**THE UNIVERSITY OF TEXAS AT EL PASO**  
College of Engineering  
Industrial, Manufacturing, and Systems Engineering Department  
**MFG 5390 (CRN 27257) Reliability & Maintainability – Spring 2021**

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Dr. Francisco Oswaldo Aguirre</th>
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<tbody>
<tr>
<td><strong>Course Title:</strong></td>
<td>Reliability &amp; Maintainability (3 Credits)</td>
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<tr>
<td><strong>Course Location:</strong></td>
<td>Online</td>
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<td></td>
<td>Tuesday 6:00 pm – 8:50 pm</td>
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<tr>
<td><strong>Office Location:</strong></td>
<td>E-226C</td>
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<td>Tuesday 5:00 pm – 6:00 pm</td>
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<td><strong>Course Description</strong></td>
<td>This course will introduce the basic reliability &amp; maintainability definitions, applications and benefits. This course will include reliability, redundancy, maintainability, availability analysis and modeling, life testing, acceleration, parametric and non-parametric models</td>
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| **Class Objectives** | • To become familiar with the major concepts of reliability, maintainability  
• To develop skills for identifying; formulating, solving, and interpreting appropriate reliability models  
• To understand how the mathematical concepts are applied in the real-world and to learn to effectively use computing software to solve more complicated reliability problems such as they arise in the real world.  
• To become a more independent learner and logical thinker. |
| **Text Book**       | An Introduction to Reliability and Maintainability Engineering By Charles E. Ebeling Second Edition |
| **Other references**| • Introduction to reliability engineering 2d Edition by E.E Lewis, Wiley  
• Reliability: probabilistic Models and statistical Methods, 2d edition by Lawrence M. Leemis  
• Reliability Engineering by Elsayed A., Wesley |
| **Late Work Policy**| Late homework or reports will not be accepted, unless certified medical proof is given. If you are unable to attend the class at which the homework is due, it is your responsibility to submit it earlier. |
**Course Assignments:**

**Homework:** There will be approximately 8 homework assignments during the course. Assignments will be posted on the course website. No late homework will be accepted. Your homework should show all necessary work you used to solve problems.

**Paper presentation:** Groups of 2-3 persons will perform a 10 minutes presentation. The Presentation will be about a journal paper related to the course. The paper can be selected for the student or be assigned by the instructor.

**Final Project:** Groups of 3-4 persons. There are different type of project to choose from:
- Apply the topics explained in class into real problem.
- Explain at least three papers related to the class.
- Model and programs a software that solve some of the problems presented in class.

**Evaluation**

There will be two midterm exams and one final exam. No books, notes, will be allowed. No make-up/alternate exam will be given.

- **Midterm 1**
- **Midterm 2**
- **Midterm 3**

**Evaluation Criteria**

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Paper Presentation</td>
<td>10%</td>
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<tr>
<td>Midterms</td>
<td>60% (20% per exam)</td>
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<tr>
<td>Final Project</td>
<td>20%</td>
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Course Schedule:

Chapter 1:
- Introduction
- Brief History
- Applications

Chapter 2
- The reliability Function
- Mean Time to failure
- Hazard Rate Function
- Bathtub Curve
- Conditional Reliability

Chapter 3
- The Exponential Reliability Function
- Failure Modes
- Applications
- The Two-Parameter Exponential Distribution
- Redundancy and CFR Model

Chapter 4
- The Weibull Distribution
- The Normal Distribution
- The Gama Distribution

Chapter 5
- Serial Configuration
- Parallel Configuration
- Combined Series-Parallel Systems
- Minimal Cuts and Minimal Paths

Chapter 6
- Markov Analysis
- Load-Sharing System
- Standby Systems
- Degraded Systems

Chapter 9
- Repair time distribution
- System repair time
- State-dependent systems with repair

Chapter 11
- Exponential Availability
- System Availability
- Repair and availability Model

Chapter 13
- Reliability Testing
- Burn-In testing
- Accelerating Life Testing