STATS BOOK CONTENTS

CHAPTER 1 - INTRODUCTION
Uncertainty in data, confidence and decision-making, predicting the future, summary of the book.

CHAPTER 2 - THE PRESENTATION OF DATA
Scatter plots, histograms, dot-plots, column and bar charts, pie charts, box plots, error bars, 3D plots, size distributions, mineral composition, liberation data, geometallurgical data, tables, filtering, pivot tables, PowerPoint.

CHAPTER 3 - UNCERTAINTY IN DATA: THE NATURE AND CONSEQUENCE OF EXPERIMENTAL ERROR
Precision and accuracy, error and the normal distribution, sources of experimental error, populations and samples, confidence intervals, error propagation, outliers and their rejection, strategies for reducing uncertainty.

CHAPTER 4 - COMPARING QUANTITIES
Principles of hypothesis tests, t-tests for means, size of sample for t-tests, power, F-test for variances, 1-way ANOVA, $\chi^2$-test for count data, non-parametric tests.

CHAPTER 5 - BUILDING AND EVALUATING REGRESSION MODELS
Correlation, simple linear regression (trendline), judging the simple linear regression, multiple linear regression, judging the multiple linear regression.

CHAPTER 6 - MORE ABOUT REGRESSION MODELS
Improving the model, transformation of variables, comparing two trendlines, non-linear regression, weighted regression, regression traps for the unwary, aids to model-building, choosing the best model, three modelling case studies.

CHAPTER 7 - DESIGNING EFFICIENT EXPERIMENTS
Features of good experimental design, randomised block designs, analysis of covariance, factorial experiments, response surface designs.

CHAPTER 8 - DESIGNING, RUNNING AND ANALYSING PLANT TRIALS
Trials using formal experimental designs, analysing informal trials by modelling, cusum charts, the reference distribution, comparing process variability, practical considerations in running plant trials.

CHAPTER 9 - THE ANALYSIS OF TIME SERIES DATA
Features of time series, stationarity, autocorrelation and the correlogram, the variogram, time series models.
CHAPTER 10 - MULTIVARIATE ANALYSIS
Principal components analysis (PCA), cluster analysis, binary logistic regression, multivariate ANOVA (MANOVA).

CHAPTER 11 - PERFORMANCE MONITORING AND OPTIMISATION
Statistical process control (SPC), evolutionary operation (EVOP and SSDEVOP), response surface optimisation, particulate tracer testing.

CHAPTER 12 - STATISTICS FOR CHEMISTS AND MINERALOGISTS
Statistical behaviour of assays, laboratory quality control, statistics of mineral point counting and liberation analysis.

CHAPTER 13 - OTHER TOPICS OF INTEREST
Mass balancing, Monte Carlo simulation, bootstrapping and resampling, sampling of particulate analysis (Gy formula), size distributions, mean sizes and surface area, Six Sigma, Box-Cox transformations.

CHAPTER 14 - A ROADMAP FOR COLLECTING AND ANALYSING DATA
General principles, preliminary data analysis by plotting, choosing an experimental design and/or analysis method, method selection charts.

APPENDIX 1: TABLES (normal distribution, t-distribution, Grubbs’ test for outliers)
APPENDIX 2: PROTOCOL FOR CONDUCTING MINERAL PROCESSING EXPERIMENTS (Proforma)
APPENDIX 3: SOME USEFUL STATISTICAL DISTRIBUTIONS (normal, log-normal, Weibull, binomial, Poisson)
APPENDIX 4: WEB RESOURCES
APPENDIX 5: THE MATHEMATICS OF LINEAR REGRESSION
APPENDIX 6: FORMULAS FOR THE COMPARISON OF TWO TRENDLINES
APPENDIX 7: GLOSSARY OF TERMS

REFERENCES

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