Engineering Literature Guides, Number 22

SELECTIVE GUIDE TO LITERATURE ON STATISTICAL INFORMATION FOR ENGINEERS

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Preface

Whether they are professionals, academic faculty, or students, engineers are among the most quantitatively and analytically skilled people. Engineers have diverse information needs. Statistical information is one specific area which is often needed for data-gathering purposes by engineers in all areas of engineering. Mathematics, including statistics, is one of the oldest and most stable scientific disciplines. Centuries ago, the Greeks, the Arabs, and people of other ancient civilizations discovered axioms which today are still useful even though the way they are being applied may have changed with the advancement of technology. With increasingly focused attention on issues of consumerism, product and professional liability, and government regulations, the engineering community is a vital force in developing the standards which will meet these expectations. In order to accomplish this function, engineers need a comprehensive library of sources for making statistical problem-solving easier and for understanding basic statistical techniques. This selective guide to the literature is intended to provide engineers with a basic collection that will be helpful in identifying the necessary sources of statistics in their academic and professional fields. Almost all of these sources include graphs, tables, and charts which make them more useful for references and self-study.

This guide does not include statistics for medicine, the health sciences, pharmaceutical sciences, biomedical and genetic engineering, biological sciences, or nursing. These disciplines will require a source guide which will more specifically apply to their statistical information needs. This guide also does not include demographic statistics for: human resources, organizations, income, business, or engineering education statistics. Statistical sources for these are best covered in a separate guide.

Bibliographies and Guides to the Literature

This section is a brief listing of some basic bibliographic reference sources which the author used in the preparation of this source guide. Statistics is a stable discipline, and some statistical methods and their applications remain current and pertinent. Therefore, the reference sources listed below are useful tools to use when seeking bibliographic information on statistical methods.

Chen, Ching-Chin. *Scientific and Technical Information Sources.* 2nd ed. Cambridge, MA: MIT Press, 1987.

This book is intended primarily as a basic one-volume reference guide for science and engineering information professionals. It also serves as a handy reference manual for scientists, engineers, students, and other users of science and technology libraries and information sources. The sources are grouped by types of material and then by subject within each type.

Henwood, Felicity, and Graham Thomas, compilers. *Science, Technology, and Innovation: A Research Bibliography*. New York: St. Martin's Press, 1984.

This useful reference is arranged by subject, and by types of material within each subject section. Includes an index.

Hurt, Charlie Deuel. *Information Sources in Science and Technology*. 2nd ed. Englewood, CO: Libraries Unlimited, 1994.

This is a book about the secondary literature in the sciences and technology. It is arranged by subject area; then by type of material. Due to the scope and coverage, some titles appear in two places.

Kendall, Maurice G., and Alison G. Doig, eds. *Bibliography of Statistical Literature*. New York: Arno Press, 1981. Reprint. Originally published: Edinburgh: Oliver and Boyd, 1962-68.

This three-volume set serves as a comprehensive listing of the significant contributions to statistics from the 16th century through 1958. Volume one covers the literature from 1950-1958, volume two, 1940-1949, and volume three, pre-1940, with supplements to the volumes for 1940-49 and 1950-58. For current literature, *Statistical Theory and Methods Abstracts*, listed under the INDEXES AND ABSTRACTS section, will be a better source.

Owen, Dolores B. *Abstracts and Indexes in Science and Technology: A Descriptive Guide*. 2nd ed. Metuchen, NJ: Scarecrow Press, 1985.

This is a bibliographic listing of abstracts and indexes in science and technology, including a section on the mathematical and statistical sciences. The listings are by subject and the titles are annotated.

Sheehy, Eugene P., compiler. *Guide to Reference Books.* 10th ed. Chicago: American Library Association, 1986. Supplement to 10th ed.: Balay, Robert. Chicago, ALA, 1992. 11th ed., 1996

is in preparation.

Throughout its publishing history, this very popular reference tool has enjoyed the sponsorship of the American Library Association. Its wide coverage of the disciplines including the sciences and technology, makes it an invaluable source.

Walford, A. J., ed. *Walford's Guide to Reference Material*, Volume 1: Science and Technology. 5th ed. London: Library Association, 1989.

A reference source which provides annotated listings of sources in the fields of science and technology. A very useful tool for the practicing engineer who may want to build a private reference collection, especially when a library is not easily accessible.

Printed and Electronic Indexes and Abstracts

Indexes and abstracts are the tools used for locating not only journal articles, but also technical reports, monographic series, and conference proceedings listed by subject and/or author. At least one such index or abstract has been developed for each major scientific or technical field. Indexes list the subjects covered in a selected group of publications and supply the information necessary to retrieve the articles. Abstracts also include summaries for each article covered. Following is a list of indexes/abstracts specific to the field of Statistics for Engineers, as well as some works with much broader scope. Most of these titles are available in university and college libraries. Indexes/abstracts preceded by an * are available in electronic formats, i.e. CD-ROM, online, or diskette.

More detailed information about availability and period of coverage of electronic databases may be found in most academic libraries. Or the database directories listed in the Appendix may be consulted.

**American Statistics Index.* Bethesda, MD: Congressional Information Service, 1973- .

A comprehensive guide and index to statistical publications of the U.S. Government by subject, name, type of data breakdown, title, and report number. It also includes National Science Foundation publications.

**Applied Science & Technology Index.* Bronx, NY: The H. W. Wilson Company, 1958- (formerly Industrial Arts Index, 1913-57).

A cumulative index to English language periodicals in engineering and the applied sciences consisting of subject entries arranged alphabetically, with a separate listing of citations to book reviews.

**Bibliography and Index of Geology.* Alexandria, VA: The American Geological Institute, 1969- .

This index is photocomposed from citations in GeoRef, its online counterpart. It is used to produce special bibliographies and year-end journal indexes. It covers mathematical geology of rock and soil mechanics, sediments of ground water, and geophysical surveys which are useful to civil, environmental, and soil mechanics engineers.

**Compendex Plus*. See *Engineering Index.*

CompuMath Citation Index (CMCI). Philadelphia, PA: Institute for Scientific Information, 1976- .

An international, interdisciplinary index to the literature of applied mathematics, computer science, statistics, operation research, robotics and related disciplines. Nearly 2,500 of the world's leading journals and monographic series are indexed. All of the journals are also included in the online database, *SciSearch.* A number of these, but not all are covered in the print and CD-ROM versions of *Science Citation Index* and *Social Sciences Citation Index.*

*_Current Contents._ Philadelphia, PA: Institute for Scientific Information, 1957- .

This database contains journal article citations and it provides access to the tables of contents of the latest research covering multidisciplinary fields. The Physical Sciences and Mathematics Section is especially strong in its coverage of statistics. The printed version is published weekly in six sections.

*Current Index to Statistics, Applications, Methods and Theory. Alexandria, VA: American Statistical Association and the Institute of Mathematics, 1975- .

This annual series provides comprehensive indexing coverage on a timely basis to journal and monographic literature for the field of statistics. A computer readable version of the *Current Index to Statistics* is available from the American Statistical Association.

**Engineering Index.* Hoboken, NJ: Engineering Information, Inc., monthly with annual cumulation. 1884- .

A comprehensive record of international engineering and technological literature. Coverage includes journal articles, technical reports, and conference proceedings. It utilizes both controlled vocabulary and classification codes to enhance subject searching. Its electronic counterpart is called *Compendex Plus.*

**INSPEC.* London, UK: Institution of Electrical Engineers (IEE), 1969- .

This is the database for physics, electronics and computing. It corresponds to the three *Science Abstracts* print publications. The Science Abstracts family of abstract journals began publication in 1898. Some source publication in languages other than English, but all articles are abstracted and indexed in English. The INSPEC database utilizes controlled vocabulary from its Thesaurus. Applied mathematics and statistics are among the subjects covered.

International Abstracts in Operations Research. Amsterdam: North Holland, 1961- .

This publication aims to provide professionals with the information needed to keep abreast of the latest operational research literature. Contributing editors scan 150 journals and abstract the articles. Entries are classified into one of four main divisions and indexed by keyword.

**MATHSCI.* Providence, RI: American Mathematical Society. Coverage: Mathematics, 1959- ; Statistics, 1910- ; Computer Science, 1954- .

