

Reliability Theory

Department: MATH

Course Number: 6781

Hours - Lecture: 3

Hours - Lab: 0

Hours - Recitation: 0

Hours - Total Credit: 3

Typical Scheduling: Every fall semester

Description:

Reliability systems and related distributions, failure rate functions and nonparametric classes, accelerated life testing, dependent failure analysis, statistical inference of reliability data. (Also listed as ISyE 6781)

Prerequisites:

[Math 3215](#) or equivalent

Course Text:

At the level of Barlow and Proschan, *Statistical Theory of Reliability and Life Testing*

Topic Outline:

Structural Properties of Coherent Systems - Structural functions, union/intersection and intersection/union methods, representation of coherent systems in terms of paths and sets

Reliability of Coherent Systems - Reliability functions of systems with either independent or dependent components, a stochastic inequality which yields bounds on system reliability, improved bounds using modular decompositions, applications to relay circuits and safety monitoring systems

Families of Probability Distributions in System Reliability Theory - The notions of aging and related families of life distributions with monotone (increasing, constant, and decreasing) failure rates

Classes of Life Distributions Based on Notions of Aging - IFR, IFRA, DFR, and DFRA families of distributions, partial orderings of life distributions and probability inequalities, a log-concavity property and DFR distributions, upper and lower bounds for reliability functions

Multivariate Distributions for Systems with Dependent Components - Bivariate and multivariate life distributions, notions of multivariate dependence, multivariate monotone failure rate life distributions

Selected topics on optimal arrangement of systems and optimal maintenance policies via applications of stochastic inequalities