

ISYE 3039 METHODS FOR QUALITY IMPROVEMENT

Required for BSIE

Credit: 3-0-3

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Prerequisite(s): ISYE 3030 Basic Statistical Methods

Text:

D. C. Montgomery, *Introduction to Statistical Quality Control*, Wiley, New York, 8th edition, 2019.

Catalog Description:

Topics include quality system requirements, designed experiments, process capability analysis, measurement capability analysis, specification/tolerances, and statistical process control.

Course description

This course provides a comprehensive introduction to statistical quality control and improvement methods used in modern manufacturing and service systems. Topics include process variation, control charts for variables and attributes, process capability analysis, measurement capability analysis, acceptance sampling, and the design of quality improvement experiments. Emphasis is placed on understanding the principles behind monitoring and improving process performance using data-driven approaches

Topical Outline

The topical outline is shown in the table below. The table has 2 columns. The first column lists the topics to be covered. The second column lists the number of weeks these topics will be covered.

Topics	Weeks (tentative)
Course overview + Introduction to quality	1
Basic methods: 7QC tools; review of Modeling and Inferences About Quality	1
Methods and Philosophies	1
Statistical process control: Control charts for variables; Performance of control charts; Control charts for attributes	4
CUSUM and EWMA	2

Topics	Weeks (tentative)
Design of experiments: Full factorial and fractional factorial experiments	3
Process Capability, Statistical tolerancing, Gauge R&R; quality improvement methods.	1
Specification/Tolerances	1

Course Learning Outcomes

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

1. Understand problems and their impacts, formulate problem solving strategies, and design data collection plans;
2. Validate collected data, select and benchmark underlining processes;
3. Perform preliminary data analysis and suggest improvement plans;
4. Design and implement control charts for monitoring continuous and discrete quality characteristics;
5. Assess and improve capability of processes and performance of measurement systems;
6. 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.

The Mapping from the Course Outcomes to ABET Student Learning Outcomes

The table below shows the relationship between course outcomes and ABET student learning outcomes. The table has 8 columns. The first column lists the course learning outcomes listed above. The next 7 columns list the abbreviated ABET Student Learning Outcomes. The entry of H in a row with specific course learning outcome and column with specific ABET Student Learning Outcomes indicate the importance of attain this outcome is high and will be assessed.

Course outcome \ Program Outcomes	1. identify, formulate solve engg prob by engg, sci & Math	2. produce solutions consider public health, safety, welfare, global, cultural, social, environ & economic	3 communicate with a range of audience	4 recognize ethical & professional responsibilities, make informed judgement consider resolutions in global, economic, environ and societal context.	5. effective on a team provide leadership, collaborative and inclusive envirm, plan tasks & meet objectives	6. develop and conduct experiment, analyze and interpret data & use engineering judgement to draw conclusions.	7. acquire and apply new knowledge using appropriate learning strategies
1. Understand problems and impacts, formulate problem solving strategies and design data collection plan.		H					
2. Validate collected data, select and benchmark underlining processes;						H	
3. Perform preliminary data analysis and suggest improvement plans;			H			H	
4. Design and implement control charts for monitoring continuous and discrete quality characteristics;		H					
5. Assess and improve capability of processes and performance of measurement systems;			H				
6. Conduct experiments, perform data analysis, design follow up experiments to confirm actions, present results, report.			H			H	

Assessment of the important outcomes

- H will be assessed on final exam question or project.