This database provides comprehensive coverage of the world's literature on mathematics, statistics, and computer science and their applications in a wide range of disciplines, including operations research, engineering, and other related fields. It is the major abstracting tool in mathematics and statistics. *MATHSCI* consists of seven subfiles whose print versions are: *Mathematical Reviews(MR)*, 1959- ;*Current Mathematical Publications(CMP)*, a current awareness index; *Current Index to Statistics (CIS)*, 1980- ; *Index to Statistics and Probability (TUKEY)*, a retrospective index to the literature from 1910-1968; *ACM Guide to Computing Literature (GCL)* 1981- ; *Computing Reviews (CR)* 1982- ; and *Technical Reports in Computer Science (STR)*, 1954-

. The combined coverage of the seven components of *MATHSCI* includes approximately 600 journals reviewed cover-to-cover, and 2500 journals covered selectively.

Mathematics of Computation. Washington, D.C.: National Research Council, 1960- Previous title: Mathematical Tables and Other Aids to Computation, 1943-1959.

Devoted to reporting advances in numerical analysis, computer applications methods, and mathematical tables.

**NTIS*. Springfield, VA: National Technical Information Service, 1964-

This database consists of summaries of unclassified U.S. government- sponsored research, development, and engineering analyses prepared by federal agencies, their contractors, or grantees. These include NASA, DOD, DOE, HUD, DOT, and some 240 other agencies including some government-sponsored research from countries outside the U.S. A great index to access technical reports. It is the electronic equivalent of *Government Reports Announcements and Index*.

**Science Citation Index*. Philadelphia: Institute of Scientific Information, 1955-

An international multidisciplinary index to the literature of science, technology, biomedicine, and related disciplines. *SciSearch*, the electronic counterpart, contains all of the records published in the *Science Citation Index* (SCI), plus additional records from the *Current Contents* series. It is distinguished by some important and unique characteristics: Journals indexed are selected on the basis of several criteria including citation analysis, resulting in coverage of the most significant publications; it also offers citation indexing which permits searching by cited references.

**Statistical Masterfile* (Computer file.) Bethesda, MD: Congressional Information Service, 1982- .

This file consists of computer laser optical disks, computer diskettes, and a reference card and user guide. User guide cover title: *Statistical Masterfile: American Statistics Index, Statistical Reference Index, Index to International Statistics.* This is published monthly, with quarterly and annual cumulations which appear in two parts: Index and Abstracts.

**Statistical Reference Index (SRI)*. Bethesda, MD: Congressional Information Service, 1980- .

A monthly publication which indexes and abstracts statistics contained in publications from more than 1000 leading American serial and monographic sources. Included in the Statistical Masterfile on CD-ROM.

Statistical Theory and Method Abstracts. London: Longman, for the International Statistical Institute, 1964- .

This is an excellent tool for keeping abreast of the statistical literature. It was formed by the merger in 1964 of the *International Journal of Abstracts: Statistical Theory and Methods*,1954-1963, and the *International Journal of Abstracts: Applications of Statistical Methods in Industry*, 1954-1963. The classified arrangement using headings such as probability, distributions, variance analysis, etc., makes this an easy tool to use by researchers and academicians alike.

**Zentralblatt fur Mathematik/Mathematics Abstract.* New York: Springer Vlg, 1931-.

This is the first abstracting and reviewing service in mathematics. It covers the entire spectrum of mathematics and information sciences, with special emphasis on areas of application. The scope is international, covering journals, conference proceedings, books, reports and preprints.

Internet resources are becoming increasingly popular. Many of these resources are the intellectual property of individuals and groups who make their works available as a public service to the academic and intellectual community. In many cases, these contributors ask that users observe their rights and refrain from copying their works except for non-profit usage.

Internet sites tend to change more often than printed resources. Thus linking to them on the World Wide Web may not always be very dependable. The few sites listed here are only a sample of what may be available to the engineers who have the inclination to 'surf' the internet. Professional and trade journals are often reviewing websites and might be good sources for identification purposes. Some useful starting places for 'surfing the net' for items of statistical interest follow:

Cornell University, Internet Connections for Engineers (ICE Index)
URL: http://ice.englib.cornell.edu

This is an index to web sites organized by engineering topic. The web pages of the School of Operations Research and Industrial Engineering at Cornell may be found here also. Faculty at this school provide procedural innovations in optimization, probability and statistics, and industrial systems.

e-MATH (Providence, RI: American Mathematical Society)
URL: http://e-math.ams.org/

This is the Society's resource for delivering electronic products and services to mathematicians and engineers. These products include books and journals in print; electronic journals on the e-Math home page; the MathSci database in several electronic formats; and other products of interest to the mathematical community including statisticians and engineers.

Geostatistics and Petroleum Related WWW Sites
URL: http://www.nr.no/home/SANDindex.html

This is issued by the SAND group at the Norwegian Computing Centre. "SAND" (Statistical Analysis of Natural Resources Data) does research and provides services of interest to the petroleum industry.

Institute for Mathematics and its Applications
URL: http://www.ima.umn.edu/

This Institute is at the University of Minnesota. This web site has information on newsletters, preprints, and schedules of interest to mathematicians and engineers.

Links of a Statistical Nature/Univ. of Washington Dept. of Statistics
URL: http://www.stat.washington.edu/www/statlinks.shtml

An annotated list of links to relevant sites.

Netlib

URL: ftp://netlib.att.com/netlib/master/readme.html.Z

This searchable software library provides many codes in some areas of applied statistics, such as evaluation of parametric distributions, but the coverage is limited in such areas as multivariate and time series analysis.

Reliability Analysis Center (RAC)

URL: http://www.litri.com/RAC/

Sponsored by the Defense Technical Information Center, and operated by ITT Research Institute. It includes information about their publications and a search capability.

SIAM World Wide Web Server

URL: http://www.siam.org/

This site contains information about the organization, events, conferences, books, and publications of SIAM (Society for Industrial and Applied Mathematics.)

Statistical Engineering Division of the Computing and Applied Mathematics Laboratory (CAML)

URL: http://www.nist.gov/itl/div882/

The Computing and Applied Mathematics Laboratory (CAML) is part of the National Institute of Standards and Technology (NIST). The mission of CAML is to conduct research, collaborate with, and provide support to all NIST activities and to other federal agencies in selected fields of the mathematical and computer sciences important in science and engineering. This gateway also provides tools for mathematical and statistical models, computational methods, mathematical tables, handbooks and manuals, and advises and provides training in disciplines related to these functions.

StatLib.

URL: http://lib.stat.cmu.edu

This is a library of statistical software maintained by Carnegie Mellon University. It can be accessed by email at **statlib@lib.stat.cmu.edu.** The general directory provides many stand-alone programs, including 200 of the source codes appearing in the *Journal of Applied Statistics.*

Useful Internet Sources

URL: http://math.okstate.edu/wrightd/useful.html

An index to useful resources in mathematics and related fields including statistics. It is compiled at Oklahoma State University.

Encyclopedias and encyclopedic dictionaries are good sources to use for overview and background material, for definitions, synthesis and history of terminology. Listed below are titles that may provide such information topics related to statistics.

Considine, Douglas M., ed. *Van Nostrand's Scientific Encyclopedia.* 8th ed. New York: Van Nostrand Reinhold, 1995.

This vital reference source addresses six major categories of scientific endeavor. Included are: Earth and Space Sciences, Life Sciences, Energy and Environmental Sciences, Materials Sciences, Physics and Chemistry, and Mathematics and Information Sciences. In this last section, the disciplines of Communications, Computers, Statistics and Standards provide the engineer with reliable technical information.

Encyclopedia of Mathematics and Its Applications. Editors vary. Cambridge, MA: Cambridge University Press, 1985- .

This monographic series is a valued reference for scientists who use applied mathematics. Each volume is devoted to a specific subject. Engineers will find this encyclopedia very helpful in determining statistical methods and their applications.

Gellert, W., et al., eds. *The VNR Concise Encyclopedia of Mathematics*. 2nd ed. New York: Van Nostrand Reinhold, 1989.

Statistics and statistical information are well covered in this encyclopedia. Included are mathematical tables, formulas, and charts. A very well indexed source.

Hazewinkel, M., managing ed. *Encyclopaedia of Mathematics.* Boston: Kluwer Academic Publishers, 1994.

An updated and annotated translation of the *Soviet Mathematical Encyclopaedia* published by Soviet Encyclopaedia Publishing House in 5 volumes, 1977-1985. The annotated translation consists of 10 volumes including a special index volume. It aims to be a reference work for all areas of mathematics, including statistics. Most articles include bibliographies.

James, Robert C., ed. *Mathematics Dictionary*. 5th ed. New York: Van Nostrand Reinhold, 1992.

