

OFFICIAL SYLLABUS

STAT 584- RELIABILITY THEORY

(adopted- Summer 2004)

Catalog Description. Reliability of complex systems. Statistical analysis of methods for reliability. statistical analysis of models for repairable systems, including non homogeneous Poisson process. Accelerated life testing. Prerequisite: Stat480a, b; Stat 484.

Textbook. Statistical Methods for Reliability Data, by Meeker and Escobar

Course Outline and Topics

Chapter 1 Reliability Concepts and Reliability Data

- 1.2 Examples of Reliability Data
- 1.3 General Models for Reliability Data
- 1.4 Repairable Systems and Nonrepairable Units
- 1.5 Strategy for Data Collection, Modeling and Analysis

Chapter 2 Models, Censoring, and Likelihood for Failure-Time Data

- 2.1 Models for Continuous Failure-Time Processes
- 2.2 Models for Discrete Data from a Continuous Process
- 2.3 Censoring
- 2.4 Likelihood

Chapter 4 Location-Scale-Based Parametric Distributions

- 4.2 Quantities of Interest in Reliability Applications
- 4.3 Location-Scale and Log-Location-Scale Distributions
- 4.4 Exponential Distribution
- 4.6 Lognormal Distribution
- 4.7 Smallest Extreme Value Distribution
- 4.8 Weibull Distribution

Chapter 7 Parametric Likelihood Fitting Concepts

- 7.2 Parametric Likelihood
- 7.3 Confidence Interval for Mean
- 7.4 Confidence Intervals for Functions of Mean
- 7.5 Comparison of Confidence Interval Procedures

Chapter 8 Maximum Likelihood for Log-Location-Scale Distributions

- 8.2 Likelihood
- 8.3 Likelihood Confidence Regions and Intervals
- 8.4 Normal-Approximation Confidence Intervals

Chapter 15 System Reliability Concepts and Methods

- 15.2 System Structure and System Failure Probability
- 15.3 Estimating System Reliability from Component Data
- 15.4 Estimating Reliability with Two or More Causes of Failure

Chapter 16 Analysis of Repairable System and Other Recurrence Data

- 16.2 Nonparametric Estimation of the MCF
- 16.4 Parametric Models for Recurrence Data
- 16.5 Tools for Checking Point-Process Assumptions
- 16.6 Maximum Likelihood Fitting of Poisson Process

Chapter 17 Failure-Time Regression Analysis

- 17.2 Failure-Time Regression Models
- 17.3 Simple Linear Regression Models
- 17.4 Standard Errors and Confidence Intervals for Regression Models
- 17.5 Checking Model Assumptions
- 17.9 The Proportional Hazards Failure-Time Model

Chapter 18 Accelerated Test Model

- 18.2 Use-Rate Acceleration
- 18.3 Temperature Acceleration
- 18.4 Voltage and Voltage-Stress Acceleration
- 18.5 Acceleration Models with More Than One Accelerating Variable

Any instructor should cover all of the material specified; additional sections are optional.