

IE 4385: Statistical Quality Control and Reliability Spring 2019 Course Syllabus

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Class meets (CRBL 205): Tuesdays and Thursdays 9:00 am – 10:20 am

Office hours (A240): Tuesdays and Thursdays 10:30 am – 11:30 am, 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.

Educational goals and 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.

Prerequisites:

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

Required textbook:

Montgomery D. C. (2012). Introduction to Statistical Quality Control. 7th Edition. Ed. Wiley

Other references:

1. Besterfield D. H. (2009). Quality Control. 8th Edition. Ed. Prentice Hall.
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

Evaluation procedure and criteria

Exam I	30%
Exam II	30%
Homeworks	15%
Quality Management Presentation	10%
Project Report	10%
Final Project Presentation	5%

Grading procedure:

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

Grade percentage

A	91-100
B	81-90
C	71-80
D	60-70
F	< 60

ISE program outcomes (ABET):

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

Contribution to Industrial Engineering Program Outcomes:		
1	An ability to apply knowledge of mathematics, science, and engineering to solve industrial engineering problems in varied sectors of industry	x
2	An ability to design experiments, collect data, analyze data, and interpret results obtained	x
3	An ability to obtain client requirements, and design a system, component, or process related to industrial engineering to meet client requirements with realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	x
5	An ability to identify, formulate, and solve industrial engineering problems	x
6	Familiarity with current and emerging topics in industrial engineering	x
7	An ability to put into practice techniques, skills, and modern engineering tools learnt in school	x

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.

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.

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 wrist watch or other electronic device may be worn. During exams and quizzes, you are allowed to use only instructor 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.

Class Attendance Policy:

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs.

As per UTEP rules, you may be asked to show a UTEP ID at any time during class.

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.
- 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.

Quality Management Presentation: Each student will participate in a presentation on a topic during one of the class meetings. The presentation will count as 10% of your grade. To encourage attendance for the presentations, your own presentation score will be discounted by the percentage of others' presentations that you fail to attend. A list of possible topics will be distributed in class.

The purpose of the presentation is for you to learn about one of the founders of quality ((W. Edwards Deming, Joseph M. Juran, Dr. Genichi Taguchi, Armand V. Feigenbaum, Kaoru Ishikawa, Philip B. Crosby, Masaaki Imai, among others) and Quality Methodologies and Standards (ISO, Malcolm Baldrige Award, Quality Function Deployment). The project will consist of a presentation that will be given to the entire class. Each student must do their presentation on a different quality management topic. You must have your topic approved by **Jan/31/2019**. Topics will be approved on a first come, first served basis.

- Teams of 4 members
- Select your preferred topic by Jan/31
- Prepare and give a 15 min ppt presentation

Other Policies:

1. **No** cell phones, pagers, or other disruptive devices are allowed in class.
2. **No** talking to classmates (unless you are working on a class exercise/discussion). You are always welcome to ask questions if something is unclear, but visiting with your friends is to be done on your own time.
3. You should always treat your classmates and me with the respect that you would expect for yourself.
4. If you are disruptive to the class in anyway, you will be asked to leave and will need my permission to re-enter the class. Everyone in class is entitled to an atmosphere conducive to learning. I will NOT tolerate individuals who disrupt this learning environment.

Term project

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 4 members
- Submit a one page project proposal by **Mar/19/2019**
- Submit a final typed report (~20 pages, in word format, 1.5 spacing, Times New Roman 11) due **May/14/2019**

Tentative class schedule

Week	Topics
1	Class introduction, syllabus, IE program objectives.
	Chapters 1: Quality philosophy
2	Chapter 2: The DMAIC Process
	Chapter 2: The DMAIC Process
3	Chapter 3. Describing Variation - MINITAB_LAB #1
	Chapter 3: Important Discrete and continuous distributions
4	Chapter 3: Probability Plots and useful approximations
	Chapter 4: Inferences about process quality
5	Chapter 4: Inferences about process quality
	Minitab_LAB #2: Probability plots, Hypothesis testing
6	Chapter 5: Methods and Philosophy of Statistical Process Control
	Chapter 6: Control Charts for Variables
7	Chapter 6: Control Charts for Variables
	Chapter 6: Control Charts for Variables
8	Exam #1 March 12 and March 14
9	Spring Break No class – Mar 18-22
10	Chapter 7: Control Charts for Attributes
	Chapter 7: Control Charts for Attributes
11	Chapter 7: Control Charts for Attributes
	MINITAB_LAB #3: Control charts
12	Chapter 8: Process and Measurement system capability analysis
	Chapter 8: Process and Measurement system capability analysis
13	Chapter 8: Process and Measurement system capability analysis
	Chapter 8: Process and Measurement system capability analysis
14	Reliability Engineering
	Reliability Engineering
15	Reliability Engineering
	Reliability Engineering
16	Exam #2 - May 7 and May 9
17	Final Project due / presentations Tuesday, May 14 th - 10:00 am – 12:45pm