IE 361 Syllabus

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Required Text: Statistical Quality Assurance Methods for Engineers by Vardeman and Jobe

Other References: Probability and Statistics for Engineers by Devore
Statistics for Engineering Problem Solving by Vardeman

Approximate Time Allocation:

- Introduction 1 day
- Simple Quality Assurance Principles and Tools 1 day
- Measurement and Related Statistical Tools 4 days
- Basic Shewhart Control Charts 7 days
- Other Control Charts 6 days
- Process Capability and Corresponding Statistical Tools 3 days
- Experimental Design and Analysis for Process Improvement and Engineering Applications of Multiple Regression 11 days
- Sampling Inspection 3 days
- TQM and SQC 1 day

Exams 2 days
Group Reports and Evening "Reception" 4 days (I'll cancel class one day in lieu of December 5 reception)
Mid-Course Interviews Regarding Projects 1 day (I'll cancel class one other day in lieu of these)

Course Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>Exam I</td>
<td>90 pts</td>
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<tr>
<td>Exam II</td>
<td>90 pts</td>
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<tr>
<td>Exam III (Final)</td>
<td>90 pts</td>
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<tr>
<td>HW Problem Sets</td>
<td>30 pts</td>
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<tr>
<td>Quality Culture Mini-Paper</td>
<td>30 pts</td>
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<tr>
<td>Course Project</td>
<td>170 pts</td>
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IE 361 Current Quality Culture Mini Paper

The course lectures in IE 361 will primarily concern tools for quality assurance. As a means of introducing you to the “culture” of the modern quality assurance and improvement, you will be required to research and write a 4 page (plus references) white paper describing some aspect of modern quality culture not adequately covered in the course text (Chapters 1, 2 and 9). Example topics could be:

- Six Sigma Programs
- The Emphasis and Impact of Quality Guru X
- The Macolm Baldrige Award
- ISO 9000 Certification
- Quality Engineer Certification Programs
- The Content of Typical “Corporate Quality Training Programs”
- “Robust” Product Design
- Quality Function Deployment
- Dilbert/Scott Adams and Quality Culture

Starting points for your thinking can be Chapters 1, 2 and 9 of the course text and the following set of web addresses. (You will also find papers from previous terms posted on the IE 361 Web page that you can access from Vardeman's homepage. These provide other Web addresses that you can investigate.)

http://www.asq.org/aboutquality/qualsite/qualsite.html
http://www.nku.edu/~lindsay/qualhttp.html
http://ditiinfo1.dti.gov.uk/mbp/bpg/m9ja00001/m9ja00001.html
http://www.math.uwaterloo.ca/IIQP/General.html
http://www.juran.com/main.html
http://www.sixsigmaqualtec.com/
http://mu.motorola.com/
http://www.deming.org/
http://www.amsup.com/

Work on this paper in groups of 2 or 3. You should have at least 5 relevant references, including at least 2 relevant URLs (all could be URLs). The paper is to be submitted Friday September 22 in 2 parts:

- a hard copy
- A (single!) WORD file. This should be in 11 pt type, 1.5 line spacing and have standard margins.

Vardeman will convert the WORD files to pdf’s and post them on the Web. You will be required to individually read all of your classmates’ submissions and provide peer feedback in a format that Vardeman will specify at a later date. Vardeman will read the papers, mark up and return the hard copies with scores 0-30 pts. He will see that you also receive your peer evaluations.

The object of these papers is to provide a crystal clear summary of some aspect of modern quality culture (that will inform your classmates to the degree that they could speak intelligently about the subject in a job interview situation and also provide sources they could follow up on to learn more). Note that since you have earlier student papers to read as background, your papers should be even clearer than and more to the point than the ones already posted on the Web (if you choose a subject already posted).

**Caution:** Anything that you take verbatim or with minimal editing from some other source MUST be properly identified and referenced. **This is an integrity issue.** DO NOT SIMPLY “CUT AND PASTE” together work from other people and implicitly call it your own.
As part of the requirements for IE 361, you will need to carry out a process-oriented quality improvement project with a (real) client of your own choosing/recruiting. To the extent possible, you should attempt to carry through an iteration of the process-oriented quality assurance cycle laid out in Table 1.1 of the text.

