ISE 4485/5485 and SYS 5485 Course Outline – Winter Term 2018, Oakland University

TO: ISE 485/585 and SYS 585 OU Students and SECS Faculty

LECTURER: John Bieda, PE, CRE, CQE, DFSS-BB
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Office Hours: T/Th 7:15-7:45 P.M. in class room or by appointment

SUBJECT: Course Outline and Operating Procedure for ISE 485/585 and SYS 585 - Statistical Quality Control, 4 credits

TEXT: Introduction to Statistical Quality Control, Douglas C. Montgomery, 7th Edition, John Wiley Publication, ISBN 978-1-118-14681-1, Minitab Software

GENERAL: Dates; January 4-April 17, 2018, Time; 5:30-7:17 PM, Days; T/TH, Location; HH233

COURSE OBJECTIVES:

On successful completion of this course a student should be able to do the following (shows mapping to ABET program outcomes):

- Define quality for a manufacturing process as well as a service process (a, e, h),
- Differentiate between the classical and the Taguchi's approach to design of experiments and analysis of results (a, b, k).
- List the contemporary issues in quality engineering including the ISO standards (c, h, j)
- List the differences between a capable process and an in-control process, estimate different measures of process capability, and use them for process certification (a, c, e, k).
- Set-up variable data and attribute data control charts and use control charts to identify out of control conditions (a, e, k),
- Use designed experiments to improve quality, robustness of product/process (a, b, e, k),
- Apply the principles of statistical tolerance to estimate the impact of tolerance stack-up (a, c, e, k)

COURSE TOPICS:

1. Quality improvement (method/management aspects) and the five step DMAIC process
2. Modeling process quality – describing variation, discrete/continuous probability distributions
3. Inferences about process quality – statistics and sampling distributions, single and two sample statistical decision-making, linear regression
4. Methods and philosophy of statistical control
5. Process monitoring and control charts for variables and attributes
6. Process and measurement system capability
7. Factorial and fractional factorial experiments for process design and improvement – DOE
8. Process Optimization with DOE (selected topics)
9. Acceptance sampling

COURSE EVALUATION:

The course grade will be decided based on the following grading-scheme:

Homework	10%
Project	20%
Mid-term Exam	30%

Final Exam	40%
Total	100%

Homework will be assigned, reviewed, and discussed in class. No homework will be accepted late without prior permission of the instructor. A late homework will carry a penalty to be decided by the instructor. The course grade will be decided based on the following grading-scheme: 1) homework (10%), 2) a project/research report with presentation (15 minute) together carrying 20% weight respectively, 3) a mid-term test with 30% weight, and 4) a comprehensive final exam with 40% weight. Students are encouraged to bring real world problems for in-class discussion.

Research project and review (15 minute maximum Power Point presentation) will involve any of the course topics and their application to a process quality control work environment. Presentation guidelines will be discussed and distributed in class.

GRADING SCALE:

100% = 4.0	88 – 89% = 3.4	78 – 79% = 2.9	68 – 69% = 2.4
98 – 99% = 3.9	86 – 87% = 3.3	76 – 77% = 2.8	66 – 67% = 2.3
96 – 97% = 3.8	84 – 85% = 3.2	74 – 75% = 2.7	64 – 65% = 2.2
94 – 95% = 3.7	82 – 83% = 3.1	72 – 73% = 2.6	62 – 63% = 2.1
92 – 93% = 3.6	80 – 81% = 3.0	70 – 71% = 2.5	60 – 61% = 2.0
90 – 91% = 3.5			58 – 59% = 1.9

ATTENDANCE POLICY:

None, but it is expected that a student will attend each and every class held during the semester. A poor attendance usually leads to poor performance in the course.

ACADEMIC CONDUCT:

Unless specified otherwise, each student must submit individual unaided work with documentation of sources used.

SCHEDULE OF TOPICS AND KEY EVENTS (subject to change):

Week 1: Introduction/course outline review, Chapter 1 (quality improvement), 2 (DMAIC process), and 3 (modeling process quality)
Week 2: Chapter 3 (modeling process quality)
Week 3: Chapter 4 (inferences about process quality), ***HW #1 due (T)***
Week 4: Ch. 4 cont'd & Chapter 5 (methods & philosophy of statistical process control),
Week 5: Chapter 6 (control charts for variables)
Week 6: Chapter 7 (control charts for attributes), ***HW#2 due (T)***
Week 7: Mid-term review, ***Mid-term test (Th)***
Week 8: Winter Break – no class this week (Feb. 19 – 23)
Week 9: Chapter 8 (process and measurement system capability analysis)
Week 10: Ch. 8 cont'd, Chapter 13 (factorial/fractional experiments for process design), ***HW #3 due (Th)***
Week 11: Chapter 13
Week 12: Chapter 14 (process optimization with DOE –selected topics), ***HW #4 due (T)***
Week 13: Chapter 15 (lot-by-lot acceptance sampling for attributes), and Chapter 16 (other acceptance sampling techniques – selected topics), ***HW #5 due (Th)***
Week 14: ***Project research due and presentations conducted,*** Final Exam Review
Week 15: ***Final Exam (T or Th)- TBD April 19 or 24, 7-10 PM***

LIST of ABET PROGRAM OUTCOMES (a through k)

(a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health, safety, manufactured ability, sustainability
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economical, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

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12-21-17 rev.