CSCI 668: Reliability

Spring, 2017

TR 2:00–3:20 ISC 3280

Instructor: Larry Leemis

Office: Jones 116

Phone: 221-2034

e-mail: leemis@math.wm.edu

Office hours: TR: 3:30 – 4:50 PM, or by appointment

Purpose:

This course introduces probabilistic models and statistical methods used in reliability. The first half of the course examines probabilistic models for the lifetime of a system of components, and the last half of the course considers statistical methods which can be applied to a data set of survival times. Specific goals include:

(a) Provide a review of probability and statistics.

(b) Understand reliability theory at the level of the current archival literature. This semester, you will read articles from *Journal of the American Statistical Association*, *IEEE Transactions on Reliability*, *Naval Research Logistics*, *Technometrics*, *Journal of Quality Technology*, *Mathematics and Computers in Simulation*, and *Management Science*.

(c) Understand the relationship between actuarial science/biostatistics/reliability.

(d) Use computer software, e.g., R, to analyze reliability and survival analysis problems.

Prerequisites:

Students should have a working knowledge of calculus-based probability, statistics, and computer programming.

Text:

Leemis, L. (2009), *Reliability: Probabilistic Models and Statistical Methods*, ISBN: 978-0-692-00027-4.

Semester project:

A semester project on a research topic in reliability is due on the last day of class. The topic should be selected before spring break.

Grades:

Course grades will be determined by these weights:

Homework	25%
Midterm exam	25%
Project	20%
Final exam	30%

The grading scale is (plus and minus grades may be assigned within each range)

90 — 100 %	A
80 — 90 %	B
70 — 80 %	C
60 — 70 %	D
0 — 60 %	F

Homework:

Weekly homework sets are typically due at the beginning of the class period. No late homework assignments will be accepted. The "empty hands" policy should be used with respect to collaboration on homework sets. The typo czar/czarina will have their lowest homework score of the semester replaced by a perfect score. The homework should be prepared in LaTeX.

Course outline:

1. Introduction
2. Coherent Systems Analysis
3. Lifetime Distributions
4. Parametric Lifetime Models
5. Specialized Models
6. Repairable Systems
7. Lifetime Data Analysis
8. Parametric Estimation for Models Without Covariates
9. Parametric Estimation for Models with Covariates
10. Nonparametric Methods
11. Assessing Model Adequacy