A. Purposes of the Project

The purpose of the project is to practice with the course material and to strengthen your skills of problem formulation and solution, cooperation with others, and professional oral and written communication.

B. Group Size

Group size will be 3 or 4. Students will organize their own groups.

C. Project Milestones/Reports

1. An initial project proposal is due September 20. This one page report should name the team members and proposed client, and should outline the general area in which the team and client plan to cooperate. Your instructor will meet with your group during late September to help you formulate a sensible plan of action for your project.

2. An intermediate progress report is due October 27. By this point your problem should be well formulated and an initial plan for solution be agreed on among team members and client. This progress report should include a careful problem statement, an outline of the planned solution with a time table for completion and a statement initialed by the client indicating his/her agreement with your plans.

3. A three part, professional quality final report will summarize your work on this project. You will produce:

   a) A professional quality display, fitting on one piece of foam (illustration) board (not poster board) between 32x40 inches and 36x48 inches. (This is your chance to tell your story ... the larger size gives you more room to do so.) This display should tell the whole story of your project and be able to stand by itself on an easel or the lip of a chalk board. It must be easily understood from a distance of 6-8 feet. No more than 300 words may appear on this display (and many effective displays have had far fewer than this number). We will hold a low key evening "reception" on Tuesday December 5, where class members, other IE students and faculty, the Engineering Deans and project clients are invited to view these displays and talk informally with you about what you accomplished in your project.

   b) An oral report will be presented in class on one of December 4, 6 or 8. You may reserve time slots for the oral presentation beginning November 3 on a first come, first served basis. Guidelines for this report are:

      i) All team members must participate.

      ii) Report length (total, including Q&A) will be 14+/−2 minutes. (Practice and time yourselves! Deviations from this guideline will not be well received.)

      iii) Power Point will be used. You should begin with a title slide, and produce other professional quality) slides outlining your main points, giving drawings/schematics of parts or machines you worked on, showing graphical summaries of data you collected and used, etc. Be sure beforehand that these are big and dark enough to be seen clearly by everyone in the classroom. Do not simply cut and paste regular size computer output into your report. (Such slides are almost never readable.) Make sure beforehand that your files will work on IMSE equipment. Make and bring with you transparency versions of your slides as a “failsafe” measure, so that if technology fails you, the presentation can go on using an overhead projector.

      iv) The report should provide adequate background for a listener with no prior knowledge of your client's business or your project, and then go on to emphasize methodology, obstacles overcome and the results/quality improvements obtained.
v) Some time (perhaps 2 minutes) should be allowed for questions and comments from the audience.

c) A single written report from each team is due at the beginning of class on December 8. This will not be returned, so if you want copies, make them before turning it in. This report should be bound in some form, so that pages can not inadvertently get lost. (A cheap loose leaf binder is acceptable.) The report is to include at least:

i) A title page giving team member names, phone numbers and e-mail addresses. (A template for this title page is attached to this statement.)

ii) A one page executive summary describing the project and main results for your busy engineering manager.

iii) A table of contents for the whole report including appendices.

iv) An introduction giving background to the problem, sketches or photos of equipment involved and a quantitative assessment of the quality situation at the beginning of team involvement. (Be sensitive to matters of corporate security here. Don't photograph anything unless you have explicit permission to do so.)

v) A description of the work done by the team in search of a problem solution/quality improvement. Although details of calculations, data collection sheets, etc. should be deferred to appendices, this section should "tell the whole story" of the team's efforts using whatever prose, graphs, tables, sketches, etc. are needed.

vi) A recommendations/results/project impact section. Ideally, team efforts will lead to recommendations for the client that can be implemented and their impact evaluated and reported in the final write-up. At a minimum, realistic (practically implementable) recommendations and justification for them should be included in the report.

