University of Alabama in Huntsville
Industrial & Systems and Engineering Management Department

ISE 423/523: INTRO STATISTICAL QUALITY CONTROL

Spring 2025

Instructor:	Cheng Chen, Ph.D.	**Office Hour:**	T/TH 2:30-3:30 pm
Email:	Cheng.chen@uah.edu	**Office:**	OKT N133
Class:	TR 01:00 - 02:20 PM	**Classroom:**	OKT N142

Objectives: Throughout the semester, this course introduces statistical theory and techniques for controlling the quality of manufacturing products, providing a strong foundation in Statistical Quality Control. Students will also gain insight into the Six Sigma methodology as part of the curriculum.

To develop the student's cognitive and reasoning skills in applying math and science, particularly statistics, to real world quality problems.
To give students an opportunity to identify, formulate, and solve engineering problems related to quality control and improvement.
To give the students an understanding of Six Sigma
To introduce the student to quality concerns and contemporary issues as they relate to engineering decision-making and their impact on the world in general.
To allow students the opportunity to use the techniques, skills, and modern engineering tools necessary for engineering practice. Specifically, student's should be able to:

- Identify the appropriate control chart for a particular situation.
- Interpret control chart signals.
- Explain how and why a control chart works.
- Conduct a basic process capability analysis.
- Use and interpret process capability measures.
- Conduct a basic gage R&R study.
- Select the appropriate acceptance-sampling plan for a given situation.

Textbooks: You can find the following PDF online as supplementary materials to help your understanding of the course materials (Any year or edition would be fine):

- Montgomery, Douglas C. Introduction to statistical quality control. John Wiley & Sons

Office Hours:

- Asking for help is not shameful or embarrassing, although it is common to feel anxious when approaching a teacher. My office is a safe space for every person. The act of entering and conversing about nothing in particular often leads to new insights. Though I typically have my door open outside of office hours, I may not be able to meet for a long period of time. However, you are always welcome to drop by.

- Please feel free to ask your questions after class, by appointment, or in the GroupMe chat provided for this purpose. If the times provided are not sufficient, you may set up a meeting time with me through an appointment. Email is the most effective method of contacting me. I will respond to your inquiry within one business day.
- TA info:
  - Website: https://uah-ise-icl-chen.streamlit.app/

Prerequisites:

- ISE 391 Probability & Engineering Statistics II
- ISE 690 Statistical Methods for Engr (for grad students)

Grading scale: (423 students only)

- Attendance: 5%
- Homework: 30%
- One in-class test: 30%
- Final project: 35%
- Total: 100%

Grading scale: (523 students only)

- Homework: 30%
- One in-class test: 30%
- Final project/Research paper: 40%
- Total: 100%

Scores	Final Course Grades
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
≤ 59	F

Course Schedule:
The topics listed here are intended to provide general guidance. As the class progresses, coverage and schedule may change.

Table 1:

Date	Special	Reading	Class Topic
06-Jan		Ch. 1 (1.1 - 1.7)	Syllabus Overview
08-Jan		Ch. 1	Overview of Quality Management
13-Jan		Ch. 1 & 2 & 5	Six Sigma Overview / SPC Methods & Philosophy
15-Jan		Ch. 1 & 2 & 5	Six Sigma Overview / SPC Methods & Philosophy
20-Jan		Ch. 1 & 2 & 5	Six Sigma Overview / SPC Methods & Philosophy
22-Jan		Ch. 6	FEMA & Fishbone Diagram
27-Jan		Ch. 6	Control Charts for Variables
29-Jan		Ch. 6	Control Charts for Variables
03-Feb		Ch. 6	Control Charts for Variables
05-Feb		Ch. 7	Control Charts for Attributes
10-Feb		Ch. 7	Control Charts for Attributes
12-Feb	Proposal Idea Due	Ch. 7	Control Charts for Attributes
17-Feb		Ch. 8	Control Charts for Attributes
19-Feb		Ch. 8	Control Charts for Attributes
24-Feb		Ch. 8	Cusum & EWMA Control Charts
26-Feb	Mid-term exam		
03-Mar		Ch. 8	Measurement System Analysis
05-Mar	No Lecture		Conference
10-Mar	No lecture		Spring Break
12-Mar	No lecture		Spring Break
17-Mar		Ch. 8	Process Capability Analysis
19-Mar		Ch. 8	Process Capability Analysis
24-Mar		Ch. 8	Process Capability Analysis
26-Mar		Ch. 8	Process Capability Analysis
31-Mar		Ch. 8	Process Capability Analysis
02-Apr		Ch. 8	Process Capability Analysis
07-Apr		Ch. 8	Process Capability Analysis
09-Apr		Ch. 8	Process Capability Analysis
14-Apr	Proposal Due	Ch. 8	Process Capability Analysis
16-Apr			Project Presentations
21-Apr			Project Presentations

Homework: There are up to six homework assignments in total, and the number of assignments depends

on the course's progress. Each assignment contains a varying number of questions, and 4 of these will be randomly selected for grading. For graduate students (530), you will have additional problems to solve for each homework assignment and exam. If a question involves a simulation, you must attach your code along with your solutions.