The main objective in publishing this dictionary is to define and clarify the meaning of mathematical terms and concepts. Symbols and terms of statistics are well covered here. Indices for French, German, Russian, and Spanish languages are included. It is a useful source for students in engineering and the sciences.

Kotz, Samuel, and Norman L. Johnson, eds. *Encyclopedia of Statistical Sciences.* New York: Wiley, 1982.

This source provides information about an extensive selection of topics concerned with

statistical theory and the applications of statistical methods. Eight volumes of entries are well cross-referenced when unfamiliar terms appear. Most articles conclude with a brief bibliography.

Kurtz, Albert K., and Harold A. Edgerton, eds. *Statistical Dictionary of Terms and Symbols*. (A facsimile of the 1939 edition.) New York: Hafner, 1967.

The primary purpose of this dictionary is to provide the user with clear and accurate definitions of each of the various meanings of statistical terms. An advisory council of statisticians was organized to carefully examine the statistical terminology in the different branches of science which they represent. Thus the terminology and the definitions are specific and applicable to each discipline.

Marriott, F. H. C., ed. *A Dictionary of Statistical Terms.* 5th ed. New York: Wiley, 1990.

This has become an essential tool for theoretical and empirical statisticians and engineers for the teaching of statistics. It is published for the International Statistical Institute.

The Mathematical Society of Japan, Kiyosi Ito, ed. *Encyclopedic Dictionary of Mathematics*. 2nd ed. Cambridge, MA: MIT Press, 1993.

This is a compact, up-to-date reference for information comprising all significant results in all fields of pure and applied mathematics. The American Mathematical Society gives this publication a very favorable review because of its scope and coverage of information about all fields of advanced mathematical research, including applied statistics.

Parker, Sybil P., ed. *McGraw-Hill Concise Encyclopedia of Science & Technology.* 3rd ed. New York: McGraw-Hill, 1994.

In preparing this concise version, the editors extracted essential information and created an encyclopedia which meets the need for current, accurate information on classical concepts in science and engineering. The special features of this reference source are: 1. The bibliographies section, which lists hundreds of books and journals alphabetically by subject area. 2. A 48-page appendix, which gathers together information on units of measurement, mathematical notation, statistical tables, and other pertinent concepts. 3. An index, which provides the reader with instant access to more than 30,000 entries to specific information.

Sneddon, I. N., ed. *Encyclopaedic Dictionary of Mathematics for Engineers and Applied Scientists.* New York: Pergamon, 1976.

This is a single-volume dictionary with alphabetical arrangement of terms in mathematics, mathematical engineering, and related fields. Subject index arrangements are used throughout. The intent of this work is to take the most commonly used mathematical concepts and techniques, and delineate their scientific underpinnings. The process pulls together a great deal of primary literature which makes the age of the work less noticeable and the utility of the information considerably greater.

Tietjen, Gary L. *A Topical Dictionary of Statistics*. New York: Chapman and Hall, 1986.

This comprehensive one-volume dictionary imparts much more information than the

standard alphabetically-arranged dictionary. An alphabetical index directs the reader to the page or chapter where the desired term is defined. It is a valuable tool for scientists and engineers who use data to draw inferences.

The World of Mathematics. Vol. 3, Part VII: *Statistics and the Design of Experiments. A Small Library of the Literature of Mathematics from A'h-mose' the Scribe to Albert Einstein.* Presented with commentaries and notes by James R. Newman. Redmond, WA: Tempus Books of Microsoft Press, 1988. Originally published: New York: Simon and Schuster, 1956.

Covered here is information on statistical deductions, statistical-experimental investigations, statistical laws, applied statistical mechanics, and statistical methods for engineers and researchers.

This section is a selective listing of handbooks and manuals which provide the user quick ready-reference information for a specific problem.

Bagui, Subhash C., ed. *CRC Handbook of Percentiles of Non-Central t-Distributions.* Boca Raton, FL: CRC Press, 1993.

In this book, obtainable percentiles of non-central t-distribution for a wide range of values are presented in tables. A wide variety of references to reliable data are listed.

Barnett, V., and T. Lewis. *Outliers in Statistical Data.* 3rd ed. Chichester; New York: Wiley, 1994.

This third edition of a standard reference manual on outliers has been updated. It provides tables and illustrations. A good bibliographical section guides the user to further reading and research.

Belding, William G., ed. *ASM Handbook of Engineering Mathematics.* Metals Park, OH: American Society for Metals, 1983.

This handbook has been compiled to serve as a practical reference for practicing engineers and engineering students with a background in basic college-level mathematics. Chapter 14 is devoted to probability and statistics. In engineering, some processes cannot be determined exactly. In evaluating such phenomena, the methods of statistics and the theory of probability are used.

Beyer, William H., ed. *CRC Handbook of Tables for Probability and Statistics.* 2nd ed. Boca Raton, FL: CRC Press, 1987.

This is a collection of standard statistical tables. Each table is followed by a description of the underlying distributions that produce it. The extensive coverage of both probability and statistics makes this an important reference source for engineers.

Beyer, William H., ed. *CRC Standard Probability and Statistics Tables and Formulae*. Boca Raton, FL: CRC Press, 1991.

This handbook is primarily a collection of expository material and tables that are useful in the statistical analysis of data. Material is presented in a multisectional format, with each section containing fundamental reference material.

Burington, Richard Stevens, and Donald Curtis May, Jr. *Handbook of Probability and Statistics with Tables*. 2nd ed. New York: McGraw-Hill, 1970.

Regression theory, analysis of variance, sampling techniques, and nonparametric methods are some of the material which is covered in this handbook. Formulas, tables, and a glossary make this a very basic ready-reference tool.

Cheremisinoff, Nicholas P., and Paul N. Cheremisinoff. *Engineering Mathematics and Statistics: Pocket Handbook.* Lancaster, PA: Technomic Pub., 1989.

This illustrated and concise handbook is a useful source for engineers who deal with applied mathematics and statistics. As the subtitle indicates, it is a handy, well outlined reference tool.

Clements, Richard Barrett. *Handbook of Statistical Methods in Manufacturing.* Englewood Cliffs, NJ: Prentice Hall, 1991.

The increased complexity of manufacturing has created a need for a comprehensive library of technical procedures and a common sense approach to the basic calculations used for statistical reasoning. This handbook is especially written for the engineer who wants to use statistical methods effectively in manufacturing, yet does not want to become a statistician. Statistical process control (SPC), quality function deployment, and experimental design are among the technologies which are well illustrated here through graphs and tables.

Greenwood, J. A., and H. O. Hartley. *Guide to Tables in Mathematical Statistics.* Princeton, NJ: Princeton University Press, 1962.

Statistical and mathematical tables change infrequently; therefore, this reference source is still a valuable guide for engineers and statisticians alike. The classified arrangement makes this an easy tool to use.

Harter, H. Leon. *CRC Handbook of Tables for the Use of Order Statistics in Estimation*. Boca Raton, FL: CRC Press, 1996.

A revision of the author's *Order Statistics and Their Use in Testing and Estimation,* volume two: *Estimates Based on Order Statistics of Samples from Various Populations*. It includes references and an index.

Hicks, Tyler G., S. David Hicks, and Joseph Loto, eds. *Standard Handbook of Engineering Calculations.* 3rd ed. New York: McGraw-Hill, 1995.

This reference work presents step-by-step calculation procedures for solving problems encountered by engineers in their practice. Each branch of engineering is covered in a separate section. It is well illustrated and includes an index.

Institute of Mathematical Statistics, ed. *Selected Tables in Mathematical Statistics.* Providence, R.I.: American Mathematical Society, v.1- , 1970- .

Each volume of this multi-volume set is a concise collection of statistical tables covering specific topics. The introductory notes and references to each topic facilitate usage.

Kirby, Kris N. *Advanced Data Analysis with SYSTAT*. New York: Van Nostrand Reinhold, 1993.

In teaching and using statistics, the author found a need for a reference book that bridges the gap between a software manual and a statistics textbook. This work provides the guidance of a

statistics text without becoming mired in details and derivations. It simplifies the use of statistical software without getting lost in an endless variety of procedures and options. SYSTAT was the choice because it has the best combination of power and user-friendliness of any program available for personal computers.

Kobayashi, Albert S., ed. *Handbook on Experimental Mechanics*. 2nd ed. New York, NY: VCH; Bethel, CT: Society for Experimental Mechanics, 1993.

An entire section of this inclusive reference source is dedicated to the statistical methods used by mechanical, structural, and civil engineers. The statistical methods employed in order to obtain data with exact results are described and illustrated.

