RELIABILITY ANALYSIS

QEM 540

INSTRUCTOR: **Dr. Tomas Velasco, C.Q.E., C.S.S.B.B.**
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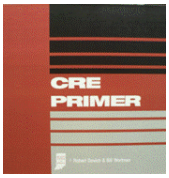
TEXTS:



Textbook

- CRE (CERTIFIED RELIABILITY ENGINEER) PRIMER, Quality Council of Indiana. 4th Edition.

Reference Material

- INTRODUCTION TO RELIABILITY ENGINEERING, *E.E. Lewis*, John Wiley & Sons.
- RELIABILITY IN ENGINEERING DESIGN, *K. C. Kapur & L. R. Lamberson*, John Wiley & Sons.
- STATISTICAL MODELS AND METHODS FOR LIFETIME DATA, *J. F. Lawless*, John Wiley & Sons.
- THE STATISTICAL ANALYSIS OF FAILURE TIME DATA, *Kalbfleisch & Prentice*, John Wiley & Sons.

Audiovisuals

- Against all Odds, Inside Statistics Series, 1988

CLASS: Spring Semester 2014
Wednesday, 1:00pm. – 4:00pm.
30 EGR-D

RELIABILITY **CONSIDERATIONS OCCUPY AN INCREASINGLY IMPORTANT PLACE IN** ***ENGINEERING*** **PRACTICE**

The ***reliability*** of the elements in a complex system is one of the most important issues to be addressed by engineers. With costly unexpected failures of piece(s) in a system, the need to insure reliability of the hardware and software components is a must. Although the details of application differ depending on whether mechanical, electrical, or chemical systems are under analysis, the ***reliability*** concepts cut across the specific fields of engineering.

Objective:

The purpose of this course is to provide the student with an overview of the basic techniques applied in the field of reliability and failure data analysis, emphasizing on quantifying reliability for product designs in industrial environments. In this course, an integrated introduction to the theory and practice of reliability engineering is provided, from an interdisciplinary point of view with applications to manufacturing systems.

Requirements:

Major emphasis will be placed on reading and understanding the material from the class, suggested books and reference material prior to class, and in homework assigned. Although I do not require class attendance, I will give occasional quizzes, the frequency of which will be inversely proportional to class attendance. Excused absences require prior approval of the instructor.

Grading:

- 3 Examinations, each of which counts 25% towards your grade.
- Homework and Quizzes, which count 25% towards your grade.

Standards:

Letter grades are assigned based on the total number of points accumulated.

- A : 90% and higher
- B : 80% - 89.99%
- C : 70% - 79.99%
- D : 60% - 69.99%
- F : Less than 60%

Grading Policy:

Assignments are due at class time. Missed examinations and assignments have a 10% penalty per day, imposed when turned in, unless an appropriate, prior excuse is provided to the instructor. The missed examination must be completed on the make-up date set by the instructor.

Academic Conduct:

Cheating on examinations, submitting work of other students as your own, or plagiarism in any form will result in penalties ranging from an **F** on the assignment to expulsion from the university, depending on the seriousness of the offense.

Office Hours:

10:30 am to 12:00 m on Mondays, 11:00 am to 12:00 m. Tuesday, 10:00 am to 12:00 m. Wednesday, 2:00 pm to 3:30 pm on Thursday; other hours by appointment.

Equipment and Software:

Hand-held calculator and any computer-based spreadsheet. Excel is available in all the P.C. laboratories in Engineering including Industrial Technology labs. and College of Engineering labs.

Schedule:

LESSON	TOPIC
1	Strategic Management of Reliability Function
2	Reliability Program Management & Product Safety
3	Basic Probability & Statistics for Reliability
4	Discrete Distributions: Binomial & Poisson
5	Discrete Distributions: Hypergeometric
6	Continuous Distributions: Normal & Log-Normal
7	Continuous Distributions: Exponential & Weibull
8	Reliability Design Techniques
9	Data Collection and Use in Reliability
10	Data and Failure Analysis Tools
11	Estimation with Normal Distribution
12	Estimation with Log-Normal Distribution
13	Estimation with Exponential Distribution
14	Estimation with Weibull Distribution
15	Reliability Modeling

SIU Policy on Incomplete Grades:

An INC is assigned when, for reasons beyond their control, students engaged in passing work are unable to complete all class assignments. An INC must be changed to a completed grade within a time period designated by the instructor but not to exceed one year (*for graduate students*) from the close of the term in which the course was

taken, or graduation, whichever occurs first. Should the student fail to complete the course within the time period designated, not to exceed one year, or graduation, whichever occurs first, the incomplete will be converted to a grade of F and the grade will be computed in the student's grade point average. Students should not reregister for courses in which an INC has been assigned with the intent of changing the INC grade. Re-registration will not prevent the INC from being changed to an F.

Mobile Technology Policy:

Cell phones should be turned off during class-time (including during tests).

SIU Student Code of Conduct/Plagiarism:

Please consult the following sites for information on the SIU's student code of conduct and Morris Library's guide on plagiarism:

- SIU Student Code of Conduct: http://policies.siu.edu/documents/StudentConductCodeFINALMay32011.pdf
- Morris Library Guide on Plagiarism: http://libguides.lib.siu.edu/plagiarism

Resources for Academic Assistance:

- Learning Support Services: http://tutoring.siu.edu/
  - Provides academic assistance in courses/tutoring
- Disability Support Services: http://disabilityservices.siu.edu/
  - Provides the required academic and programmatic support services to students with permanent and temporary disabilities
- SIUC Writing Center: http://write.siu.edu/
  - Offers free tutoring services to all SIUC undergraduate and graduate students and faculty.

SIU Email Policy:

Official SIU Student Email Policy: http://policies.siu.edu/policies.email.htm