
Preface to 2nd Edition

This second edition, like the first, is about how to generate informative data and how to extract information from data. The short-chapter format of the first edition has been retained. The goal is for the reader to be able to “dip in” where the case study or the statistical method stimulates interest without having to study the book from front to back, or in any particular order.

Thirteen new chapters deal with experimental design, selecting the sample size for an experiment, time series modeling and forecasting, transfer function models, weighted least squares, laboratory quality assurance, standard and specialty control charts, and tolerance and prediction intervals. The chapters on regression, parameter estimation, and model building have been revised. The chapters on transformations, simulation, and error propagation have been expanded.

It is important to encourage engineers to see statistics as a professional tool. One way to do this is to show them examples similar to those faced in one’s own work. For most of the examples in this book, the environmental engineer will have a good idea how the test specimens were collected and how the measurements were made. This creates a relevance and reality that makes it easier to understand special features of the data and the potential problems associated with the data analysis.

Exercises for self-study and classroom use have been added to all chapters. A solutions manual is available to course instructors. It will not be possible to cover all 54 chapters in a one-semester course, but the instructor can select chapters that match the knowledge level and interest of a particular class. Statistics and environmental engineering share the burden of having a special vocabulary, and students have some early frustration in both subjects until they become familiar with the special language. Learning both languages at the same time is perhaps expecting too much. Readers who have prerequisite knowledge of both environmental engineering and statistics will find the book easily understandable. Those who have had an introductory environmental engineering course but who are new to statistics, or vice versa, can use the book effectively if they are patient about vocabulary.

We have not tried to discuss every statistical method that is used to interpret environmental data. To do so would be impossible. Likewise, we cannot mention every environmental problem that involves statistics. The statistical methods selected for discussion are those that have been useful in our work, which is environmental engineering in the areas of water and wastewater treatment, industrial pollution control, and environmental modeling. If your special interest is air pollution control, hydrology, or geostatistics, your work may require statistical methods that we have not discussed. Some topics have been omitted precisely because you can find an excellent discussion in other books. We hope that whatever kind of environmental engineering work you do, this book will provide clear and useful guidance on data collection and analysis.

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