Kokoska, Stephen, and Christopher Nevison. *Statistical Tables and Formulae.* (Springer Texts in Statistics Series.) New York: Springer-Verlag, 1989.

This handy reference source is a collection of mathematical and statistical tables which are useful for engineers in the various engineering disciplines.

Krishnaiah, P.R., and C. R. Rao, eds. *Quality Control and Reliability. (Handbook of Statistics, 7.)* Amsterdam; New York: North-Holland, 1988.

The main chapter in this reference handbook is written by W. Edwards Deming, a pioneer in statistical quality control. The focus is on the concepts and theory of reliability, which are discussed with supporting statistical methods to implement them.

Mathai, A. M. *A Handbook of Generalized Special Functions for Statistical and Physical Sciences*. Oxford: Clarendon Press, New York: Oxford University Press, 1993.

This handbook is a valuable reference source and a manual for researchers and advanced students in mathematical statistics, several areas of engineering statistics, and various applied areas where transcendental functions are used.

Middendorf, William H., series ed. *What Every Engineer Should Know.* New York: Marcel Dekker, 1979- .

Regardless of the area of expertise, engineering intersects with all the fields that constitute modern industry. Soon after graduation, the engineer discovers that the range of subjects in the engineering curriculum omits many of the practical problems
encountered in daily practice. With this series of concise, easy-to-understand volumes, every engineer has within reach a compact set of primers on important subjects. Books in this series which cover statistical methods for engineers are listed below:

Moddares, M. *What Every Engineer Should Know About Reliability and Risk Analysis*. Vol. 30, 1993.

Murr, Lawrence Eugene, ed. *What Every Engineer Should Know About Material and Component Failure, Failure Analysis, and Litigation*. Vol. 20, 1987.

Pyzdek, Thomas, ed. *What Every Engineer Should Know About Quality Control*. Vol. 26, 1989.

Schenk, Margaret T., and James K. Webster, eds. *What Every Engineer Should Know About Engineering Information Resources*. Vol. 13, 1984.

Shupe, Dean S., ed. *What Every Engineer Should Know About Economic Decision Analysis.* Vol. 4, 1980.

Neave, Henry R. *Statistics Tables for Mathematicians, Engineers, Economists and the Behavioural and Management Sciences*. London; Boston: Allen & Unwin, 1978.

This reference source presents a collection of tables relating to standard statistical techniques considered in an introductory course in statistical methods. It includes tables relevant to probability, distributions, estimation, hypothesis-testing, regression, correlation and analysis of variance, non-parametric methods, quality control, and basic operations research.

Pearson, Egon Sharpe, and H. O. Hartley, eds. *Biometrika Tables for Statisticians.* 3rd ed., repr. with corrections. London: Biometrika Trust, 1976, 1966.

This two-volume reference is a preferred handbook for many statisticians. It is referred to by almost every statistics handbook or textbook. A very useful source for engineering students and practicing engineers.

Sundararajan, C. (Raj), ed. *Probabilistic Structural Mechanics Handbook: Theory and Industrial Applications*. New York: Chapman & Hall, 1995.

This reference volume offers the most comprehensive coverage of probabilistic structural mechanics available. A vast array of analytical and computational methods for structural reliability is explained in depth, and their applications are described using concrete examples. Statistical methods for structural stability and dynamics are the key subjects covered.

Tuma, Jan J. *Engineering Mathematics Handbook: Definitions, Theorems, Formulas, Tables*. 3rd ed. New York: McGraw-Hill, 1987.

A concise summary of the major tools of engineering mathematics. One of the five parts covers numerical methods, which include data and mathematical and statistical formulas for the practicing engineer, engineering students, and faculty. This new edition has been revised and enlarged to facilitate the use of the personal computer in engineering applications.

Weast, Robert C., and Samuel M. Selby, eds. *Handbook of Tables for Mathematics.* Rev. 4th ed. Cleveland, OH: CRC Press, 1975.

An extensive section on "Probability and Statistics" is included. Statistical tables, functions, distributions, processes, and symbols are discussed in this basic reference source.

World Industrial Robots. New York: United Nations, Economic Commission for Europe (UN/ECE)

Working Party on Engineering Industries and Automation and International Federation of Robotics, annual, 1994- .

Previous title: *World Industrial Robot Statistics, 1992-93*. 1994 vol. covers statistics for 1983-1993 and forecasts to 1997.

The titles in this very selective list of textbooks and treatises were chosen to represent a large body of literature, either because of their extensive bibliographies for further reading, or because they have handbook qualities, or because they are the definitive work about some aspect of advanced statistics. A number of these titles are volumes of statistics series. Further works can be found in libraries' catalogs under STATISTICS or STATISTICAL METHODS, preceded or followed by a specific engineering discipline, for example: CIVIL ENGINEERING--STATISTICAL METHODS.

Andersen, Per Kragh, et al., eds. *Statistical Models Based on Counting Processes*. (Springer Series in Statistics.) New York: Springer-Verlag, 1993.

One of the most remarkable examples of fast technology transfer from new developments in mathematical probability theory to applied statistical methodology is the use of counting processes, martingales in continuous time, and stochastic integration in even history analysis. The aim of this book is to present a theory for handling such statistical problems. It illustrates most methods by concrete practical applications.

Ang, Alfredo Hua-Sing, and Wilson H. Tang. *Probability Concepts in Engineering Planning and Design*. 2 vols. New York: Wiley , 1984.

This two-volume set presents statistical methods and probability for the design and manufacturing engineer. Vol. 1 focuses on basic principles; vol. 2 concentrates on the concepts in engineering planning and design.

Ansell, J. I., and M. J. Phillips. *Practical Methods for Reliability Data Analysis*. (Oxford Statistical Science Series, 14.) Oxford; New York: Clarendon Press, 1994.

This book tackles the analysis of reliability data from a practical standpoint, giving a critical appreciation of the statistical methods and models used. The aim is to provide guidance on the use of statistical techniques for reliability engineers.

Augusti, Giuliano, Alesandro Baratta, and Fabio Casciati. *Probabilistic Methods in Structural Engineering.* New York: Chapman and Hall, 1984.

This book contains information specifically outlined for practicing civil and mechanical engineers and their academic counterparts. It is well organized and has an extensive bibliography for further reading.

Babu, G. Jogesh, and Eric D. Feigelson. *Astrostatistics: Interdisciplinary Statistics.* New York: Chapman & Hall, 1996.

This book, authored by a statistician-astronomer team, provides graduate students and professionals in statistics, astronomy, and aerospace engineering with the exposure to issues of mutual interests. Each chapter begins with examples of problems arising in recent astronomical

research, and highlights challenging methodological issues. Complex astronomical data and statistical principles are widely discussed. References to software (including internet addresses) implementing statistical methods are provided.

Barker, Thomas B. *Engineering Quality by Design: Interpreting the Taguchi Approach. (Statistics: Textbooks and Monographs, vol. 113; Quality and Reliability Series. vol. 43.)* New York: Marcel Dekker; Milwaukee: ASQC Quality Press, 1990.

This practical volume applies the Taguchi approach to quality engineering with traditional experimental design and analysis techniques. Providing a wealth of information accessible to non-statisticians, it becomes a working resource for quality control, reliability, design, industrial and manufacturing engineers, managers, and statisticians. It is a well balanced text for upper-level undergraduate and graduate students in industrial engineering.

Barnes, J. Wesley. *Statistical Analysis for Engineers and Scientists: A Computer-Based Approach.* A revised edition of the author's 1988 *Statistical Analysis for Engineers.* New York: McGraw-Hill, 1994.

Emphasis is given to the application of computer methods in practical statistical analysis while also providing a sound understanding of basic mathematical principles. The book is accompanied by software especially written for this purpose, and a user's manual.

Beauregard, Michael R., Raymond J. Mikulak, and Barbara A. Olson. *A Practical Guide to Statistical Quality Improvement: Opening Up the Statistical Toolbox.* New York: Van Nostrand Reinhold, 1992.

Written by working engineers for working engineers, this volume takes the mystery out of statistical improvement tools. It gives readers a non-theoretical look at continual enhancement of quality in manufacturing through statistical process control and improvement techniques. This guide is the only one of its kind intended for engineers in manufacturing.

Berthouex, P. M., and Linfield C. Brown. *Statistics for Environmental Engineers.* Boca Raton, FL: Lewis Publishers, 1994.

This work provides statistical methods to meet the needs of the environmental engineering professional. It includes statistical models for environmental studies and research in areas such as water pollution and air quality control. It is well illustrated with charts, tables, and graphs. An extensive bibliography and an index make this a valuable reference source.

