

The University of Texas at El Paso
Statistical Quality Control and Reliability – IE 4385
Spring 2023 – Course Syllabus

Professor: Dr. Ana C. Cram
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Class meets: Physical Science Building, 314, Tuesdays & Thursdays 9:00 am – 10:20 am

Office hours: E-201L or Microsoft Teams. Tuesdays & Thursdays 11:00 am – 12:00 pm, and by appointment

Course web page:

<https://blackboard.utep.edu/>

COURSE DESCRIPTION

The objective of this course is to teach students statistical methods for quality control and reliability. Topics include control charts for variables and attributes data, process capability studies acceptance sampling procedures and reliability engineering. New topics and recent trends in quality engineering are introduced including SPC for Short Production Runs, EWMA chart and Six Sigma. The Philosophies of Dr(s). Deming, Juran, and Taguchi are surveyed.

PREREQUISITES:

BE 3373: Engineering Probability and Statistical Models (with a grade of “C” or better) or
IE 3373: Engineering Probability and Statistical Models (with a grade of “C” or better)

COURSE OBJECTIVES OR EXPECTED LEARNING OUTCOMES

- To understand the important of quality and the prevailing quality philosophy in use today.
- To convey the importance of “statistical thinking” in industry.
- To introduce concepts of *common* and *special* cause random variation.
- To understand sampling techniques for assessing product quality.
- To understand the usefulness and theory behind use of *Shewhart* control charts.
- To examine advancements in *statistical process control* over the last 15 years.

REQUIRED MATERIALS

Montgomery D. C. (2020). Introduction to Statistical Quality Control, 8th Edition. Ed. Wiley

ISBN: 978-1-119-72309-7

OTHER REFERENCES:

1. Besterfield D. H. (2009). Quality Control. 8th Edition. Ed. PrenticeHall.
2. Krishnamoorthi K. S. (2006). A First Course in Quality Engineering. 1st Edition. Ed. Prentice Hall.
3. Devor R. E., Chang T-H., and Sutherland J. W. (2006). Statistical Quality Design and

- Control. 2nd Edition. Ed. Prentice Hall.
4. Elsayed E. A. (2012). Reliability Engineering, 2nd Edition, Ed. Wiley
 5. Nachlas J. A. (2005). *Reliability Engineering: Probabilistic models and maintenance methods*, 1st Edition, CRC Press
 6. Leemis L. M. (2009). Reliability: Probabilistic Models and Statistical Methods, 2nd Edition, Prentice Hall.
 7. Vardeman, S. B. and Jobe, J. M. (1998). Statistical Quality Assurance Methods for Engineers. 1st Edition, Ed. Wiley

COURSE ASSIGNMENTS AND GRADING

Evaluation procedure and criteria

Exam I	20%
Exam II	20%
Exam III	20%
Homework	15%
Quizzes	10%
Final Project Report	10%
Final Project Presentation	5%

Grading procedure:

The final grade will be based on a weighted average of the exams scores, homework assignments, quizzes, final project report and final project presentation.

Grade Distribution

A	$90 \leq 100$
B	$80 < 90$
C	$70 < 80$
D	$60 < 70$
F	< 60

Homework Assignments

Homework assignments will be announced in class and posted on blackboard after their announcement. All assignments are due 1 week after they are announced and should be submitted through blackboard. Assignments submitted via email will NOT be accepted. Late assignments will NOT be accepted unless certified medical proof is given.

Quizzes

Quizzes will be announced randomly in class. If you missed class the day a quiz was given, you will still be able to take it if you advised the instructor about your absence PRIOR to the class and can properly justify it.

Final Project Report

The purpose of the term project is to provide an opportunity to apply and/or further explore a topic area related to the course. For the final project, you can obtain data and apply quality control methods reviewed in class.

- Teams of 5 students
- Submit a final typed report (~20 pages, in word format, 1.5 spacing, Times New Roman 12)

IE program outcomes (ABET):

This course supports the following Industrial Engineering program outcomes, which state that our students will have:

1. ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

Students with disabilities:

Students with disabilities or who suspect they have a disability may wish to self-identify for purposes of modifications. You can do so by providing documentation to the Office of Disabled Student Services located in the UTEP Union. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, you are encouraged to discuss this in confidence with the instructor and/or director of the Disabled Student Services. For general information about the American with Disabilities Act (ADA), please call 747-5184.

