

**IME 3280 – Quality Assurance/Control  
Semester: Fall 2006**

- CRN 42994, Monday: 6:30 – 9:20 pm, C0206 Parkview
- CRN 42994, Tuesday, Thursday: 11:30 am – 12:40 pm, C0141 Parkview

*Instructor:* Leonard R. Lamberson, Ph.D., Professor – Department of Industrial and Manufacturing Engineering; ASQ Certified Quality Engineer (CQE)

*Office Hours:* Monday – 5:00 to 6:30 pm, Tuesday - 9:00 to 10:00 am; Room E0207

**Catalog description:**

Techniques of controlling quality in manufacturing systems. Topics include organization of quality, methods of measurement and basic statistical tools. NOT FOR ENGINEERING CREDIT. Prerequisites: MATH 216 or MATH 260 or MATH 366.

**Prerequisites by topic:**

1. Basic electronic communication skills; word processing, electronic spreadsheet, internet access, email
2. Working knowledge of descriptive statistics, mean, variance, standard deviation, graphical display methods, probability, confidence intervals (MTH 216, 260, or 366)
3. Working knowledge of inferential statistics; estimation, hypothesis testing, regression (MTH 216, 260, or 366)

**Textbooks:**

1. Besterfield, D.H.; *Quality Control*, 7<sup>th</sup> Ed., Prentice-Hall, 2001, ISBN 0-13-025668-4.
2. Course pack – a required reading list of articles will be handed out in the second week of class and will also be made available from [www.XanEdu.com](http://www.XanEdu.com).
3. *MINITAB*, Version 14, MINITAB, Inc., 3081 Enterprise Drive, State College, PA, 16801. MINITAB is available for use in the CAE Center, Parkview Campus. You do not need to purchase this software. Also, older versions will work fine. However, the student version does not have all of the options we will be using.

**Course objectives<sup>1</sup>:**

1. Understand the fundamentals of quality and the methods used to control quality (a,b).
2. Be able to select and apply fundamental quality improvement tools including flowcharting, cause & effect diagrams, and Pareto analysis (a,b,f).
3. Comprehend the concept of statistical process control and be able to set up and interpret both variable and attribute control charts (a,b,f).
4. Be able to understand and apply lot-by-lot sampling (a,b,f).
5. Comprehend the concept of quality costs, be able to categorize costs and analyze results (a,b,f).
6. Be cognizant of ISO-9000 and the various quality standards in existence. (a,b,f,k).
7. Realize the importance of quality in current society and its role in manufacturing and service operations (j).
8. Acquire the knowledge to successfully pass the Certified Quality Engineer examination as given by the American Society for Quality ([www.ASQ.org](http://www.ASQ.org)).

**Significant dates:**

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<sup>1</sup> Letters in parentheses refer to the ABET-TAC criteria.

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November 22, 2006 – Classes end at noon. No classes for remainder of week.

**Final Examination:**

- CRN 42994; Monday, December 11, 2006; 10:15 am – 12:15 pm
- CRN 45686; Monday, December 11, 2006; 7:15 pm – 9:15 pm

**Course grade determination:**

1. Approximately five announced multiple choice quizzes will be given during the semester.
2. A midterm examination of approximately 30 multiple-choice questions will be given.
3. A final examination of approximately 50 multiple-choice questions will be given.
4. Homework assignments will be given on an approximately weekly basis.
5. No make up exams/quizzes will be given.

