**IE 1072 – Design of Experiments and Quality Assurance**

**Fall 2019**

**Course Syllabus**

(Subject to be changed)

# Instructor

Dr. Steve H. Wang (email: steve.wang@scu.edu.cn)

Office: Zone 4, 221

Office Hours: Wednesdays & Thursdays – 5th and 6th Periods

# Teaching Assistant

Jasper Wu

Office: TBA or WeChat

Office Hours: Wednesday 09:10 to 11:55 and 13:50 to 16:25；Thursday 13:50 to 16:25

**Lecture**

Wednesdays, 10st to 12th Periods (18:00 – 20:35); Room: Zone 3, 106

**Course Description**

This course introduces students to the technical aspects of statistical quality control and design of experiments by covering the following topics (time permitting, subject to change):

1. Background and Overview (Chapter 1; Sections 1.1-1.3)
2. Probability & Statistics Review (Chapters 3 & 4)

*Please review this material on your own. We will refer to it as needed throughout the semester, but will not cover it in depth.*

1. Acceptance Sampling (Chapters 15 & 16)
2. Control Chart Basics (Chapter 5; Sections 5.1-5.3, 5.6-5.7)
3. Control Charts for Variables (Chapter 6)
4. Control Charts for Attributes (Chapter 7)
5. Process Capability Analysis (Chapter 8; Sections 8.1 – 8.4, 8.6)
6. Cumulative Sum & Exponentially-Weighted Moving Average Charts (Chapter 9)
7. Economic Design of Control Charts (Chapter 10; Section 10.6)
8. Factorial & Fractional Factorial Experiments (Chapter 13)
9. Response Surface Methodologies (Chapter 14)

Knowledge in these areas will enhance students’ general ability to:

* apply knowledge of mathematics, science, and engineering
* design and conduct experiments, as well as to analyze and interpret data.

**Course Prerequisites**

A course on introductory statistics (IE 1071) or consent of the instructor, as well as a working knowledge of Excel, Minitab or **Statgraphics**, and Matlab or Mathematica, are pre-requisites for this course.

# Course Objectives

This course will discuss the statistical methods useful in quality control and improvement and their future development. The theory and methods of quality monitoring and including process capability, control charts, acceptance sampling, quality engineering, and quality design.

1. Utilize a variety of software resources related to quality process management to control and improve an existing process in a system.
2. Utilize their knowledge of the six-sigma project management to define, measure, analyze a process.
3. Demonstrate their knowledge of process improvement to develop an action plan for an existing process in a system.
4. Incorporate their knowledge of the Define, Measure, Analyze, Improve, and Control (DMAIC) process to monitor the process capability in a system.
5. Select the appropriate sampling procedure and standard for the statistic process control

# Applicable ABET Outcomes

1. An ability to design of statistic experiments
2. An understanding of processes capability through statistical process control
3. The broad education necessary to understand the systems quality in a global, economic, environmental, and societal context
4. A recognition of the need for, and an ability to assure systems quality
5. A knowledge of contemporary issues

# Textbook

Doug Montgomery. Introduction to Statistical Quality Control, 7th edition. Wiley, 2013. E-text version is fine.

# Grading

Graded Assignments PointsPossible

Discussions and Weekly Activities 100

Quiz 100

Homework Assignments (8 assignments X 50 points each) 400

Midterm Exams 100

Group Projects 200

Final Exam 200

**Total Points Possible:** 1100

**Final Grades**

The following point scale will be used when calculating final grades for graduate students:

A 930-1000 A- 900-929 B+ 870-899

B 830-869 B- 800-829 C+ 770-799

C 730-769 C- 700-729

Homework will be assigned via Blackboard. Homework is due by noon on Wednesday unless otherwise specified. Homework should be submitted electronically via Blackboard as a PDF file with your last name(s) in the file name. High quality scans of neatly hand written assignments are permitted. Show all work to receive full credit.

Late homework is not accepted for any reason and you must submit the correct problems to receive credit. If you must miss class for a legitimate emergency (illness, death in the family), please provide official documentation of the emergency and you will be excused from the homework assignment.

You may work in groups of two to complete the homework assignments. These groups can vary from week to week; simply indicate group members on each assignment submitted.

# Quizzes

Throughout the term there will be (un)announced quizzes. The quizzes will be collaborative and open notes. Missed quizzes for *any* reason may not be taken at a later date, though you may be excused from a quiz in the event of a documented emergency (see above). Solutions from class will be posted on Blackboard. *Please bring your book to class.*

# Exams

The exams will be open book, open notes, open homework, and open software.

# Group Project

Each of these will be described in separate handouts as they are assigned.

# Participation

Regular attendance as well as active classroom participation is expected. Any required student absences should be reported to the instructor in advance via email or if not possible in advance, shortly thereafter.

**Student Opinion of Teaching Surveys**

Students in this class will be asked to complete a Student Opinion of Teaching Survey. Surveys will be sent via SCUPI email and appear on your Blackboard landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Read more about Student Opinion of Teaching Surveys.

# Avoiding Plagiarism

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.

# Tentative Course Schedule