Bethea, Robert M., and R. Russell Rhinehart. *Applied Engineering Statistics. (Statistics: Textbooks and Monographs, vol. 121.*) New York: Marcel Dekker, 1991.

This is a useful source for engineers in all disciplines. It provides a practical applied approach to statistical methods with situations, examples, and solutions to unique problems.

Bethea, Robert M., Benjamin S. Duran, and Thomas L. Boullion. *Statistical Methods for Engineers and Scientists.* 3rd ed., revised and expanded. (Statistics: Textbooks and Monographs, vol. 144.)

New York: Marcel Dekker, 1995.

A concise and well-organized text, which guides engineers through the basic steps of applying statistical methods to specific problems. Students in both the engineering and physical sciences disciplines will also find this to be a useful text.

Bosq, Denis. *Nonparametric Statistics for Stochastic Processes: Estimation and Prediction. (Lecture Notes in Statistics: vol. 110.)* New York: Springer-Verlag, 1996.

New developments have taken place in the theory of nonparametric statistics for stochastic processes. Optimal asymptotic results have been obtained and special behavior of estimators and predictors in continuous time has been pointed out. This book, using new methods and comparisons, is devoted to these questions and it presents many new results.

Bowerman, Bruce L., and Richard T. O'Connell. *Linear Statistical Models, an Applied Approach.* 2nd ed. Boston: PWS-Kent, 1990.

This edition is designed for applied courses in regression analysis, analysis of variance, and experimental design. The book will appeal to advanced undergraduates and graduate students in the fields of engineering, the sciences, and business. The depth of the information makes this a useful source for practicing engineers with a limited statistical background.

Bowker, Albert H., and Gerald J. Lieberman. *Engineering Statistics.* 2nd ed. Englewood Cliffs, NJ: Prentice Hall Inc., 1972.

This book attempts to present statistics as a science for making decisions. It provides a logical presentation of statistical techniques used in engineering and the physical sciences, requiring only an elementary knowledge of calculus as a prerequisite. In spite of the publication date, it remains a great text for engineering students in all disciplines.

Burr, Irving W. *Elementary Statistical Quality Control. (Statistics: Textbooks and Monographs, vol. 25.)* New York: Marcel Dekker, 1979.

Written by one of the pioneers of quality control in the U.S., this text is for students of industrial engineering at all levels. It is an ideal self-study and an introductory review tool for the inspectors and industrial engineers who use quality control.

Breipohl, Arthur M. *Probabilistic Systems Analysis: An Introduction to Probabilistic Models, Decisions, and Applications of Random Processes*. New York: Wiley, 1970.

Probabilistic models are basic to the analysis of almost any kind of engineering problem. Courses in probability and statistics are useful but do not emphasize applied engineering problems. This book presents the fundamentals of probability theory and statistical methods to show students how to develop probabilistic models.

Carr, Wendell E. *Statistical Problem Solving. (Quality and Reliability series, vol. 33.)* New York: Marcel Dekker; Milwaukee: ASCQ Quality Press, 1992.

This book offers highly practical methods for quality control and reliability in manufacturing.

Industrial engineers, students, statisticians, and mathematicians will all benefit from the information contained herein. It includes applicable statistical problems from probability to confidence intervals.

Champion, Edward R., Jr. *Numerical Methods for Engineering Applications. (Mechanical Engineering: vol. 84.)* New York: Marcel Dekker, 1993.

Explaining basic concepts and algorithms, this outstanding reference examines the numerical analysis of practical engineering concerns using popular computer programs. It contains over 350 equations and drawings. An excellent reference source for engineers who use numerical analysis and mechanical design. It is also an essential text for graduate and upper-level undergraduateand graduate students in these disciplines.

Clarke, Robin T. *Statistical Modelling in Hydrology.* Chichester; New York: Wiley, 1994.

This book shows how many methods applied in hydrological practice are related through the statistical models which are used to describe the underlying structure of hydrological data. The author emphasizes the interactive approach to model development made possible by the power of desk-top computers and the use of computer graphics.

Cohen, A. Clifford. *Truncated and Censored Samples, Theory and Applications. (Statistics: Textbooks and Monographs Series, Vol. 119.)* New York: Marcel Dekker, 1991.

The massive increase in the complexity of manufacturing created a need to use statistical reasoning. With the recent revival of statistical process control (SPC), statistical tools are becoming a dominant force in the planning, building, and execution of a manufacturing process. In this book, SPC and other quality functions are fully discussed and well illustrated.

Dougherty, Edward R. *Probability and Statistics for the Engineering, Computing, and Physical Sciences.* Englewood Cliffs, NJ: Prentice-Hall, 1990.

This source provides comprehensive coverage of fundamental probabilistic and statistical theory with applications from manufacturing, materials science, electrical and mechanical engineering, computer design, artificial intelligence, image and signal processing, and a host of other areas in the sciences. It stresses models and practical applications relevant to students. It provides strong coverage of estimation theory, hypothesis testing, and statistical methods.

Farnum, Nicholas R., and LaVerne W. Stanton. *Quantitative Forecasting Methods.* Boston: PWS-Kent, 1989.

This is an applications-oriented statistical forecasting book. Written to serve both as a quick reference source for forecasting practitioners and as a university-level text in introductory statistical forecasting courses. It focuses on in-depth descriptions of the rationale underlying the various forecasting techniques, the guidelines for choosing them, and detailed procedures for applying each technique.

Farrashkhalvat, M., and J. . Miles. *Tensor Methods for Engineers and Scientists*. New York: Ellis Horwood, 1990.

Statistics, operational research, and computational mathematics are subjects that are well covered in this book. It includes bibliographical reference and an index.

Festa, Roberto. *Optimum Inductive Methods: A Study in Inductive Probability, Bayesian Statistics, and Verisimilitude*. Boston: Kluwer Academic Publishers, 1993.

Bayesian statistics, decision theory, truth, probability and mathematical induction theories and practices are discussed in this text. This source provides good background information for academicians and practicing engineers.

Ghosh, Subir, ed. *Statistical Design and Analysis of Industrial Experiments. (Statistics: Textbooks and Monographs, vol. 109.)* New York: Marcel Dekker, 1990.

Technologies such as just-in-time, quality function deployment, and experimental design rely on the use of statistics. This text serves as a source for the basic statistical methods which are needed by industrial engineers to develop these skills to learn how to think statistically.

Gibbons, Robert D. *Statistical Methods for Groundwater Monitoring*. New York: Wiley, 1994.

This book is designed to provide the environmental engineer and statistician interested in environmental problems accurate and authoritative information regarding the statistical methods for monitoring and measuring groundwater pollution. Measurement graphs and tables are used throughout.

Gibra, Isaac N. *Probability and Statistical Inference for Scientists and Engineers.* Englewood Cliffs, NJ: Prentice-Hall, 1973.

Statistical hypothesis testing, statistical inference and applications, statistical stability, and statistical tolerance limits are among the major topics in this self-study book. A classic reference for practicing engineers in all disciplines.

Greer, A. *Statistics for Engineers.* Cheltenham, England: Stanley Thornes, 1990.

Most engineers are not mathematicians. Therefore, this book provides basic statistical information geared specifically for the engineers who do not have a solid background in mathematics. It serves as a tool for both practicing engineers and their academic counterparts.

Guttman, Irwin, S. S. Wilks, and S. Stuart Hunter. *Introductory Engineering Statistics.* 3rd ed. New York: Wiley, 1982.

The purpose of this book is to give undergraduate engineering students a facility in and understanding of elementary and applied statistical techniques. No previous background in probability and statistics is assumed, but an introductory course in calculus is expected. It is still used as a classic introductory source.

Haar, D. Ter. *Elements of Statistical Mechanics.* 3rd ed. Oxford; Boston: Butterworth-Heinemann, 1995.

Following the Boltzmann-Gibbs approach to statistical mechanics, this new edition provides

undergraduates and senior academics with a thorough introduction to the subject. A problem section follows each chapter which helps the reader to apply each theory to various physical situations. Solutions to selected problems appear at the end of the book.

Hahn, Gerald J., and Samuel S. Shapiro. *Statistical Models in Engineering.* New York: Wiley, 1994, 1967.

This is a reprint of the 1967 edition from the Wiley Classics Library. It is the outgrowth of many years of consulting with electrical, mechanical, chemical, industrial, and reliability engineers. Detailed treatment, directed at engineers, on the use of statistical models to represent physical phenomena is presented.

