

**ENRE 641**  
***Probabilistic Physics of Failure and Accelerated Testing***  
***(Fall 2018)***

***Important Dates:***

***Midterm Exam: 18 October, 2018 (Also, a one-hour Review Session on 11 October)***

***Review Session and Project Due Date: 6 December, 2018***

***Final Take Home Exam: Assigned at 12:01 AM 12 December, 2018, Due 11:59 14 December, 2018.***

**Instructor: Prof. M. Modarres, [modarres@umd.edu](mailto:modarres@umd.edu), Office Hours: 2:00-3:00 PM Thursdays, Telephone: 301-405-5226.**

***Grading:***

<b><i>Midterm (open book):</i></b>	<b><i>25%</i></b>
<b><i>Six Homework:</i></b>	<b><i>15%</i></b>
<b><i>Project:</i></b>	<b><i>25%</i></b>
<b><i>Final Exam (Take home):</i></b>	<b><i>35%</i></b>

***Required Textbook:***

*“Probabilistic Physics of Failure Approach to Reliability: Modeling, Accelerated Testing, Prognosis and Reliability Assessment”, M. Modarres, M. Amiri, and C. Jackson, Univ. of Maryland, Scrivener-Wiley Publishing (2017).*

*Also, class notes are posted and you need to regularly check for updates, assignments, and announcements.*

***Additional Recommended References:***

- *Accelerated Testing: Statistical Models, Test Plans, Data Analyses*, W. Nelson, John Wiley and Sons, 1990.
- *Statistical Methods for Reliability Data*, W.Q. Meeker, L.A. Escobar, Wiley and Sons, 1998.
- *Failure of Materials in Mechanical Design, 2<sup>nd</sup> Ed.*, J. Collins, Wiley & Sons, 1993
- *Mechanical Behavior of Materials, 2<sup>nd</sup> Ed.* N. Dowling, Prentice Hall 1999

- *Metal Fatigue in Engineering, 2nd Edition*, Ralph I. Stephens, Ali Fatemi, Robert R. Stephens, Henry O. Fuchs, Wiley and Sons, 2000
- *Fundamentals of Metal Fatigue Analysis*, Julie Bannantine, Jess Comer, James Handrock, Prentice Hall, 1989
- *HALT, HASS, and HASA Explained: Accelerated Reliability Techniques*, H. W. McLean, ASQC Press, 2009.
- *Accelerated Reliability and Durability Testing Technology*, L. M. Klyatis, Wiley, 2012.
- *Accelerated Testing and Validation*, A. Porter, Elsevier, 2012.
- *Accelerated Testing: A practitioner's Guide to Accelerated Reliability Testing*, B. Dodson, H. Schwab, SAE Int., 2006.

**ENRE641**  
**Curriculum**

**Overview of Probabilistic Physics-of-Failure Approach to Reliability** Error! Bookmark not defined.

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Overview of Physics-of-Failure Modeling	<b>Error! Bookmark not defined.</b>
Important Forms of PoF Models	<b>Error! Bookmark not defined.</b>
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**Summary of Mechanisms of Failure and Associated PoF Models** Error! Bookmark not defined.

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Approximate Accelerated Life Degradation Analysis	<b>Error! Bookmark not defined.</b>

Maximum Likelihood Approach to Estimating Acceleration Degradation Model Parameters	<b>Error! Bookmark not defined.</b>
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### **Accelerated Test Planning**

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### **Accounting for Uncertainties and Model Validation**

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PPoF Model Uncertainties, Errors, and Validation	<b>Error! Bookmark not defined.</b>
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