STAT 335: Statistics in Quality Assurance

The following is a guide to the course Stat 335, Statistics for Quality Assurance, as given in the Fall term of the academic year 2011-12.
Aims and Objectives: Detailed aims and objectives for this course will be found in a document located on the course web page. You are urged to refer to this document throughout the course to clarify the outcomes you are expected to attain for each section of the material.
Pre-requisites: One of STAT 200, 241, 251, BIOL 300, FRST 231 or equivalent.
Co-requisites: None.
Lecturer: Dr. B. Dunham (room LSK 322, email: `B.Dunham@stat.ubc.ca`)
Lectures and learning support: Mondays, Wednesdays and Fridays, 12pm (in LSK 460). There will also be an office hour each week, and labs on ten weeks of the term in LSK 302.
Assessment: By the completion of the labs (10%), a fifty–minute midterm test (20%, on **24th October**), a $2\frac{1}{2}$–hour unseen examination (50%) and an assignment (20%). Dates for the setting and completion of the assignment are indicated below:

	Set	Hand-in
Assignment	4th Nov.	24th Nov.

The usual university rules for extenuating circumstances and plagiarism apply. Specific details regarding assessment regulations for the course can be found on the course web page.
Teaching methods: Classes of approximately fifty minutes duration will occur three times a week, with sets of notes being available from the course web page in advance. In most sessions an in–class activity will replace at least part of the lecture component. Usually guided reading or other activities may be set at the end of one lecture to be completed prior to the next. There will be required lab sessions most weeks. The web page includes detailed notes covering the course content, and you are requested to bring to each class the current chapter. The web page provides other sundry resources like solutions to exercises when appropriate and an on–line forum.
Programme of work: The study time should total at least eight hours per week. So in addition to the contact hours, it is essential that learners spend no less than four hours per week on self–study for the course. It is suggested

at least two hours per week are spent on revising and assimilating the material covered in the lectures or on guided reading, and at least two hours should be spent attempting the exercises that are set.
Feedback: After all assignments have been submitted and marked, individual feedback will be provided in the form of brief notes on marked work. Detailed written comments will also be provided on the course web–page where appropriate.
Recommended texts: There is no core text as such, but there are numerous books that cover at least some of the material in this course, and it is suggested you try the UBC library stock to find those that suit you. A good example, however, is
Kenett, R.S. and Zacks, S. (1998): *Modern Industrial Statistics.* Nelson/Duxbury.
There are useful books available electronically via the library (more details in library rep session). These include the following, which between them cover nearly all the material in the course:
Chandra, J.M. (2001): *Statistical Quality Control.* CRC Press.
Thompson, J. R. and Koronacki, J. (2002): *Statistical Process Control For Quality Improvement.* Chapman and Hall/CRC
Many introductory texts are useful in covering at least most of the content of the course, such as
Walpole, R.E, Myers, R.M., Myers, S.L. and Ye, K. (2007): *Probability and Statistics for Engineers and Scientists.* Pearson/Prentice Hall.

There follows a provisional guide to the lecture slots available. It is possible that the material covered in the classes will differ slightly from the description below.

1. Introduction, motivation. Activity: Pre-test.
2. Library representative talk. review of fundamental ideas.
3. Activity: Review exercises.
4. History of quality assurance. Activity: Investigating a probability distribution.
5. Activity: Sampling for an attribute. Acceptance sampling concepts.
6. One-stage designs.

7. Activity: One–stage acceptance sampling.
8. Double sampling methods
9. Activity: Likelihood functions
10. Activity: Likelihood ratio comparisons. Sequential sampling
11. Activity: Sequential sampling.
12. Activity: Tolerance limits.
13. Sampling for variables.
14. SPC, Process capability.
15. Capability indices.
16. Ishikawa's tools. Activity: Stemplots
17. Activity: Fishbone diagram
18. Comparison of Pareto charts.
19. Control charts, Charts for attributes
20. Midterm test
21. Charts for variables
22. s, r charts
23. Cusum charts: Upper Page schemes
24. Activity: Theory of Page schemes.
25. Activity: Page schemes in practice.
26. Lower, two–sided Page schemes.
27. Process monitoring: EWMA charts.
28. Activity: Variance of EWMA estimator.
29. Experimental design, ANOVA review.

30. Activity: ANOVA SS

31. Two–way ANOVA

32. Activity: Factorial designs

33. Analysis of 2^2 factorial designs

34. 2^p designs. Activity: Contrasts in 2^p designs

35. Blocking, Fractional factorial designs

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