

Math 2470 Fundamentals of Statistics

Textbook: Probability and Statistics by Jay L. Devore, (*Sixth Edition*), Thomson Brooks/Cole

Prerequisite: C or better in MATH 1260, 1310, or 1350.

Course Description: Descriptive statistics. Discrete probability models, sampling distributions, statistical estimation, and testing.

General Description: The key objective of this course is to train students to think statistically. We will discuss topics on discrete probability models, sampling distributions, data collection, data analysis, and statistical inference. The course will focus on the understanding of statistical concepts and procedures. To ease the burden of computation, we will introduce statistical software *Minitab*.

Sections to be covered:

Introduction 1.1-1.4; Probability 2.1, 2.2, 2.4, 2.5; Discrete 3.1-3.4, 3.6; Continuous 4.1-4.3, 4.5; Random samples 5.1-5.3; Estimation 6.1, 6.2; Confidence intervals 7.3; Hypothesis testing 8.1-8.4; Two samples 9.4; ANOVA 10.1; Regression 12.1-12.3.

Chapter and section headings:

1. OVERVIEW AND DESCRIPTIVE STATISTICS.

Introduction. Populations, Samples, and Processes. Pictorial and Tabular Methods in Descriptive Statistics. Measures of Location. Measures of Variability.

2. PROBABILITY.

Introduction. Sample Spaces and Events. Axioms, Interpretations, and Properties of Probability. Counting Techniques. Conditional Probability. Independence.

3. DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS.

Introduction. Random Variables. Probability Distributions for Discrete Random Variables. Expected Values of Discrete Random Variables. The Binomial Probability Distribution. The Poisson Probability Distribution.

4. CONTINUOUS RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS.

Introduction. Continuous Random Variables and Probability Density Functions. Cumulative Distribution Functions and Expected Values. The Normal Distribution. Other Continuous Distributions.

5. JOINT PROBABILITY DISTRIBUTIONS AND RANDOM SAMPLES.

Introduction. Jointly Distributed Random Variables. Expected Values, Covariance, and Correlation. The Distribution of the Sample Mean.

6. POINT ESTIMATION.

Introduction. Some General Concepts of Point Estimation. Methods of Point Estimation.

7. STATISTICAL INTERVALS BASED ON A SINGLE SAMPLE.

Introduction. Basic Properties of Confidence Intervals. Intervals Based on a Normal Population Distribution.

8. TESTS OF HYPOTHESES BASED ON A SINGLE SAMPLE.

Introduction. Hypothesis and Test Procedures. Tests About a Population Mean. Tests Concerning a Population Proportion. P-Values.

9. INFERENCES BASED ON TWO SAMPLES.

Inferences Concerning a Difference Between Population Proportions.

10. THE ANALYSIS OF VARIANCE.

Introduction. Single-Factor ANOVA.

12. SIMPLE LINEAR REGRESSION AND CORRELATION.

Introduction. The Simple Linear Regression Model. Estimating Model Parameters.

Inferences About the Slope Parameter.