials before class; students are responsible for bringing printouts of lecture notes to class.

- There will be no deviations from scheduled due dates and test dates.
- Class attendance is mandatory.
- HW is assigned and must be submitted via coursework before the beginning of each class. No late HW accepted, HW will be discussed in class the following week
- Exams will consider all materials covered in lectures, which may not be in the textbook. Students are responsible for quantitative problems to the extent those problems are covered in class or homework.
- Final Exam will be cumulative

Policy

All participants are expected to handle themselves with professional conduct at all times. Students are expected to adhere to all university policies and uphold academic integrity throughout the course.

Grading

- Homework and Participations [10%]
- Attendance, HW and Participation [10%]
- Quizzes [10%], (total of 4), will be announced during class lectures
- Term Projects [05/01/2017], [20%]
- Midterm Exam [03/06/2017], [30%]

- Final Exam [05/08/2017], [30%]

Your final grade in the class will be determined based on the summation of the number of points that you acquire. The following point spread corresponds to the following grade.

A>92.5, A->88.5, B+>84, B>77.5, B->72.5, C+>67.5, C>60, F
 *Students achieving overall percentages as shown are guaranteed grades as indicated. Actual cutoffs may be lower.

DISCLAIMER:

The instructor may reserve the right to adjust and modify the scope of the course, lecture schedules, including number and timing of exams if necessary.

Week	Date	Lec.#	Topic	Reading	Assig.
1/16/17	01/18	1	Introduction and Expectation		
1/23/17	01/23	2	Six Sigma and DMAIC Process...1	Hand-Out	HW 1
	01/25	3	Six Sigma and DMAIC Process...2	Chapter 4, Ross	
1/30/17	01/30	4	Variable control charts (xbar & R)	Ch 6 Mitra, Ch 6 Ross	HW 2
	02/01	5	Variable control charts (xbar & S)	Ch 7 Mitra	
2/6/17	02/06	6	Variable Control Charts (I & MR)	Ch 7 Mitra	
	02/08	7	Variable Control Charts (CUMSUM & EWMA)	Ch 7 Mitra	HW 3
2/13/17	02/13	8	Attribute Control Chart...(p,&np)	Ch 8 Mitra, Ch 7 Ross	HW 4
	02/15	9	Attribute Control Charts...(u & c)	Ch 8 Mitra, Ch 8 Ross	
2/20/13	02/20	10	Acceptance Sampling	Ch 10 Mitra	HW 5
	02/22	11	Acceptance Sampling for Attributes	Ch 10 Mitra	
2/27/13	02/27	12	Acceptance Sampling for Attributes	Ch 10 Mitra	
	03/01	13	Acceptance Sampling for Variables	Ch 10 Mitra	HW 6
3/06/17		14	Midterm exam		
3/13/17	NO CLASS		Spring Recess		
3/15/17			Spring Recess		
3/20/17	3/20	15	Design of Experiment...1	Hands-out	HW 7
	3/22	16	Design of Experiment...2	Hands-out	
3/27/17	3/27	17	Design of Experiment...3	Hands-out	HW 8
	3/29	18	Design of Experiment...4	Hands-out	
Quality Management in Health Care					
4/03/17	4/03	19	Quality Management Building Block	Ch 2 Ref. 5	
	4/05	20	Measuring Performance	Ch 3 Ref. 5	HW 9
4/10/17	4/10	21	Evaluating Performance	Ch 4 Ref. 5	HW 10
	4/12	22	Evaluating Performance	Ch 4 Ref. 5	
4/17/17	4/17	23	Continuous Improvement	Ch 5 Ref. 5	HW 11
	4/19	24	Performance Improvement Tools	Ch 6 Ref. 5	
4/24/17	4/24	25	Quality Cost Management	Hands-out	HW 12*
	4/26	26	Quality Cost Management	Hands-out	
5/01/17	5/1	27	Project Presentations		
5/03/17	NO CLASS		Study Day		
5/08/17	5/8	28	Final Exam		