STAT 3170 Statistical Quality Control 2009/2010

Text: • Introduction to Statistical Quality Control, 6th Edition, Douglas C. Montgomery. John Wiley & Sons, 2009, ISBN: 978-0-470-16992-6.
• Statistical Tables for Students, Smiley W. Cheng and James C. Fu, Nelson Canada, 1995, ISBN: 17-604932-0.
• *JMP 8*.

Course Calendar Description: Techniques for quality improvement through the use of statistical process control. Topics will include acceptance sampling, Pareto diagrams, boxplots, normal probability plots, control charts (EWMA, CUSUM), measurements of process capability and process performance.

Prerequisite: STAT 2000, or the equivalent.

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Marking scheme:

Assignments	20%
Term Test	30% *(Feb. 12, 2010 Friday 11:30 am – 12:20 pm)*
Final exam	50%

Lecture Room: 115 Armes

Office Hours: 8:00 am – 4:30 pm.
You don't need an appointment to see me, you are welcome to drop by my office at any time.

Examination & Term Test:
The Term Test is scheduled above and it will be written in the regular class time *(Feb. 12, 2010 Friday 11:30 am – 12:20 pm)*. The results of the test will be available well in advance of the voluntary withdraw date (*March 19, 2010*) - for dropping the course without academic penalty. By that time you should have the marks of at least 3 assignments as well.

The Student Records Office will schedule the **Final Examination**.

Assignments: There will be an assignment approximately every two weeks. Should you wish to work cooperatively with others in the class please feel free to do so. **However each of you must write-up the solutions using your own words and effort!**

Readings: There are sections of the Text that will be assigned from time to time as readings. The material contained in these readings will be part of the course material that may be examined.

JUMP Portal: I will be making extensive use of the JUMP Portal for posting assignments, notes, articles, links, announcements and results. Be sure to claim your computer ID in order to be able to access the course site.

Academic Integrity: I wish to draw your attention to the sections in *The University of Manitoba 2009/2010 Undergraduate Calendar* dealing with academic dishonesty, including plagiarism, cheating, and examination personation. Check: *http://umanitoba.ca/science/student/webdisciplinedocuments.html>http://umanitoba.ca/science/student/webdisciplinedocuments.html*

Course Outline:

- Setting the Stage for Studying Quality Improvement Tools and Techniques
  - Definition of Quality and related terminology
  - An overview of the various approaches to achieving quality
  - The systems/process approach
- Studying Variation
  - The use of simple graphs and numerical summaries.
  - Useful graphical ideas: histogram, run chart, stem-and-leaf plots, boxplots, etc.
- The Use of Statistical Models for Understanding Processes
  - Sampling, random variables, statistic, and sampling distributions.
  - Discrete and continuous probability distributions.
  - Statistical Inference.
- Control Charting for SPC
  - The basic ideas of statistical control; "in control", common cause, assignable cause
  - Types of control charts
  - Rational Subgrouping, Control Chart patterns, Average Run Length
  - Control Chart issues.
- Variables Control Charts
  - $\bar{x}$ and R chart, $\bar{x}$ and S chart, Median Chart, Individuals chart.
- Attributes Control Charts
  - p, np, c, and u charts
- Process and Measurement Capability and Performance
  - Assessing nonconformance
  - Process Capability and indexes
- EWMA and CUSUM Charts
- Some Additional SPC Techniques
  - Short-run Control Charts, Modified and Acceptance Charts, Group chart for multiple stream processes, correlated data, etc.
- Other Topics (as time permits):
  - Acceptance Sampling
    - Acceptance Sampling versus Control
    - Acceptance sampling definitions (AQL, LTPD, etc.) and strategies
    - OC curves
    - Sampling Plans
  - Multivariate charts
  - The Use of Designed Experiments