The final class score will be determined using the following scale.

| <i>Activity</i> | <i>Weight</i> |
|-----------------|---------------|
| Homework        | 10%           |
| Midterm exam    | 30%           |
| Final exam      | 40%           |
| Quizzes         | 20%           |

The class score will be translated to a numerical grade using the following table:

| <b>Course<br/>Grade</b> | <b>Point<br/>Spread</b> | <b>Limits</b> |          |
|-------------------------|-------------------------|---------------|----------|
|                         |                         | <i>U</i>      | <i>L</i> |
| A                       | 7.5                     | 100.0         | 92.5     |
| BA                      | 5                       | 92.5          | 87.5     |
| B                       | 6                       | 87.5          | 81.5     |
| CB                      | 5                       | 81.5          | 76.5     |
| C                       | 7.5                     | 76.5          | 69.0     |
| DC                      | 5                       | 69.0          | 64.0     |
| D                       | 9                       | 64.0          | 55.0     |
| E                       |                         | Below 55      |          |

**Computer usage:**

*MINITAB* and/or *Excel* will be used to do homework problems. If your company has a preferred statistical package to do QC and data analysis you may use it, but be sure to tell me what it is. And wrong answers cannot be blamed on the software.

Microsoft Word or a similar word processing package will be necessary for some homework assignments.

**General comments:**

Bring a calculator to class that will perform statistical calculations. We will be doing problems in class and also, it will be needed for tests and quizzes.

You are not permitted to borrow a calculator, textbook or any other materials during quizzes and exams.

If your calculator’s batteries die during an exam, you will have to do the problems by hand calculations. So, if you think this is going to happen, plan ahead and bring an extra set of batteries.

**Topical Coverage:**

| <b>No.</b> | <b>Topic</b>  |
|------------|---|
| 1          | Review of course syllabus, Quality concepts, quality philosophy   |
| 2          | Graphical display of data for decision making: Pareto charts, Cause and effect diagrams, box plots, dot plots, calculation of mean and standard deviation, Intro to MINITAB |
| 3          | Review of basic probability theory  |
| 4          | Descriptions of data – mean, median, mode, range, standard deviation, variance  |
| 5          | Using the normal distribution for prediction  |
| 6          | The distribution of sample averages   |
| 7          | Quality characteristics and specifications  |
| 8          | Introduction to control charts - process monitoring; Type I and II error, warning limits  |
| 9          | X-bar and R charts – basic procedures   |
| 10         | Setting up a variables control chart on a process   |
| 11         | Calculating fraction in/out of specs from control chart data  |
| 12         | Calculating probability of detecting a shift, average run length ARL  |
| 13         | Using MINITAB to establish variables control charts   |
| 14         | X-bar and s charts (Brief discussion)   |
| 15         | Chart for individuals and moving averages   |
| 16         | Introduction to process capability analysis   |
| 17         | Calculating Cp and Cpk; Prediction of fraction out-of-tolerance   |
| 18         | Measurement systems analysis, terminology - repeatability, reproducibility, bias, linearity, stability/NIST   |
| 19         | Gage R&R studies  |
| 20         | Discrete distributions; Binomial, Poisson, Hypergeometric   |
| 21         | Discrete approximations   |
| 22         | Attribute control charts - p, np, c and u charts/Using MINITAB to establish attribute control charts  |
| 23         | Setting up an attribute control chart   |
| 24         | Recognizing which control chart to place on a process   |
| 25         | Sampling inspection, sampling systems   |
| 26         | Sampling plan terminology- AQL, RQL, AOQ, AOQL  |
| 27         | Introduction to tabled sampling plans for attribute inspection  |
| 28         | Introduction to variables sampling plans  |
| 29         | Quality costing systems   |
| 30         | ISO 9000:2000   |
| 31         | Quality systems/quality audits  |
| 32         | Using normal probability paper to analyze a process   |
| 33         | What the quality gurus have to say (and have said)!   |

**Academic integrity:**

You are responsible for making yourself aware of and understanding the policies and procedures in the Undergraduate Catalog (pp. 271-272) [Graduate Catalog (pp. 24-26)] that pertain to Academic Integrity. These policies include cheating, fabrication, falsification and forgery, multiple submission, plagiarism, complicity and computer misuse. If there is reason to believe you have been involved in academic dishonesty, you will be referred to the Office of Student Judicial Affairs. You will be given the opportunity to review the charge(s). If you believe you are not responsible, you will have the opportunity for a hearing. You should consult with me if you are uncertain about an issue of academic honesty prior to the submission of an assignment or test.