

# EAS 361

## Reliability Engineering

### 1. Basic Information:

- a. Course Number: EAS 361
- b. Course Title: Reliability Engineering
- c. Credit Hours: 4
- d. Pre-Requisites: Course or Applicable Experience in Engineering Statistics
- e. Instructor: William "Ike" Eisenhower, M.Eng. Sys. Eng., BS Mech. Eng.
- f. Class Location: Online
- g. Class Hours: Online – New "Week" begins on Mondays
- h. Text:

Practical Reliability Engineering (4<sup>th</sup> Ed)

[O'Connor]

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*Referred to as PRE in Reading Lists and Presentations*

- i. Office Hours: By appointment – CECS Engineering Building. Suite 500
- j. Phone: 503-680-7653
- k. Email address: [wde@pdx.edu](mailto:wde@pdx.edu) or through WEBCT
- l. Mailbox: CECS Dean's Office, Engineering Building. Building Suite 500
- m. Final Exam: Online WebCT Exam – Self Schedule During Exam Week

### 2. Course Description

- a. Failure is a fact of engineering. No product or system can be assumed to work correctly 100% of the time. The engineering effort to even attempt to design such a system would be both time and cost prohibitive. In light of that, the reliability of systems can not be ignored and must be studied to ensure, at least, we grasp the reality we are dealing with. This course provides an in depth study of the engineering and management of the reliability space. Including describing and quantifying reliability, as well as examining the modeling, test design, trade off analysis required of engineers involved with products and systems that do not perform 100% correct at all times.

### 3. Specific Goals and Objectives:

Key objectives are:

- a. To apply engineering knowledge and specialist techniques to prevent or to reduce the likelihood or frequency of failure.
- b. To identify and correct the causes of failures that do occur, despite efforts to prevent them.
- c. To determine ways of coping with failures that do occur, if their causes have not been corrected.
- d. To apply methods for estimating the likely reliability of new designs, and for analysis of reliability data.
- e. To understand and apply probabilistic and stochastic representations of reliability and failure
- f. To understand how disciplined maintenance and designing for maintainability can accomplish our objectives and provide a cost effect means to offset the lack of resources to design 100% reliable systems

### 4. Logistics:

Success in this course will require:

- a. Reading and completing weekly assessments by the assigned date
- b. Posting assignment results on, or before, the assigned date
- c. Successful completion of Mid-Term and Final Examinations
- d. Active participation in online discussions in the forums

## 5. Metrics for Student Progress

- a. Total of 500 points
  - i. Written Assignments [10] (200 points total)
  - ii. Mid-Term Exam (100 points)
  - iii. Final Exam (100 points)
  - iv. Discussion Participation (100 points) [10 per week]
    1. 5 for responding to the question of the week
    2. 5 for providing your thoughts on the material for the week
    3. 2 bonus points for in-depth discussion during the week on the forums
- b. Grades will be assigned as follows (this is the minimum guaranteed distribution, the instructor reserves the right to adjust the lower thresholds as needed to ensure adequate representation of effort)
  - i. 500-465 : A
  - ii. 464-450 : A-
  - iii. 449-435 : B+
  - iv. 434-415 : B
  - v. 414-400 : B-
  - vi. 399-385 : C+
  - vii. 384-365 : C
  - viii. 364-350 : C-
  - ix. 349-335 : D+
  - x. 334-300 : D
  - xi. 299-000 : F
- c. Refer to WebCT for due dates. **\*There is a 5 point penalty per day late\*.**

## 6. Tentative Week Plan [Deliverables are Due by 8AM PST on Monday of Following Week]

- a. Week 1: Reading / Written Assignment #1
- b. Week 2: Reading / Written Assignment #2
- c. Week 3: Reading / Written Assignment #3
- d. Week 4: Reading / Written Assignment #4
- e. Week 5: Reading / Mid Term / Written Assignment #5
- f. Week 6: Reading / Written Assignment #6
- g. Week 7: Reading / Written Assignment #7
- h. Week 8: Reading / Written Assignment #8
- i. Week 9: Reading / Written Assignment #9
- j. Week 10: Reading / Written Assignment #10
- k. Week 11: Finals Week

## 7. Tentative Week Topics and General Reading [Specifics will be given each week]

- a. Week 1: Introduction to Reliability Engineering and Views of Reliability in Various Engineering Domains
  - i. PRE: Chap. 1 [All], 8 [Intro+Select], 9 [Intro+Select], 10 [Intro+Select], 13 [Intro]
- b. Week 2: Mathematics of Reliability
  - i. PRE: Chap. 2, 4
- c. Week 3: Probability Plotting
  - i. PRE: Chap. 3
- d. Week 4: Reliability Prediction and Modeling
  - i. PRE: Chap. 6
- e. Week 5: Designing for Reliability
  - i. PRE: Chap. 7
- f. Week 6: Reliability Testing
  - i. PRE: Chap. 11
- g. Week 7: Analysing Reliability Data
  - i. PRE: Chap. 12
- h. Week 8: Maintainability, Maintenance and Availability
  - i. PRE: Chap. 14

- i. Week 9      Reliability Management I
  - i. PRE: Chap. 15 [Thru "The Reliability Manual" (pg. 434)]
- j. Week 10     Reliability Management II
  - i. PRE: Chap. 15 ["The Project Reliability Plan" (pg. 434) to End]