**UNIVERSITY OF BRIDGEPORT**
**School of Engineering**

**SPRING 2014**
**COURSE OUTLINE**

# TCMG 524-DL
# Statistical Quality Control Techniques

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|---|---|---|---|
| **Semester Offered:** | Spring 2014 | **Instructor:** | Elif Kongar |
| **Course Number:** | TCMG 524 DL | **Office:** | 141 TECH |
| **Credit Hours:** | 3 SH | **E-mail:** | kongar@bridgeport.edu |
| **Office Hours:** | Tuesday: 11:00 – 1:00 PM | **Phone:** | (203) 576-4379 |
| | Thursday: 1:00 – 3:00 PM or by appointment | | |

## Course Description:

This course presents a comprehensive summary of methods for managing quality and continuous process improvements. The course objective is to develop an operational familiarity with contemporary methods found to be effective. This course is intended for those students who do not plan to specialize in quality management.

- *Topics include:* Statistical process control, quality function deployment, concurrent design, the house of quality, the Taguchi method, Six Sigma, lean and others. It also covers continuous process improvement methodologies and techniques.

## Course Prerequisites:

- Basic knowledge of probability and statistics.
- Basic computer programming experience.
- General spreadsheet skills and familiarity with industrial engineering, operations research, and manufacturing systems

## Course Objectives:

Successful completion of the course will provide:

1. Demonstrating a comprehensive understanding of the modern statistical methods for quality control and improvement.
2. An understanding of integrated and comprehensive models for TQM, Six Sigma, and TQS.
3. An understating of preventing, detecting, and analyzing the root cause of problems in manufacturing.

## Course Topics:

- Introduction to basic concepts of quality improvement and quality control
- An overview of Total Quality Management (TQM)
- Six-Sigma Process and the DMAIC Roadmap
- Modeling process quality
- Just in Time (JIT) Manufacturing / Agile Manufacturing / Lean Manufacturing
- Preventing problems
- Detecting problems: Statistical Process Control
- Analyze the root cause of problems
- Qualitative Six Sigma Tools

**Schedule and Classroom:**

- Online

**Examinations and Grading Criteria (Subject to change):**

| | | |
|---|---|---|
| • Assignments: | 30% | - Announced throughout the semester |
| • Midterm Exam: | 35% | |
| • Final Exam | 35% | - To be explained in detail during the course |

Bonus points will be credited throughout the course.
The grading is subject to change and the changes will be communicated with the students.

**Textbook:**

1. Introduction to Statistical Quality Control, by D. C. Montgomery, 6th edition 2008, Wiley, ISBN: 0470169923, 9780470169926
2. Additional handouts may be providing during the semester.

**Recommended (Optional) Reading:**

1. Probability and Statistics for Engineers and Scientists – Sixth Edition by Walpole, Myers and Myers, 1998, ISBN: 0-13-840208-6.
2. Statistics for Six Sigma Made Easy !
3. Statistical Quality Control, by E.L. Grant and R.S. Leavenworth, 6th edition, McGraw-Hill, ISBN: 0078443547.

**Software:**

General spreadsheet applications will be used throughout the semester.

**Policies:**

- Late homework / project assignment submission will not be accepted.
- Three or more unexcused absences will result in an automatic failure.
- Make-up exams / quizzes will not be allowed (except for prior instructor approval for a documented emergency)
- Homework assignments and programs are due within a week from the assignment date, unless the instructor notes otherwise.
- All homework assignments are to be typed.
- All programs are to include sufficient comments and documentation with a clear program statement.
- Programs are to be submitted with all I/O files and source code hardcopies.
- Extra credit quizzes, assignments, and programs (if any) will be announced by the instructor.

## Assignment Submission Guidelines

1. Computer-type your assignments (preferably MS-Word format).

2. Save your file with a proper filename format:

e.g: If the student name is Elif Kongar, student ID# 0123456, Homework Assignment 1; the filename should be:

TCMG524DL_Elif_Kongar_0123456_HW1.

3. Login to myub and click on the Canvas link under Library & Technology Resources. Use the first part of your UB email as username (for example: jbond, without the @bridgeport.edu) and follow the instructions to set up your password.