vii) Appendices. Include as appendices carefully documented lists of data collected by the team (include date, technician, unit of measure, etc.), listings of computer programs written for the project, fully annotated computer outputs, detailed "hand" calculations, a reference list and copies of the project proposal and progress report. (The relevance of any such appendix material should be immediately clear to the reader. Do not leave a reader guessing why the appendix material was included. Appendix material included should be referred to in the body of the report. Be sure any appendices are clearly labeled!)

viii) Copies (paper only) of the Power Point slides you use in your oral presentation.

ix) Sealed envelopes (one from each team member) containing an assessment of percentage of total team effort provided by every team member. (If it becomes clear that the project work load was wildly unbalanced, your instructor may assign different project grades to different team members.)

x) The peer and instructor comment sheets for your oral report. (See D. below.)

xi) A receipt signed by your client indicating that he/she has received a copy of your final written report.

Use i) through xi) above as a checklist, and **do not fail to include any of these items** (except possibly vii) if appendices are not needed).

If the appropriate group(s) and client(s) grant permission, your instructor will post "best-in-class" written report(s) on the World Wide Web (on a site maintained by John Wiley and Sons in support of the class text). In order to be eligible for this, groups will need to supply both a diskette with the report (including any graphics) on it (preferably in Microsoft Word format) and permission statement signed by all group members and a representative of your client organization. (It will be acceptable to provide a version of the report that disguises both company identity and company data, but even in this event a signature from the client organization will be necessary. If you want help deciding how to "sanitize" proprietary data, ask your instructor for it.)

**D. Instructor and Peer Feedback**

Your instructor will react in writing to your project proposal and progress report and meet with your group during Late September to discuss your approach to your client's situation. Provided you submit them at
least a week in advance of your in-class presentation (and in proposed final form), your instructor will also
provide "free" (ungraded) feedback on your visuals for the in-class presentation (in time for you to
correct/improve them before making the presentation). Further, provided you submit (again in proposed
final form) it by December 1, your instructor will (for free, i.e. without any grading consequences) mark up
draft of your written report in time for you to make improvements before turning in the final report on
December 8. He will also mark up your final report and prepare a summary sheet of his overall assessment
of your work that you may see after course grades are completed.

Your peers will write comments on your oral report that will be given to you at the end of class on your
report day. (These and your instructor's comment sheet on your oral report are to be returned with your
final written report!)

E. Acceptable Topics and Grading Criteria

An ideal project will focus on a client process producing a good or service, complete a logical analysis of
how that process works, formulate appropriate measures of process performance, collect process data,
assess and make any changes needed to establish process stability, characterize "stable process
performance" and work to the improvement of the process that has been brought into stability. The ideal
project has a client who owns the problem/process and works closely with the team, allowing it substantial
"hands on" (or near hands on) contact with the process, and stands to gain real benefit from successful
project completion. The client could be a manufacturing engineer, a shop manager, a Q.C. analyst, a small
business owner, etc. Ideally, techniques used in the project will be drawn from those discussed in IE 361.

It is unlikely that every project team will find an "ideal" project. Project grades will be assigned partially on
the basis of topic quality (potential and interest), partially on the basis of the technical merit of the team
effort and the real usefulness of the project to the client, and partially on the quality and professionalism of
the reports produced by the team (including the proposal, progress report and display). The final report
should leave no doubt in the reader's mind that the work done was truly design and not merely "real world"
or "data analysis" work.

The project will be graded according to:
  • Topic Quality 20%
  • Technical Merit/Usefulness 25%
  • Display Effectiveness 15%
  • Oral Report 15%
  • Written Report 25%

Pay attention to this set of guidelines! Your work will be judged against it!
(Cover Sheet Template)

Title:
Date:

Team:
Name 1 Phone  Number 1  E-mail 1
Name 2 Phone  Number 2  E-mail 2
Name 3 Phone  Number 3  E-mail 3

Client:
Organization
Address

Contact Person  Phone Number  E-mail

Permission to Post Report on WWW:

Permission to Post Full Report Included? (Yes or No)

Permission to Post Edited (to Disguise Company and/or Data) Report Included? (Yes or No)