Tests:

- One in-class tests will be given. Depending on the progress of the lectures, the actual exam date may change.
- No make-up tests will be given. This applies to both excused and unexcused absences. If you miss a test and have a valid excused absence, the points associated with the missed test will be shifted to the final exam. If you do not have a valid excused absence, a grade of zero (0) will be recorded for the test.
- Calculators. Standard scientific calculators are allowed for use during all quizzes. Programmable calculators and wireless devices(e.g., cell phone, iPod/Pad, etc.) are not permitted.
- Formula sheet. You are permitted to bring an A4 formula sheet/a letter size paper to the exam, with notes on both the front and back. Throughout the semester, prepare this sheet by noting down the formulas you deem most important. You don't need to submit the formula sheet after the exam.

Research paper: Graduate students will be expected to do a research paper on a topic related to statistical quality control. Topics must be submitted and approved. Papers will not exceed two pages and should follow the paper format guidelines.

Project: There will be a statistical quality control project that will require you to be thinking of a process where you could improve the mfg processes. It can be something from work, a case study that you read about, or a place that is familiar to you.

For 530 students, the scope of project must have .....

Academic Coaching: Academic Coaching at the UAH exists to address the holistic needs of undergraduate students that impact their academic success. (Visit https://www.uah.edu/ssc/tutoring/academic-coaching)

Presentation Help: UAH students looking for assistance with practicing presentations or public speaking can visit the Presentation Collaboratory. (Visit https://www.uah.edu/ssc/resources-for-students)

Student Success Workshops: Student Success Center (SSC) are offered to provide a comfortable environment where students can feel free to ask questions and engage with faculty, academic coaches, mentors, and peers. (Visit https://www.uah.edu/ssc)

Attendance: Attendance is required (in-person). Students who are absent without an excuse for more than 3 consecutive classes may have their overall score reduced by an additional 1% per missed class, or may be dropped from the course at the discretion of the instructor.

Communication Skills: Written communication is an important aspect of being an engineer. It is important that engineers are able to clearly explain difficult topics to individuals that may not be as knowledgeable on the subject. Each submittal will be graded in part on your communication skills. These include: spelling, grammar, punctuation, and clarity of writing, enunciation, voice projection, clarity and logical order of presentations.

Professionalism: Engineering faculty at UAH expect students to act in a professional manner at all times, develop the work ethics required for a successful engineering career and follow the Engineering Code of

Ethics. Engineering students at UAH are responsible for maintaining the highest standards of professionalism and professional practice.

Inclement Weather: Class will be held at its regularly scheduled time unless the University is shut down or we (instructor) make a personal decision to cancel class. In the event that we cancel class, we will post an e-mail/CANVAS message.

Disability Statement: The University of Alabama in Huntsville will make reasonable accommodations for students with documented disabilities. If you need support or assistance due to a disability, you may be eligible for academic accommodations. Apply here or contact Disability Support Services (256.824.1997 or Wilson Hall 128) as soon as possible to coordinate accommodations.

ABET outcome mapped to this course:
OUTCOME (1) ASSESSMENT: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
This is achieved through a plant layout case study. This is one of three plant layout assignments and counted 30-40% of the grade. One of the versions is given below the table. Students were also given the option of coming up with a project and I had one student to take this option.

You will need to make and identify many assumptions as part of the design process. You may also need to perform several iterations of the various design process steps. Please document all assumptions and iterations. I am more interested in the process followed than in the final answer obtained. A project that would be considered "very good" will result in a grade in the lower 90%; to achieve a near 100% you must go beyond what is asked and enter into the realm known as "excellent." I will be looking for innovation and an attention to details. It will be in your best interest to keep your design to yourself (For example if several people have almost the same "good" or "very good" solution I will take this as an average grade and all will receive 70%.- 80%)

Mental Health Statement: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities.

The University of Alabama in Huntsville offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Department of Student Affairs located under the Health and Wellness or the UAH Counseling Center by calling 256.824.6203.

24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1.800.273.TALK or at suicidepreventionlifeline.org or a student who lives on-campus can reach out to the UAH PD dispatch to contact an on-call counselor by calling 256.824.6596. If you find yourself in a mental health emergency, call 6911 on-campus or 911 off-campus.

Subject to Change: Every effort is made to follow the guidelines in the syllabus; however, if needed, the syllabus will be amended. You will be notified if changes are made.