Hardle, Wolfgang, ed. *Computer Intensive Methods in Statistics.* Heidelberg: Physica; New York: Springer-Verlag, 1993.

A great reference source for computer-based statistical methods. It is especially geared for electrical engineers and computer scientists.

Hines, William W., and Douglas C. Montgomery. *Probability and Statistics in Engineering and Management Science*. 3rd ed. New York: Wiley, 1990.

This book has been written for a first course in applied probability and statistics for undergraduate students in engineering, the physical sciences, and operations research. The emphasis is on statistical background required for model formulation and decision making. Knowledge of differential and integral calculus is assumed, and some familiarity with matrix algebra is required.

Hipel, Keith W., ed. *Stochastic and Statistical Methods in Hydrology and Environmental Engineering. (Water Science and Technology Library vol. 10.)* Dordrecht: NL; London: Kluwer Academic, 1994.

This 4-volume set forms a collection of papers written by highly respected scientists and engineers from around the world who present some of the latest research results. Volume one covers the extreme values: floods and droughts; volume two deals with stochastic and statistical modeling and ground and surface water applications; volume three covers time series analysis in hydrology and environmental engineering; volume four reflects on the effective environmental management for sustainable development.

Hogg, Robert V., and Johannes Ledolter. *Engineering Statistics*. New York: MacMillan, 1987.

Hogg is a well-known author and lecturer in the fields of probability, mathematical statistics, and inferences. This well-written concise text focuses on distributions, estimations, decision-making, inferences, and tests of hypotheses.

Hoyland, Arnljot, and Marvin Rausand. *System Reliability Theory: Models and Statistical Methods.* New York: Wiley, 1994.

Statistical methods, reliability, data analysis, and modeling are the major subjects covered in this book. It includes extensive bibliographical references as well as a good index.

Hughes, Barry D. *Random Walks and Random Environments*. Oxford: Clarendon Press; New York: Oxford University Press, 1995.

Functions of complex variables and elements of probability are discussed in this first volume of a planned two-volume set. The material is geared toward applied mathematicians, engineers, probabilists, statisticians, and students in these disciplines.

John, Peter W. M. *Statistical Methods in Engineering and Quality Assurance.* New York: Wiley, 1990.

This book is designed to give engineers an introduction to the engineering applications of statistics, with particular emphasis on modern quality assurance. It reflects more than 30 years of teaching statistics to engineers and physicists. The examples given in the text cover a wide range of engineering applications, including chemical engineering and semiconductors.

Johnson, Norman Lloyd, and Samuel Kotz. *Distributions in Statistics.* 4 vols. New York: Wiley, 1969-1972.

Volume one of this series covers discrete distribution; volumes two and three cover continuous univariate distributions; volume four covers continuous multivariate distributions. In spite of the dates of publication, this compendium gives a comprehensive account of statistical distributions. These texts are not on general statistical theory; they are, rather, books for persons who wish to apply statistical methods and who have some knowledge of standard statistical techniques. Each chapter is followed by a bibliography.

Kendall, Maurice G., et al. *Kendall's Advanced Theory of Statistics*. 6th ed. New York: Halstead Press, 1994-

The three-volume set covers: distribution theory; classical inference and relationship; and Bayesian inference. A compendium which is a must in every engineer's and statistician's library. Sir Maurice Kendall was one of the giants in the fields of applied and theoretical statistics.

Kennedy, John B., and Adam M. Neville. *Basic Statistical Methods for Engineers and Scientists.* 3rd ed. New York: Harper & Row, 1986.

This book is a useful source to satisfy the needs of engineers and scientists who need statistics but not necessarily the full treatment of the underlying mathematical theory.

Lapin, Lawrence L. *Probability and Statistics for Modern Engineering.* 2nd ed. Boston: PWS-Kent, 1990.

The aim of this book is to make it easier for engineering students to assimilate probability and statistics. All examples and problems are specifically geared toward the needs of engineering students.

Larson, Harold J., and Shubert Bruno O. *Probabilistic Models in Engineering Sciences.* New York: Wiley, 1979.

A two-volume set which remains a useful source of information on applied probability. It provides an introduction to applied probability theory and deals with further topics in the theory and applications of stochastic processes.

Leemis, Lawrence M. *Reliability: Probabilistic Models and Statistical Methods*. Englewood Cliffs, NJ: Prentice-Hall, 1995.

As the title of this source implies, this reference provides engineers with data and tables of statistical methods in reliability. It discusses statistical methods for engineering mechanics, structural engineering, and geotechnical engineering.

Lewis, Peter A. W., and E. J. Orav. *Simulation Methodology for Statisticians, Operations Analysts, and Engineers*. Pacific Grove, CA: Wadsworth & Brooks/Cole, 1989-

Mathematical statistics and computer simulations as applied to engineering and operations research are well illustrated in this basic tool. Bibliographies and indexes are included.

Little, Robert E. *Probability and Statistics for Engineers.* Champaign, IL: Matrix Publishers, 1978.

This basic classic text was written for engineers and engineering students with no previous experience in probability and statistics. With basic concepts, it guides the reader progressively to more advanced work.

Lyon, Richard H., and Richard G.DeJong. *Theory and Application of Statistical Energy Analysis*. 2nd ed. Boston: Butterworth-Heinemann, 1995.

Sponsored by the Massachusetts Institute of Technology, this source provides the engineer with statistical models for energy analysis. All engineers who deal with the provision of energy in any of its forms will find this to be a helpful source.

Mann, Lawrence, Jr. *Applied Engineering Statistics for Practicing Engineers.* New York: Barnes & Noble, 1970.

Another basic source for engineers who encounter practical problems in technical decision-making situations. Many examples, worked in detail, allow the engineer to solve these problems independently. This is especially helpful to the engineer whose curriculum did not include statistical methods.

Mason, Robert L., et al. *Statistical Design Analysis of Experiments with Applications to Engineering and Science*. New York: Wiley, 1989.

This is intended to be a practitioner's guide to statistical methods for designing and analyzing experiments. The intended audience consists of two groups: a broad spectrum of practicing engineers and scientists, and students in classes of statistical experimental design.

Mei, Chiang C. *Mathematical Analysis in Engineering: How to Use the Basic Tools*. New York: Cambridge University Press, 1995.

In conjunction with the Massachusetts Institute of Technology, this user-friendly text was

prepared to show how to use mathematics to formulate, solve, and analyze physical problems selected primarily from applied mechanics, a field central to many branches of engineering and applied sciences. Statistical analysis and methodology are widely discussed.

Mendenhall, William, and Terry Sincich. *Statistics for Engineering and the Sciences*. 4th ed. Englewood Cliffs, NJ: Prentice Hall, 1995.

This is intended to be an introductory text for students majoring in engineering. Inevitably, once they graduate, these students will be involved in the analysis of data and will be required to make inferences from their analyses. This source provides the basic concepts of statistical inference and familiarity with the statistical methods that they will use in their employment.

Messina, William S. *Statistical Quality Control for Manufacturing Managers.* New York: Wiley, 1987.

This book provides a scientific method for analyzing data. Statistical methods for quality control in manufacturing are the main focus.

Metcalfe, A. V. *Statistics in Engineering: A Practical Approach.* New York: Chapman & Hall, 1994.

This basic source provides the statistical methods needed by the practicing engineer. It includes tables, charts, and solutions to specific problems in the different engineering disciplines.

Mezei, Louis M. *Practical Spreadsheet Statistics and Curve Fitting for Scientists and Engineers.* Englewood Cliffs, NJ: Prentice Hall, 1990.

Here is an exciting alternative to expensive scientific software designed to assist laboratory scientists and engineers using Lotus 1-2-3, Symphony, or other spreadsheets. It demonstrates how to apply statistical methods to data already captured in the spreadsheet, with particular emphasis on the unique problems involved in high technology research. Among highlighted features are statistical characterizations and distribution analyses.

Miller, Irwin, John E. Freund, and Richard A. Johnson. *Probability and Statistics for Engineers.* 4th ed. Englewood Cliffs, NJ: Prentice-Hall, 1990.

This is intended for engineers and engineering students who have had no previous work in probability and statistics. The focus is on the basic concepts. The background knowledge attained here will permit the reader to progress rapidly to more advanced work.

Milton, J. Susan, and Jesse C. Arnold. *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences*. New York: McGraw-Hill, 1993.

A wide range of engineering statistical problems are made easy with computer applications. This is a valuable source for the engineer who possesses some personal computer skills.

Montgomery, Douglas C., and George Runger. *Probability and Statistics for Engineers.* New York: Wiley, 1993.

