University of Illinois at Urbana-Champaign
Department of Industrial and Enterprise Systems Engineering
Spring 2026
IE 431: Design for Six Sigma

Lectures: Monday/Wednesday, 10:00-11:20 AM
           Location: 2039 Campus Instructional Facility

Instructor: Roshanak Khaleghi
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           Office Hours: Wednesday, 1:00-2:00 PM (and by appointment)
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           Location: Zoom Link

Course Description & Objectives
This course presents the principles and practices of Quality Engineering with an emphasis on the Six Sigma Define/Measure/Analyze/Improve/Control (DMAIC) framework. It examines the application of concepts and methods such as statistical process control, design of experiments, and measurement systems analysis to cases of quality and productivity improvement in product development, service enterprises, and manufacturing processes. Course topics include the Six Sigma and DMAIC problem-solving framework, process measurement and quality tools, process analysis and mapping with root cause analysis, measurement system analysis, process data and regression analysis, process and design optimization, and design for Six Sigma.
The objective of this course is to equip students with the knowledge and tools of quality engineering. Students will learn how data-driven and statistical process control methodologies can be applied to systematically study, analyze, and improve processes, and to support continuous improvement initiatives across a wide range of industries and real-world cases.

Prerequisites
Undergraduate courses in probability and statistics (i.e., IE 300)

Course References
[1] Quentin Brook; *Lean Six Sigma and Minitab*, Any edition, OPEX Resources **(Recommended)**
[2] *Rath & Strong's Six Sigma Advanced Tool Pocket Guide*, Any edition, McGraw-Hill
[3] Theodore T. Allen; *Introduction to Engineering Statistics and Six Sigma: Statistical Quality Control and Design of Experiment and Systems*, Any edition, Springer

Course Web Page
Course materials, including lecture slides and assignment files, will be available on the course Canvas page.

Course Software

Minitab Statistical Software (primary software) and spreadsheet programs such as Microsoft Excel. Minitab is available at University of Illinois WebStore ($25 per year). Please visit the following link for information on ordering the software: MINITAB Named User License & Download

Required Work and Grading Policy

1. Homework Assignments	3-5 Case Study Assignments	38%
2. Take-Home Quizzes	3-5 Timed quizzes	15%
3. Exams	Midterm (22%), Comprehensive Final Exam (22%)	44%
4. Pop Quizzes/Attendance		3%

Note: All assignment submissions and reports must be submitted electronically through Gradescope (Gradescope is available via the course Canvas page).

Late submissions policy: Case study assignments submitted within **24 hours after the deadline** will be graded with a **50% penalty** applied to the earned score. Submissions more than **24 hours late will not be accepted** unless prior approval is granted by the Emergency Dean or the absence is supported by appropriate medical documentation.

Academic Integrity

Plagiarism will constitute grounds of University Sanctions including immediate failure in course for reason of academic dishonesty (Academic Integrity Infraction). The use of Artificial Intelligence (A.I.) such as ChatGPT is permitted only if used for learning, research or general inquiry and properly attributed as a cited source along with affirming secondary cited sources regarding the information obtained. However, A.I. is not permitted to solve or write in whole or in part any portion of the course assignments/quizzes. Any violation of A.I. rules is considered academically dishonest (Generative AI Guidance for Students).

Students with Disabilities

Students who require accommodation should contact Disability Resources and Educational Services (DRES) to initiate the accommodation process. To ensure sufficient time for planning and implementation, students are encouraged to share their approved accommodation documentation with the instructor as early as possible, and no later than two weeks prior to the midterm exam. If course exams are scheduled through the Testing Accommodations Center (TAC), please note that reservations must be made at least three business days prior to the exam date.