4. Sign in to your UB Canvas account and then into the course, e.g. "Statistical Quality Control Techniques" to submit your assignments.

To access Canvas tutorial for faculty:

https://bridgeport.instructure.com/courses/900843

UB Canvas account can also be accessed through the URL:

https://bridgeport.instructure.com/login

### Important Dates

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|---|---|
| No Classes, Martin Luther King Day | Monday, 1/20 |
| Classes Begin | Tuesday, 1/21 |
| Spring Break - No Classes | Sunday-Sunday, 3/9-3/16 |
| Last Day of Classes | Friday, 5/2 |
| Final Grades Due | Monday, 5/12 |

### Grading Scale

| Letter Grade | Percentage |
|---|---|
| A | **94.9 – 100%** |
| A- | **90 – 94.8%** |
| B+ | **87 – 89.9%** |
| B | **83 – 86.9%** |
| B- | **80 – 82.9%** |
| C+ | **77 – 79.9%** |
| C | **73 – 76.9%** |
| C- | **70 – 72.9%** |
| D+ | **67 – 69.9%** |
| D | **63 – 66.9%** |
| D- | **60 – 62.9%** |
| F | **Below 60%** |

## Weekly Schedule (1/21/14 - 5/2/14)

***Please note that the class notes and handouts are updated every week***

| Week | Date | Topic |
|---|---|---|
| 1 | 1/21 | • Syllabus<br>• Introduction to the Class |
| 2 | 1/28 | • Basic Definitions and Terminology<br>• Flowchart<br>• Quality of conformance<br>• Control Charts for Variables and Attributes<br>• History of Quality Improvement<br>• Statistical Methods for Quality Improvement<br>**Assignment 1** |
| 3 | 2/4 | • *Statistics Review – I (Supplementary Material)*<br>• X-bar Chart Example<br>• Usage of Statistical Methods<br>• Management Aspects of Quality Improvement<br>• Deming's 14 Points<br>• Statistical Process Control, Process Variation and Control Charts<br>**Assignment 1 is due**<br>**Assignment 2** |
| 4 | 2/11 | **Faculty Development Day – No Class** |
| 5 | 2/18 | • Deming Funnel Experiment<br>• Juran and Other Quality Gurus<br>• Lean Six Sigma<br>• Normal Distribution Table<br>• Stem and Leaf Display/Histograms<br>• Mean/Variance/Standard deviation<br>• The Box Plot<br>**Assignment 2 is due**<br>**Assignment 3** |
| 6 | 2/25 | *Guest Lecturer*<br>**Assignment 3 is due** |
| 7 | 3/4 | • Regression Review (Supplementary Material)<br>• Sample X-bar Chart.xls and Blood sugar chart1.xls are posted (Supplementary Material)<br>• Normal Distribution<br>• How to read the Normal Distribution table<br>• Normal Probability Plot<br>• Other Probability Plots<br>• X-bar Chart Example<br>• Linear Regression Model<br>**Assignment 4** |
| 8 | 3/11 | **Spring Break No Classes** |
| 9 | 3/18 | • Magnificent Seven<br>• Course Review / Exercises<br>**Assignment 4 is due** |
| 10 | 3/25 | **Midterm Exam** |

| Week | Date | Topic |
|---|---|---|
| 11 | 4/1 | • Linear Regression Model (cont/)<br>• Basic SPC Tools<br>• Hypothesis Testing<br>• Producer's Risk<br>• Consumer's Risk<br>• Shewhart Control Chart Model<br>• Reasons for Popularity of Control Charts<br>**Assignment 5** |
| 12 | 4/8 | • Phase I and Phase II QC Charts<br>**Assignment 5 is due**<br>**Assignment 6** |
| 13 | 4/15 | • The Basics of Lean Manufacturing<br>• Case Study<br>**Assignment 6 is due** |
| 14 | 4/22 | • The Basics of Agile Manufacturing<br>• Case Study |
| 15 | 4/29 | Last Day of Classes – **Final Project Due** |