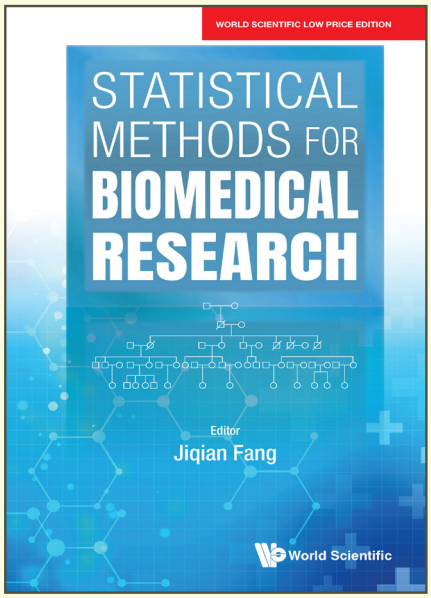
Statistical Methods for Biomedical Research



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ABOUT THE BOOK

This book consists of four parts with 32 chapters adapted for four short courses, from the basic to the advanced levels of medical statistics (biostatistics), ideal for biomedical students. Part 1 is a compulsory course of Basic Statistics with descriptive statistics, parameter estimation and hypothesis test, simple correlation and regression. Part 2 is a selective course on *Study Design and Implementation* with sampling survey, interventional study, observational study, diagnosis study, data sorting and article writing. Part 3 is a specially curated course of *Multivariate Analyses* with complex analyses of variance, variety of regressions and classical multivariate analyses. Part 4 is a seminar course on *Introduction to Advanced Statistical Methods* with meta-analysis, time series, item response theory, structure equation model, multi-level model, bio-informatics, genetic statistics and data mining.

The main body of each chapter is followed by five practical sections: *Report Writing, Case Discrimination, Computer Experiments, Frequently Asked Questions and Summary*, and *Practice & Think*. Moreover, there are 2 attached Appendices, Appendix A includes Introductions to SPSS, Excel and R respectively, and Appendix B includes all the programs, data and printouts for *Computer Experiments* in addition to the *Tests for Review* and the reference answers for *Case Discrimination* as well as *Practice & Think*.

This book can be used as a textbook for biomedical students at both under- and postgraduate levels. It can also serve as an important guide for researchers, professionals and officers in the biomedical field.

READERSHIP

Biostatisticians, applied statisticians, medical researchers and clinicians, bioscience students, biopharmaceutical researchers, public health epidemiologists; biometricians& applied mathematicians.

CONTENTS

- Introduction

- **Basic Concepts and Methods:**
- Statistical Description
- Probability Distribution
- Parameter Estimation
- Hypothesis Testing
- Comparison of Means Between Two Groups
- Comparison of Means Among Multiple Groups
- Comparison of Distributions of Categorical Variables
- Analysis for Association
- Simple Linear Regression
- **Design & Implementation of Bio-Medical Research:**
- Sampling Survey
- Interventional Study
- Clinical Trial
- Observational Comparative Effectiveness Research
- Diagnostic Test
- Sample Size Estimation
- Missing Data
- Statistical Reporting Guidelines for Medical Papers
- **Frequently Used Powerful Statistical Methods:**
- Analysis of Variance for Complicated Designs
- Multiple Linear Regression
- Logistic Regression
- Survival Analysis
- Discriminant Analysis and Classification Tree
- Cluster Analysis
- Principal Component Analysis and Factor Analysis
- **Selected Topics of Advanced Statistics:**
- Meta Analysis
- Time Series
- Structural Equation Model
- Multi-Level Model
- Item Response Theory
- Statistics for Genetics
- Statistics for Bioinformatics
- Data Mining
- **Appendices:**
- Introduction for Statistical Software
- Supplement for the Text
- Statistical Tables

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