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 and S-Plus, to analyze reliability and survival analysis problems

Prerequisites:

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

Text:

Grades:

Course grades will be determined by these weights:

- Homework 35%
- Midterm exam 30%
- Final exam 35%

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

- 90 - 100 % A
- 80 - 90 % B
- 70 - 80 % C

Homework:

Weekly homework sets are typically due at the beginning of the Friday 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 (preferably) 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