STAT 435
Industrial Statistics
Fall Semester 2018

Instructor: Dr. David J. Edwards, Associate Professor

Contact Information:
E-mail: dedwards7@vcu.edu (Note: This is the best way to contact me.)
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Office: 4141 Grace E. Harris Hall

Office Hours: 2:30-3:30pm, Monday-Thursday, and by appointment

Course Time and Place: 4-5:15pm Monday/Wednesday, Harris Hall 2133

Course Prerequisite: STAT 309 and either STAT 305 or STAT 314, or equivalent, or permission of instructor


Course Objectives/Outcomes: At the end of the course, students will be expected to:
• Have an understanding of variability and its impact on quality control/process improvement
• Differentiate between common and special causes of variation
• Understand the philosophy of industrial statistics
• Create and interpret common tools for process study including process flowcharts, cause/effect diagrams, and Pareto plots
• Construct and interpret control charts for attributes data: p, np, c, and u charts
• Construct and interpret control charts for variables data: Xbar and R/S charts, moving range and individuals charts
• Understand how to quantify process capability
• Understand process components contributing to total variation
• Compute and interpret components of variation
• Understand the role of design of experiments in quality control/process improvement
• Construct and analyze designed experiments commonly used in industry: Two-level factorial and fractional factorial designs
• Understand the nature of sequential design of experiments for process optimization
• Analyze second-order experiments for process optimization
Website: We will be using the Blackboard system at blackboard.vcu.edu for course announcements, notes, assignments, etc. If you are not using your VCU email address, please be sure to have it rerouted to your current email provider.

Textbook: *Introduction to Statistical Quality Control, 7th edition*, by Douglas Montgomery

Software: We will make extensive use of JMP Statistical Software Version 14. The software can be downloaded for free at www.ts.vcu.edu.

Homework: Homework will be assigned and collected on a regular basis. You may work with others on homework assignments. However, your final write up must be your own work and reflect your understanding of the material.

Exams: Two midterm exams will be given during the semester. They will be announced at least one week in advance. The final exam is scheduled for Monday, December 12: 1-3:50pm.

All tests will be closed notes and closed book. I do not expect you to memorize formulas for this course; so formula sheets will be permitted during the tests. Given the nature of statistics, each test is necessarily cumulative in that the material learned early in the course will be needed for topics later in the course. There will be no make-up exams without prior permission of the instructor.

Attendance: Students are expected to attend every class meeting and to arrive to class on time. Class attendance and participation are essential in the learning process. It is difficult, if not almost impossible, to do well without practicing regular attendance.

Course grade determination:
• Homework: 25%
• Exam 1: 25%
• Exam 2: 25%
• Final Exam: 25%

Grading Scale: 90-100 (A), 80-89.99 (B), 70-79.99 (C), 60-69.99 (D), <60 (F)

All work in this course will be conducted according to the VCU Honor Code. Class and group discussion will be encouraged as a part of the learning process, but all work submitted for an individual grade must reflect the final analysis of only that individual. See statement of the honor code below.

Additional Information: Exceptions to the policies above may be made in the event of serious illness or personal emergency at my discretion. Please contact me if such a situation arises. Exceptions may also be made at the request of a sponsor or coach of a university-sponsored activity.
Tentative Outline and Readings:
I. Introduction to Quality Improvement – Montgomery Chapter 1
II. Tools for Process Study – Montgomery Chapter 5
   A. Introduction to Control Charts
   B. Flowcharts, Pareto Diagrams, Cause and Effect Diagrams
III. Control Charts for Attributes Data – Montgomery Chapter 7
   A. p and np charts
   B. c and u charts
IV. Control Charts for Variables Data – Montgomery Chapter 6
   A. Variability and Location – R and Xbar charts, R and S charts
   B. Moving Range and Individuals charts
V. Process and Measurement Capability Analysis – Montgomery Chapter 8
   A. Capability ratios
   B. Measurement studies
VI. Subgrouping and Components of Variation – Notes
VII. Introduction to Design of Experiments – Montgomery Chapter 13
   A. Two-level factorial experiments
   B. Fractional factorial experiments
VIII. Introduction to Response Surface Methodology – Montgomery Chapter 14
   A. Sequential experimentation
   B. Second-order experimental designs
   C. Process optimization
IX. Additional Topics (as time allows) – Montgomery Chapters 9 and 11
   A. CUSUM and EWMA charts
   B. Multivariate process control

Students should visit http://go.vcu.edu/syllabus and review all syllabus statement information. The full university syllabus statement includes information on safety, registration, the VCU Honor Code, student conduct, withdrawal and more.