A probability and statistics text for engineers that was written by engineers, this book contains all the unique problem sets which reflect the types of situations engineers encounter in their working lives. It provides a practical, applied approach that is less mathematical and more oriented to engineers in all disciplines than any other text published.

Nash, Franklin R. *Estimating Device Reliability: Assessment of Credibility.* Boston: Kluwer, 1993.

Statistical models which are illustrated in this book provide the plausibility of reliability estimates used for statistical predictions. Flawed reliability methodologies can produce disastrous results, like the catastrophic failure of the space shuttle Challenger. The issue is not whether, but which, statistical models and methods should be used. This book is for engineers who are obliged to make reliability calculations with little or somewhat corrupt data.

Neter, John, et al, eds. *Applied Linear Statistical Models.* 4th ed. Chicago: Irwin Professional Pub., 1996.

This source demonstrates the successful applications of linear statistical models for regression, analysis of variance and experimental designs. It seeks to blend theory and applications effectively by explaining the underlying theory followed by practical problems.

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Ochi, Michel K. *Applied Probability and Stochastic Processes in Engineering and Physical Sciences.* New York: Wiley, 1990.

This is a useful text for graduate and undergraduate students and all who are interested in applied probability and statistics. It covers random variables and their distributions, discrete functions, Markov chains, queues, martingales, and other methods in probability and statistics.

Penny, J.E.T. and G. Lindfield. *Numerical Methods Using MATLAB.* New York: Ellis Horwood, 1995.

This is an innovative and exciting text which approaches the difficult area of numerical methods using the software package *MATLAB*, which provides a natural and succinct way of implementing numerical algorithms. *MATLAB* functions are applied to many areas of engineering statistics. Applications are illustrated using the *MATLAB* graphical facilities. Thus, the book provides a valuable guide to understanding and applying numerical methods. Many exercises and examples are given together with solutions.

Rao, S. S. *Engineering Optimization: Theory and Practice*. 3rd. ed. New York: Wiley, 1996.

This text provides information on mathematical models and optimizations which are useful for engineers. It is a good introductory course for undergraduate engineering and mathematics students.

Ross, Sheldon M. *Introduction to Probability and Statistics for Engineers and Scientists.* New York: Wiley, 1987.

This is an introductory text with basic statistical information for engineers and scientists as well as graduate and undergraduate students. Charts and tables illustrate probability methods and

random processes.

Ryan, Thomas P. *Statistical Methods for Quality Improvement*. New York: Wiley, 1989.

This book was written in recognition of the fact that quality improvement requires the use of more than just control charts. It provides insight into statistically designed experiments and the related topics.

Scheaffer, Richard L., and James T. McClave. *Probability and Statistics for Engineers*. 4th ed. Belmont, CA: Duxbury, 1995.

This text is a calculus-based introduction to probability and statistics with emphasis on techniques and applications that are useful in engineering and the physical and biological sciences. The notion of probabilistic models for real phenomena is emphasized throughout the text. The book contains many examples.

Schwabe, Rainer. *Optimum Designs for Multi-Factor Models.* (Lecture Notes in Statistics, 113.) New York: Springer-Verlag, 1996.

In real applications most experimental situations are influenced by a large number of different factors. In these settings the design of an experiment leads to challenging optimization problems. Based on recent research, this volume introduces the theory of optimum designs for complex models. Familiarity with the statistical theory of linear models is desirable but not necessary.

Shammas, Namir Clement. *C/C++ Mathematical algorithms for Scientists and Engineers.* New York: McGraw-Hill, 1995.

The applications of data processing to mathematical statistics and numerical analysis are illustrated in this book. As the title indicates, C/C++ computer program language is used.

Siddall, James N. *Probabilistic Engineering Design: Principles and Applications.* (Mechanical Engineering Series vol.23.) New York: Marcel Dekker, 1993.

This invaluable companion to the author's *Optimal Engineering Design: Principles and Applications* (New York: Dekker, 1982) provides all the tools necessary for applying probability and statistical theories directly to design. It is a computer-oriented single-source reference in this field written specifically for engineers.

Stark, Henry, and John W. Woods. *Probability, Random Processes, and Estimation Theory for Engineers*. 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1994.

Software programs accompany this text on probability and random processes.

Sundararajan, C. (Raj), ed. *Probabilistic Structural Mechanics Handbook: Theory and Industrial Applications.* New York: Chapman & Hall, 1995.

This volume offers the most comprehensive coverage of probabilistic structural mechanics available. A vast array of analytical and computational methods for structural stability are explained in depth, and their applications are described using concrete examples.

Tanner, Martin Abba. *Tools for Statistical Inference: Methods for the Exploration of Posterior Distributions and Likelihood Functions.* 3rd ed. New York: Springer-Verlag, 1996.

In this book the Bayesian statistical decision theory is illustrated using graphs, tables and examples. Graduate students will find this a useful and easy text.

Tobias, Paul A. *Applied Reliability.* 2nd ed. New York: Van Nostrand Reinhold, 1995.

Statistical quality control and reliability methods are discussed in this updated basic source. Tables and charts are used to demonstrate functions and illustrate problems and solutions.

Vardeman, Stephen B. *Statistics for Engineering Problem Solving*. Boston: PWS Publishing, 1994.

An interesting, useful, and well written book with a practical orientation. An appealing feature is the introduction of statistical concepts for engineering problems exclusively through examples involving real data and real scenarios. It is a problem solving handbook. Using graphs, tables, and charts, it guides the user through specific problems with corresponding solutions.

Venables, W. N., and B. D. Ripley. *Modern Applied Statistics with S-Plus*. New York: Springer-Verlag, 1995.

This book covers the basics in statistics and computing. It is a valuable source for computer scientists and engineers of all disciplines who need to use applied statistics.

Wadsworth, Harrison M., Jr., ed. *Statistical Methods for Engineers and Scientists*. New York: McGraw-Hill, 1990.

Regardless of their specialty or level of statistics knowledge, engineering professionals who need to make sense of data will find this handbook valuable. No prior knowledge of statistics is needed to use this handbook. The concepts are presented in such a way that persons trained in any quantitative field can understand them. Each concept is immediately followed by a real-life example for its use.

Walden, Andrew T., and Peter Guttorp, eds. *Statistics in the Environmental and Earth Sciences.* London: E. Arnold, 1992.

Statistical techniques for environmental monitoring, earthquake prediction, acid rain, oil, gas and mineral exploration, and other environmental issues have gained worldwide interest. This source provides a main source of statistical information for both practicing engineers and academics.

Conference Proceedings

Webster defines **Proceedings** as the "official record or account of (as in a book of minutes) of things said or done as at a meeting or convention of a society." Therefore, conference proceedings can be among the most timely and detailed sources of technical information. Often they can be more important than the journal literature. They appear in many different forms: special issues of journals, books in a series, monographs, or individually printed papers. Conference proceedings can be difficult for libraries to locate and acquire. Most, however, are indexed in commonly available indexes, abstracts, and databases such as Mathematical Reviews, Engineering Index/COMPENDEX, or Science Citation Index. Proceedings and copies of papers presented can often be obtained from the sponsoring societies. Some may be located on the internet. The following are selected conference proceedings which provide statistical information for engineers.

American Statistical Association. *Proceedings of the Section on Physical and Engineering Sciences.* Washington, D.C.: The Association, 19??, annual.

A listing of conference proceedings and reports of symposia in the field of Statistics. It includes national and international conferences and specifies which engineering discipline is the major topic, e.g., "International Conference on Applications of Statistics and Probabilities to Soil and Structural Engineering--Statistics and Probability in Civil Engineering: Proceedings."

COMPSTAT: Proceedings in Computational Statistics. New York: Physica-Verlag, 1974-, biennial.

This conference deals with mathematical statistics and electronic data processing.

Chaos and Statistical Methods. New York: Springer-Verlag, 1984.

These proceedings of the Sixth Kyoto Summer Institute focus on the chaotic behavior in systems and on statistical mechanics.

Combinatorics, Representation Theory, and Statistical Methods in Groups. (Lecture Notes in Pure and Applied Mathematics, no.57). New York: Marcel Dekker, 1980.

Also entitled the Young Day Proceedings, these papers include information on theory of groups and mathematical statistics.

Complex Stochastic Systems and Engineering. New York: Oxford University Press, 1995.

Sponsored by the Institute of Mathematics and its Applications and the Royal Statistical Society, this conference was held at the University of Leeds in 1993. The proceedings outline the statistical methods in chaotic behavior in systems, image processing, telecommunications, and stochastic analysis.

