

## **ISYE 3039 METHODS FOR QUALITY IMPROVEMENT**

**Credit:** 3-0-3

**Prepared** Prof. Kvam, 2011

**Prerequisite(s):** ISYE 2028

### **Catalog Description:**

Topics include quality system requirements, designed experiments, process capability analysis, measurement capability, statistical process control, and acceptance sampling plans.

### **Text:**

D. C. Montgomery, *Introduction to Statistical Quality Control*, Wiley, New York, 2009.

### **Objective**

The objective of this course is to teach different methods that can be used for improving the quality of products and processes.

### **Topical Outline**

- Introduction to Quality Improvement and Statistical Process Control
- Statistics needed for SPC: graphics, probability, tests of hypothesis
- Control charts for variables: basic principles of the Shewhart Chart
- Control charts for attributes: counting defects or nonconformities
- Advanced control charts: CUSUM, Exponentially weighted moving average
- Process Capability Analysis: graphs, control charts, capability ratios
- Design of Experiments: Analysis of variance, blocking, factorial designs
- Acceptance Sampling: lot-by-lot sampling, OC curve, guidelines

### **Outcomes and their relationships to ISyE Program Outcomes**

At the end of this course, students will be able to:

- Understand problems and their impacts, formulate problem solving strategies, and design data collection plans;
- Validate collected data, select and benchmark underlining processes;
- Perform preliminary data analysis and suggest improvement plans;
- Conduct statistically designed experiments, perform primary data analysis and design follow-up experiments to confirm recommended actions;
- Present studied results, document accomplishments and prepare reference reports.

<b>Course outcome \ Program Outcomes</b>	<b>a. apply math</b>	<b>b. data</b>	<b>c. IE method</b>	<b>d. team</b>	<b>e. problem solving</b>	<b>f. prof/ and ethical responsibilities</b>	<b>g. communication</b>	<b>h. global, eco, envi and soc context</b>	<b>i. continue to improve</b>	<b>j. current issues</b>	<b>k. participate in an organization</b>
Understand, strategies, and design data plan		L	M		M				M		
Validate collected data		H	M	L			L		L		
Preliminary data analysis	L	H	M	L	M		M		M		
Conduct statistically designed experiments	M	H	M	L	M		M		M		
Present results							H				

- H, M and L denote high, moderate and low relationships.
- Team projects are conducted

#### **Evaluation of the important outcomes**

1. A project will be assigned to a team of 2-3 students. Students are expected to conduct experiments, collect data, analyze, draw conclusions, and present the solutions.
2. Homework problems will be used to evaluate student's ability to analyze quality-related data using statistical software and implement quality improvement methods in practice.
3. Exams will be used for evaluating student's understanding of quality concepts and their ability to draw conclusions from the statistical analysis of data.