EAS 561

Reliability Engineering

1. **Basic Information:**
   a. Course #: EAS 561
   b. Course Title: Reliability Engineering
   c. Credit Hours: 4
   d. Pre-Requisites: Applicable Experience in Engineering Statistics
   e. Instructor: William "Ike" Eisenhauer, M.Eng. Sys. Eng., BS Mech. Eng.
   f. Class Location: Online [6/25-9/2]
   g. Class Hours: Online – New "Week" begins on Mondays
   h. Text:

      Introduction to Reliability and Maintainability Engineering (2nd Ed)
      [Ebeling]
      ISBN 978-1-57766-625-7 [Retail $97.95, Currently (6/12) $71.21]
      Referred to as IRM in Reading Lists and Presentations

   i. Office Hours: By appointment – CECS Engineering Building. Suite 500
   j. Phone: 503-422-6022
   k. Email address: wde@pdx.edu or through Desire2Learn Site
   l. Mailbox: CECS Dean's Office, Engineering Building. Building Suite 500
   m. Final Exam: Online D2L 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 provide the practicing Systems Engineer with fundamental understanding of reliability and maintainability engineering, with emphasis on determining reliability at the system level.
   c. To apply methods for estimating the likely reliability of new designs, and for analysis of reliability data.
   d. To understand and apply probabilistic and stochastic representations of reliability and failure
   e. 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 1000 points
        i. Written Assignments [9] (450 points total)
        ii. Mid-Term Exam (170 points)
        iii. Final Exam (200 points)
        iv. Discussion Participation (180 points) [20 per week]
            1. 10 for responding to the question of the week
            2. 10 for providing your thoughts on the material for the week
            3. Possible 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. 1000-900 : A
        ii. 899-875 : A-
        iii. 874-850 : B+
        iv. 849-825 : B
        v. 824-800 : B-
        vi. 799-750 : C+
        vii. 749-700 : C
        viii. 699-000 : F
    c. Refer to D2L for due dates. ***There is a 5 point penalty per day late*. No submissions allowed after Wednesday of the due week, unless PRIOR instructor permission.**

6. **Week Topics and Readings**
    a. Week 1: Introduction to Reliability Engineering and Probability/Statistics Primer
        i. IRM: Chap. 1 [All]
        ii. IRM: Chap. 16 [16.1, 16.3, 16.4, 16.5, 16.6]
    b. Week 2: Failure Distributions
        i. IRM: Chap. 2[All, Appendices are optional]
    c. Week 3: Constant Failure Rate Models
        i. IRM: Chap. 3 [All]
    d. Week 4: Time-Dependent Failure Models
        i. IRM: Chap. 4 [4.1 and 4.2]
    e. Week 5: Reliability of Systems
        i. IRM: Chap. 5 [All]
    f. Week 6: State-Dependent Analysis
        i. IRM: Chap. 6 [All, Appendices are optional]
    g. Week 7: Design for Reliability
        i. IRM: Chap. 8 [All]
    h. Week 8: Data Collection and Reliability Growth Testing
        i. IRM: Chap. 12 [All]
        ii. IRM: Chap. 14 [All]
    i. Week 9: Maintainability and Availability
        i. IRM: Chap. 9 [All, Appendices are optional]
        ii. IRM: Chap. 11 [All]
    j. Week 10: FINALS WEEK