

go with a desk calculator, the treatment represents an invaluable pedagogical aid toward developing a feel for reactor calculations in a budding nuclear engineer.

Emphasis throughout the entire work is on methods of computation rather than on mathematical nicety, and if Dr. Meem pursues his subject with more vigor than rigor, that is at once the chief strength and weakness of the work. As an example of the strength this approach contributes, we might note that his treatment of the diffusion of thermal neutrons through a parallelepiped simply ignores the problem of fitting the boundary condition with a point source of thermal neutrons. Since no one has ever seen a point source of thermal neutrons, I consider this a step forward from the traditional approach of Glasstone and Edlund, wherein the fit is made with great eclat in a shower of scintillating orthogonal functions. Dr. Meem, by contrast, tells the student far more of what he needs to know of practical fact and less of mathematical fancy.

On the other hand, the present book displays an occasional rough spot because of this disinclination toward mathematical profundity. For example, in the development of a hitherto unpublished expression for the effective resonance integral of a homogeneously dispersed absorber, Dr. Meem's rather casual regard for the significance of mathematic averages yields an approximation, the limits of whose usefulness are not clearly defined in the text. In general, the emphasis throughout the book is on the practical means available for making approximations and for getting, or indeed even forcing, answers. Pure mathematicians might look with some trepidation upon the methods employed and the proofs developed. However, there is a strong case for the practice of following in the footsteps of a man who has been there, and in the matter of reactor calculation, Dr. Meem is certainly that.

His first six chapters present a general introduction to reactor theory, and the next four apply two-group theory to various reactor configurations and to control-rod estimation. The last quarter of the book consists of three appendices in which detailed calculations are made on a pool-type reactor, a natural-uranium graphite reactor, and a fast critical assembly. Not only are methods given for obtaining critical dimensions and loadings, but approximations are given to fit fluxes with separable solutions for the wave equations (even for the cases where, strictly speaking, no such solutions exist).

The book is a thorough, detailed guide aimed at teaching graduate nuclear engineering students to do many of the practical calculations of the trade. It is generally complete, and the inclusion of subjects which it does not cover (e.g. calculation of adjoint fluxes) would probably only have made it cumbersome. To sum up, unlike many other books in the field, it is less a mathematical *tour de force* than a reactor builders' guide.

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vised reactor operations at Lawrence Radiation Laboratory. He received a BS degree from Columbia University in 1946, and had graduate training at Ohio State University and the University of California.

A GOOD INTRODUCTION

Title Statistics for Scientists and Engineers.

Author R. Lowell Wine

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Price \$12.00

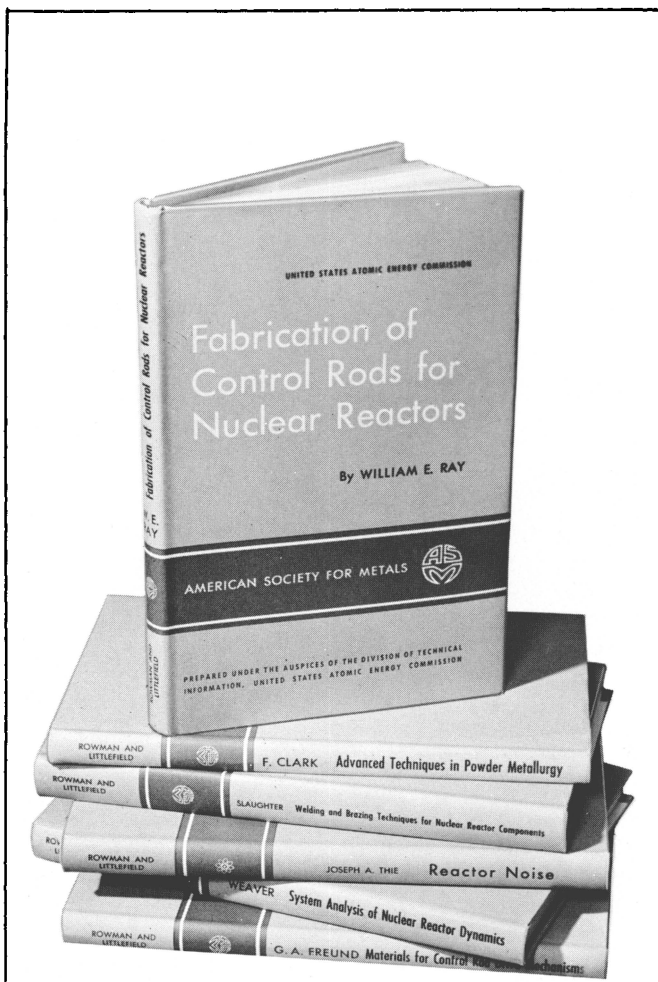
Reviewer Horace P. Flatt

Statistics is a mathematical field which is still rapidly developing, with somewhat uneven progress in different application areas. This book is a first introduction to this field, and attempts to make available statistical tools to students at an early point in their studies. It is intended to supply the necessary material for a course for junior, senior, or first-year graduate students. Elementary calculus is supposed to be the only mathematical prerequisite.