Late Work Policy:

Late homework or reports will not be accepted, unless certified medical proof is given. If you are unable to attend the class at which the homework is due, it is your responsibility to submit it earlier.

Academic Honesty

During exams and quizzes, you are **not allowed to use any form of wi-fi enabled electronic device**, including cell phones or other electronic communication devices or methods (calculators, wrist watches, earbuds, etc.). No wristwatch or other electronic device may be worn.

During exams and quizzes, you are allowed to use only instructor approved calculators. Check your syllabus for the list of approved calculators.

No electronic version of the book, loose paper print-outs of the book or extra sheets of paper of any kind are allowed unless explicitly mentioned in writing by the instructor. As a part of the zero-tolerance policy, if you have a cellphone or other electronic device capable of communication on your person; or if any proctor sees or hears any electronic device during the exam or if you share your work with someone else, you will be reported to the proper authorities, and you may receive a zero on the exam and an F in the class. Other actions including suspension may also be perused.

If you have a disability that requires the use of an electronic device during exams you must have a letter of accommodation from the Center for Accommodations and Support Services (CASS). This accommodation must be coordinated in advance with the instructor.

During exams, you will not be allowed to leave the examination room until you complete the exam. This includes restroom breaks. Students with disabilities must have a letter of accommodation and coordinate this in advance with the instructor.

Instructors and/or proctors may record and/or use their personal cell phones to document activity during the exam. Recording devices may also be located at various locations in the room and may be out of sight of the students. These recordings will be managed according to the UTEP approved regulations for such media.

If you are suspected of scholastic dishonesty, you may not be directly confronted about your conduct by the instructor or proctor. You will, however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam will not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes or graduation.

If you arrive more than 15 minutes late to an exam, you will not be allowed to enter the examination room.

There will be no makeup exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given.

If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid.

No food or drinks will be allowed in the examination room.

Departmental policy allows for the use of assigned seats. All students must present their UTEP issued ID prior to and during every exam and may be required to sign in. Not having a UTEP issued ID when asked will result in forfeiture of the exam.

Scholastic dishonesty on homework, lab assignments and all other class assignments will be held to the same standards and requirements of academic honesty as quizzes and exams.

Harassment Policy

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment; but repeated questions about a grade or an administrative decision are.
- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.
- Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
- Similar behavior towards department staff, and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students and should be treated with due respect.

Cell phone policy- Cell phones are to be off or mute during class. You should not take phone calls during class, except for emergencies.

TENTATIVE CLASS SCHEDULED

Week	Date	Topics
1	17-Jan	Class introduction, syllabus, IE program objectives
	19-Jan	Chapter 1: Introduction to Quality
2	24-Jan	Chapter 1: Statistical methods for Quality control and Improvement
	26-Jan	Chapter 2: The DMAIC Process
3	31-Jan	Chapter 3: Describing Variations - MINITAB LAB #1
	2-Feb	Chapter 3: Important Discrete and continuous distribution
4	7-Feb	Chapter 3: Probability Plots and useful approximations
	9-Feb	Chapter 4: Inferences about process quality
5	14-Feb	Chapter 4: Inferences about process quality
	16-Feb	MINITAB LAB #2 - Probability plots, Hypothesis testing
6	21-Feb	EXAM 1
	23-Feb	Chapter 6: Control Charts for Variables
7	28-Feb	Chapter 6: Control Charts for Variables
	2-Mar	Chapter 6: Control Charts for Variables
8	7-Mar	Chapter 6: Control Charts for Variables
	9-Mar	Chapter 7: Control Charts for Attributes
9	14-Mar	SPRING BREAK
	16-Mar	SPRING BREAK
10	21-Mar	Chapter 7: Control Charts for Attributes
	23-Mar	Chapter 7: Control Charts for Attributes
11	28-Mar	Chapter 7: Control Charts for Attributes
	30-Mar	MINITAB LAB #3 - Control Charts
12	4-Apr	EXAM 2
	6-Apr	Chapter 8: Process and Measurement system capability analysis
13	11-Apr	Chapter 8: Process and Measurement system capability analysis
	13-Apr	Chapter 8: Process and Measurement system capability analysis
14	18-Apr	Reliability Engineering
	20-Apr	Reliability Engineering
15	25-Apr	Reliability Engineering
	27-Apr	EXAM 3
16	2-May	Final project presentations
	4-May	Final project presentations
17	9-May	FINAL EXAMS WEEK
	11-May	FINAL EXAMS WEEK