ISE 426 STATISTICAL QUALITY CONTROL

Instructor: Prof. Qiang Huang
                    Epstein Department of Industrial & Systems Engineering

Office: GER 241   Class Schedule:
Office hours: MW: 4:30pm-5:30pm   Lecture: MW 2:00pm-3:20pm, KAP146
                    Other time by appointment   Website: blackboard.usc.edu
                                                           Smart Phone App: Bb MobileLearn
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TA: Ye Wang, Office: GER 236; Office hours: TBD

PREREQUISITE: ISE 225 Engineering Statistics I (or equivalent)

REQUIRED TEXT:
TEXT   *Introduction to Statistical Quality Control*, 7th Edition by Douglas C. Montgomery,
              2013, John Wiley & Sons, Inc., New York.
References
              Engineering Statistics by Douglas C. Montgomery, George C. Runger, and Norma F.
              Hubele, John Wiley & Sons, Inc., New York.
              Applied Statistics and Probability for Engineers Second Edition by Douglas C.
              Montgomery and George C. Runger, 1999, John Wiley & Sons, Inc., New York.

COURSE OBJECTIVES
This course will present the theory and methods of quality monitoring including process capability, control charts, acceptance sampling, quality engineering, and quality design. The objectives include
- To understand the basic concepts of quality monitoring.
- To understand the statistical underpinnings of quality monitoring.
- To learn various available statistical tools of quality monitoring.
- To learn the statistical and economical design issues associated with the monitoring tools.
- To demonstrate the ability to design and implement these tools.

SEMESTER CALENDAR
              August 25, first day of class
              September 1, Labor Day
              Wednesday, October 8, Midterm Exam
              November 26-29: Thanksgiving
              December 5, last day of class
              Friday, December 12th, Final Exam, 2:00-4:00pm

1. TENTATIVE COURSE SCHEDULE

Week	Date	Topics
1		Introduction to the course / Chapter 1: Quality Improvement in the Modern Business Environment and Introduction to Statistical Computing with R
	Lecture	Chapter 2: DMAIC Process
2	Lecture	Chapter 3: Modeling Process Quality and R
		Chapter 4: Inferences about Process Quality and R (**HW#1**)
3	Lecture	Chapter 5: Methods and Philosophy of Statistical Process Control
4	Lecture	Chapter 6: Control Charts for Variables
5,6	Lecture	Chapters 6 (**HW#2**) **Proposal presentation**
	Lab	*Use Excel to plot control charts in Ch6*
7,8,9	Lecture	Chapter 7: Control Charts for Attributes (**HW#3**) **Midterm Exam**
	Lab	*Use Excel to plot control charts in Ch7*
10,11,12	Lecture	Chapter 8: Process and Measurement System Capability Analysis (**HW#4**)
	Lab	*Use Excel to Process Capability in Ch8*
13,14	Lecture	Chapter 9: Cumulative Sum and Exponentially Weighted Moving Average Control Charts (**HW#5**)
	Lab	*Use Excel to plot control charts in Ch9*
14	Lecture	Chapters 15: Acceptance Sampling for Attributes (**HW#6**)
	Lab	*Use Excel to solve problem in sampling*
15	Lecture	Chapter 15 *Final Exam Review and Q&A* **Final project presentation**

2. COURSE GRADING

Homework sets   = 30%
Exams   = 60% (Midterm Exam: 30%, Final Exam: 30%)
Project   = 10% (Due on Monday, November 25)
                Total   = 100%

Grading scale:

A: [95, 100];   A-: [90, 95); B+: [85, 90);   B: [80, 85);   B-: [75, 80);
C+: [70, 75];   C: [65, 70); C-: [60, 65);   D: [50, 60);   F: <50

PROJECT will be due on **Monday, November 25**.

3. CLASS PROJECT

Please form a team of three or four. In the final project report, all team members should sign and state that they contribute to their project roughly equally. Every member will receive the same grade on the project.

All reports should be typewritten and printed out for handing in. The report should not exceed 8 pages. (12 point, double space, Appendix does not count to 8 pages.) The report must have a

professional appearance. Clarity and thoroughness of the analysis, and good use of the English language, including grammar, spelling and punctuation, are considered in grading the project.

Final project report includes project objective, problem statement, solutions, conclusions, and appendix if needed. The report should describe the background, any assumptions made, the analysis used to analyze the data, and the appropriate results. Explanation, interpretation, and justifications are required. Computer output should be included in an appendix and the description of the outcome/results included in the text of the report.

Sample Class Projects:

Example 1: *IPod Nano Nike Plus System Capability Analysis:* The team used IPod Nano to measure the distance and time of runs and analyze the capability (repeatability and reproducibility) of the device's pedometer.

Example 2: *Heart Failure Discharge Rate Analysis for Medicare Patients:* The team collected data on the discharge rate of Medicare patients with heat failure in US. They aims to test the hypothesis whether there is a statistically significant decrease in discharge rate and which states does this have the impact on.

Example 3: *Monitoring energy use*: The team aims to monitor and analyze the energy usage for an industrial pump at a Pulp and Paper plant. By monitoring baseline energy usage, the team will determine whether the pump is within nameplate specifications and then decide if energy-saving component is needed.

4. CLASS POLICIES
- Grading is purely based on the merit of your work. Request of credit or higher grade for other reasons will NOT be considered.
- Assigned homework will be collected **in class**. Homework is due one week after it is assigned. *No late homework will be accepted*.
- *Cellphones are not allowed during exams*.
- *Exams can be taken on or before the scheduled exam dates with justifiable reasons.*
- Exams will be closed book, closed notes. One 8 ½ x 11 formula sheet can be used. Be sure to bring your calculator. There will be ABSOLUTELY NO SHARING among students of books, formula sheets, or calculators.
- If you believe there was an error in the grading of an exam or homework, then you can submit the entire exam to the TA requesting a regrade. This must be done *within one week* from the date the exam was returned. The entire exam will be regraded, so that you may gain, or lose, points by resubmitting.
- Students are responsible for all information conveyed during class and on Blackboard. It is the student's responsibility to make sure they are receiving their official USC email.
- Always bring your textbook to class! Also bring your calculator, notebook, pencils/pens, eraser, and course syllabus.

5. COURSE WEBSITE
The course will use Blackboard: blackboard.usc.edu. You can also use smartphone app Bb MobileLearn to access Blackboard.

6. SOFTWARE USAGE:

Software is required for control charting in homework and project (not in exams). You can use Excel templates provided in the class to do homework and project.

7.   **ACADEMIC INTEGRITY**

ISE adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of and to observe the academic integrity standards described in SCampus. ***Plagiarism are NOT acceptable***.

8.   **ACCOMMODATION FOR DISABILITIES**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 am - 5:00 pm, Monday through Friday. The phone number for DSP is (213)740-0776.