The University of Arizona  
College of Engineering

Course Title: Advanced Reliability Engineering    Fall 2013

Course:  SIE 608

Instructor:  Dr. Haitao Liao, Associate Professor  
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E-mail: TBD@email.arizona.edu

Text:  Statistical Methods for Reliability Data, William Q. Meeker and  

Course Description and Goals:
This is a three-credit course configured for well-qualified graduate students who have taken  
graduate-level statistics courses. The objective of this course is to provide a comprehensive  
introduction to the statistical principles and methods for reliability data analysis. The course  
will cover parametric, nonparametric, and semiparametric methods for modeling degradation  
data and failure time data with different types of censoring. As a 600-level course, the  
primary focus will be on model developments, statistical inference, and interpretation of  
results. Cox proportional hazards model, accelerated failure time models, Bayesian method,  
construction of confidence interval, optimum design of accelerated testing plans based on  
asymptotic distribution theory will be introduced. One of the course requirements includes a  
term project that focuses on original theoretical developments in the form of a technical paper  
and/or real-world implementations of reliability data analysis. Project topics (e.g., accelerated  
life/degradation testing, warranty data analysis) must be approved by the instructor.

Prerequisite:
SIE 508.

Contribution to Professional Component/Learning Outcomes:
1. Understand and gain the ability to apply advanced statistical methods for reliability  
analysis based on failure-time data and degradation data.
2. Understand and be able to develop accelerated life testing models based on probability  
distributions (exponential, Weibull, etc.) and proportional hazards model for reliability  
prediction.
3. Acquire ability to apply statistical methods to construct confidence intervals for estimated  
reliability indices.
4. Acquire ability to use statistical analysis software as a tool for advanced data analysis.
Grading:

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<tbody>
<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Midterm Test</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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<td>Term Project</td>
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It is expected that grading will be based on a percentage of the total points possible with the following minimums required for each grade: \( A = 90\% \), \( B = 80\% \), \( C = 70\% \), and \( D = 60\% \). Homework will be assigned approximately one week before it is due. **NO LATE HOMEWORK WILL BE ACCEPTED.** If you cannot attend class, make sure your homework is e-mailed to the GTA or delivered to my office (223 Engineering Building) before class on the day it is due. Homework not turned in on time will be graded as zero, so please turn in what you have completed even if you have not fully completed an assignment.

**Suggested References**

**Websites:**
1. www.reliasoft.com
2. Dr. Bill Meeker’s course web site - http://www.public.iastate.edu/~stat533/
3. Dr. Ramon Leon’s course web site - http://web.utk.edu/~leon/rel/

**Books:**