The book is quite lengthy for an introductory text and clearly has ample material for more than one course. The first few chapters cover in an extremely clear manner the basic definitions, concepts, and results of statistics. The format is generally the same, that is, basic definitions followed by plentiful illustrations and, where appropriate, worked examples. There are included many problems to be solved, including a few drawn from various fields of science and engineering. Proofs of some of the theorems stated in the text are given as problems to be solved, and the more difficult have some helpful hints. In this way, basic definitions such as mean, modes, and class marks are covered, and concepts such as measures of dispersions, distributions, etc., are introduced. Many theorems are developed, and the groundwork is laid for understanding the central-limit theorem, a restricted proof of which is given in an exercise for the reader.

Even in these early chapters, it becomes quite clear that more than a course in elementary calculus is required for following the text, and a still more sophisticated mathematical background is required for many of the problems. The manipulation of infinite integrals and multiple integrals is quite common, and the behavior of solutions of ordinary differential equations enters into at least one problem.

Subsequent chapters discuss sampling from normal populations, and include such topics as the chi-square distributions, the student *t* distribution, and the usefulness of the F distribution for problems involving two variances. An extensive discussion of the analysis of variance is included and leads into the problems of experimental design.



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The book concludes with two topics of especial interest to the experimentalist in the nuclear field—regression analysis and the analysis of counted data. A thorough discussion is made of both simple and multiple linear regression, and polynomial regression is introduced as a special case of the preceding. Although a few references are given, it would seem that in a book of this length more space might have been given to the problem of estimating the regression parameters when this has to be done by an iterative procedure. This may be required in working with data from a buckling experiment, for example. The discussion of the analysis of counted data is shorter, and emphasizes the use of the chi-square distribution to obtain good approximations to probabilities applied in goodness-of-fit and contingency-table problems.

In summary, the book is a well-written introduction to statistics. The title, "Statistics for Scientists and Engineers," is perhaps somewhat misleading, and can be justified mostly through the use of some technical applications in a small percentage of the problems for solution. The difficulty in writing such a book might be that the reader who has only the mathematical background that is supposedly required for this book probably is not sufficiently advanced in a scientific or engineering field to appreciate more technical examples.

Horace Flatt is manager of the Problem Analysis Department, IBM Systems Research and Development Center at Palo Alto, California. He was formerly head of the Applied Mathematics Group at Atomics International and is a past chairman of the Mathematics and Computations Division of ANS. His PhD degree (mathematics) was earned from Rice Institute in 1958.

BOOK ANNOUNCEMENTS

Although the following books will not be reviewed, they may be of interest to some of our readers:

- Quantum Electrodynamics*, A. I. Akhiezer and V. B. Berestetskii, translated by G. M. Volkoff, John Wiley, New York, 1965, 868 pp, \$22.50
- Reactor Shielding*, International Atomic Energy Agency, Vienna, 1964, 167 pp, \$3.50
- Optical Scintillation; A Survey of the Literature*, J. R. Meyer-Arendt and C. B. Emmanuel, National Bureau of Standards, Washington, D. C., 1965, 140 pp, 70 cents.
- Tables of Thermodynamic Data*, International Atomic Energy Agency, Vienna, 1965, 95 pp, \$2.50
- Cosmic Ray Physics*, A. E. Sandstrom, John Wiley, New York, 1965, 421 pp, \$15.00
- Interpretation of Metallographic Structures*, W. Rostoker and J. R. Dvorak, Academic Press, New York, 1964, \$10.00
- Magnetic Thin Films*, R. F. Soohoo, Harper & Row, New York, 1965, 377 pp, \$11.75
- Mechanical Design and Systems Handbook*, H. A. Rothbart, ed., McGraw-Hill, 1964, 1594 pp, \$39.50
- International Directory of Isotopes*, 3rd ed., International Atomic Energy Agency, Vienna, 1964, 487 pp, \$9.00
- Parametric and Tunnel Diodes*, K. K. N. Chang, Prentice-Hall, Englewood Cliffs, New Jersey, 1964, 256 pp, \$11.50
- Reliability Engineering*, W. H. Von Alven, ed., Prentice-Hall, Englewood Cliffs, New Jersey, 1964, 593 pp, \$14.95