

Uncertainty Analysis for Forensic Science, Raymond M. Brach & Patrick F. Dunn
Lawyers and Judges Publishing Company, 2004

Table of Contents:

Chapter 1, Introduction

Chapter 2, Units, Dimensions, Significant Figures and Calculations

- 2.1 Chapter Overview
- 2.2 A Brief History of English and Metric Systems
- 2.3 Systems of Units
- 2.4 SI Standards
- 2.5 Conversions between Technical English and SI
- 2.6 Prefixes
- 2.7 Significant Figures
- References

Chapter 3, Probability and Statistics

- 3.1 Chapter Overview
- 3.2 Basic Concepts in Probability
- 3.3 Sample Versus Population
- 3.4 Plotting Statistical Information
- 3.5 The Probability Density Function
- 3.6 Central Moments
- 3.7 The Probability Distribution Function
- 3.8 Various Probability Density Functions
- 3.9 Normalized Variables
- 3.10 Student's t Distribution
- 3.11 The Standard Deviation of the Means
- 3.12 Pooling Samples
- 3.13 The Chi-Square Distribution
- References

Chapter 4, Uncertainty Analysis

- 4.1 Uncertainty
- 4.2 Comparing Theory and Measurement
- 4.3 Uncertainty as an Estimated Variance
- 4.4 Systematic and Random Errors
- 4.5 Measurement Process Errors
- 4.6 Quantifying Uncertainties
- 4.7 Measurement Uncertainty Analysis
- 4.8 General Uncertainty Analysis
- 4.9 Detailed Uncertainty Analysis
- 4.10 Uncertainty Analysis Summary
- 4.11 Finite-Difference Uncertainties
- References

Chapter 5, Uncertainty Analysis Using Statistics

5.1 Chapter Overview

5.2 Mathematical Relationships

5.3 Equations That Relate Statistical Variables Linearly

5.4 Statistical Variables That Are Related Nonlinearly - Approximate Relationships

5.5 Monte Carlo Analysis

5.6 Mean and Variance of Related Variables

References

Chapter 6, Sensitivity and Design of Experiments

6.1 Chapter Overview

6.2 Background on the Design of Experiments

6.3 Basic Design of Experiments

6.4 Factorial Design and Main Effects

6.5 Response Surface and Sensitivity

6.6 Significance of Results of a Factorial Design

6.7 Full Factorial Designs

6.8 Fractional Factorial Design

References

Appendix Sign Patterns for 2^k Full Factorial Design, $k \leq 4$

Appendices

Appendix A: Unit Conversions for Common Units

Appendix B. Normal Probability Graphs