Computational Aeronautical Fluid Dynamics. (The Institute of Mathematics and its Applications Conference Series, n.s. no.44.) New York: Oxford University Press, 1994. The proceedings

focus on the statistical methods in fluid dynamics and space technology. The conference was held in Antibes in 1989.

Computational Statistics. Heidelberg: Physica-Verlag, 1994.

This 25th Conference on Statistical Computing includes papers on the data processing of mathematical statistics. It was held at Schloss Reisenburg in 1994.

Computational Stochastic Mechanics. Brookfield, VT: A.A. Balkema, 1995.

Proceedings of this international conference are a collection of papers on statistical mechanics and processes.

ECCOMAS Conference on Numerical Methods in Engineering. Chichester, England; New York: Wiley, 1996.

Proceedings of the second ECCOMAS, held in Paris, France.

European Conference on Mathematics in Industry. Stuttgart: B.G. Teubner, 1985- , annual.

Earlier title *European Symposium on Mathematics in Industry.*

International Modal Analysis Conference: IMAC. Bethel, CT: Society for Experimental Mechanics, 1982-, annual.

More progress has been made in modal analysis technology in the past decade than in all of its previous history. These proceedings provide the latest theories, research activities and practical computer applications of modal analytical methods to seek solutions that fit structural integrity problems.

International Working Conference on Scientific and Statistical Database Management. Los Alamitos, CA: IEEE Computer Society Press, 1982-, biennial.

The proceedings of these conferences include information on databases of mathematical statistics.

International Workshop on Maximum Entropy and Bayesian Methods. Boston: Kluwer Academic, 198?- .

The proceedings of these conferences focus on the Bayesian statistical decision theory and on entropy in information theory. The 15th Workshop was held in 1995.

Proceedings of the First US/Japan Conference on the Frontiers of Statistical Modeling: An Informational Approach. Dordrecht; Boston: Kluwer Academic Publishers, 1994.

The major theme of this conference was the implementation of statistical modeling with a practical, informational approach to complex, real-world problems. This three-volume work is useful to engineers and scientists whose work involves statistics. Vol. one deals with theory and methodology of time series analysis. Vol. two covers multivariate statistical modeling. Vol. three deals with engineering and scientific applications.

Specialty Conference on Probabilistic Mechanics and Structural Reliability. New York: American Society of Civil Engineers, 1979-, irregular.

This conference focuses on Bayesian statistics, engineering reliability, and statistical methods in structural dynamics and stability. The 7th conference was held in 1996.

Stochastic Approaches in Earthquake Engineering. (Lecture Notes in Engineering, no. 32). New York: Springer-Verlag, 1987.

These proceedings are a collection of papers presented at the U.S./Japan Joint Seminar. Civil and mechanical engineers as well as seismologists and geologists will find these proceedings to contain a wealth of information on this subject.

Stochastic Hydrology and its Use in Water Resources Systems Simulation and Optimization. (NATO ASI Series E: Applied Sciences, v. 237). Dordrecht; Boston: Kluwer, 1993.

The main objective of this conference was to discuss the state of the art stochastic statistical methods and techniques for hydrological data analysis, data generation and forecasting which are used in the simulation and optimization of water resources systems. These proceedings are an invaluable source of information for the environmental engineer.

Stochastic Models, Statistical Methods, and Algorithms in Image Analysis. (Lecture Notes in Statistic, no. 74). New York: Springer-Verlag, 1992.

Proceedings of the Special Year on Image Analysis, these represent papers on stochastic processes and statistical methods for image processing.

Time Series Prediction: Forecasting the Future and Understanding the Past: Proceedings of the NATO Advanced Research Workshop on Comparative Time Series Analysis. New York: Addison-Wesley, 1994.

This conference is volume 15 of the Santa Fe Institute studies in the sciences of complexity. Conference proceedings multiply each year and it may be difficult to locate them. The following is a list of commonly available basic indexes which provide the information necessary in order to locate these primary publications.

Directory of Published Proceedings. Series SEMT - Science/Engineering/ Medicine/ Technology. Harrison, NY: InterDok, 1965-

A bibliography citing preprints and published proceedings of congresses, conferences, summer schools, symposia, meetings,and seminars that have taken place worldwide. Published in 10 issues a year, with a cumulative index and supplement.

**Index to Scientific & Technical Proceedings.* Philadelphia, PA: Institute for Scientific Information, Inc., 1978-. [Electronic version: ISI: CD-ROM, 1994-.]

ISTP was created to help librarians and researchers locate and acquire proceedings. It is the only multidisciplinary reference tool specifically for the published conference literature which

provides easy access to proceedings and to the papers which appear in them.

*Proceedings in Print***.** Halifax, MA: Proceedings in Print, Inc., 1964-.

This bi-monthly publication is an index to conference proceedings in all subject areas and in all languages. Entries are listed alphabetically for easy identification.

World Meetings: Outside United States and Canada. New York: Macmillan, 1968-.

A two-year registry of all important future medical, scientific, and technical meetings to be held outside the United States and Canada. It is published, revised, and updated quarterly.

World Meetings: United States and Canada. New York: Macmillan, 1967- .

A two-year registry of all important future medical, scientific, and technical meetings to be held in the United States and Canada. It is published, revised and updated quarterly.

Journals and periodicals, like symposia and conference proceedings, are considered to be primary tools to locate scientific and technical information. A number of these journals are now published in an electronic format. More will be electronically transmitted as technology improves and access to these is made more widely available. Engineers are advised to investigate this availability in their environment. Following are titles of the basic journals and periodicals which focus on the latest in research on statistical information for the engineer.

American Journal of Mathematics. Baltimore, MD: Johns Hopkins University Press, bimonthly, 1878- .

American Mathematical Monthly. Washington, D.C.: Mathematical Association of America, 10/yr., 1894- .

American Statistician. Alexandria, VA: American Statistical Association, quarterly, 1947- .

The Annals of Applied Probability: An Official Journal of the Institute of Mathematical Statistics. Hayward, CA: The Institute, quarterly, 1991- .

The Annals of Probability. Hayward, CA: Institute of Mathematical Statistics, bimonthly, 1973-1981, quarterly, 1982- .

The Annals of Statistics. Hayward, CA: Institute of Mathematical Statistics, bimonthly, 1973-1981, quarterly, 1982- .

Applied Mathematics and Computation. New York: Elsevier, monthly, 1975- .

Applied Statistics. Oxford: Royal Statistical Society, quarterly, 1952- .
Alt. title: *Journal of the Royal Statistical Society, Series C.*

Bulletin of Informatics and Cybernetics. Research Association of Statistical Sciences. Fukuoka, Japan: The Association, annual, 1982- .

Communicational Statistics and Data Analysis. Amsterdam: North Holland, quarterly, 1983-.

Communications in Numerical Methods in Engineering (CNME). New York: Wiley, monthly, 1994- . Previous titles: *Communications in Applied Numerical Methods,* 1985-93; *International Journal for Numerical Methods in Engineering*, 1969-84.

Communications in Statistics: Simulation and Computation. New York: Marcel Dekker, frequency

varies, 1976- .

Communications in Statistics: Stochastic Models. New York: Marcel Dekker, 3/yr., 1985- .

Communications in Statistics: Theory and Methods. New York: Marcel Dekker, 15/yr, 1976- .

Computational Statistics and Data Analysis. Amsterdam: North Holland, quarterly, 1976- .

International Statistical Review. Edinburgh: Longman, for International Statistical Institute, 3/yr, 1933- .

Journal of Applied Mathematics and Stochastic Analysis. Melbourne, FL: Society of Applied Mathematics, Modeling, and Simulation, quarterly, 1990- .

Journal of Applied Probability. London: Applied Probability Trust, quarterly, 1964- .

Journal of Applied Statistics. Abington, England: Carfax, bimonthly, 1984- .

Journal of Computational and Graphical Statistics: *A Joint Publication of American Statistical Association and Institute of Mathematical Statistics.* Alexandria, VA: The Association, quarterly, 1992- .

Journal of Statistical Planning and Inference. Amsterdam, North-Holland, quarterly, 1977- .

Methods and Applications of Analysis. Cambridge, MA: International Press, quarterly, 1994- .

Probabilistic Engineering Mechanics. Berking, England: Elsevier Computational Mechanics Publications, quarterly, 1986- .

Probability in the Engineering and Informational Sciences. New York: Cambridge University Press, quarterly, 1987- .

SIAM Journal on Applied Mathematics. Philadelphia, PA: Society for Industrial and Applied Mathematics, bimonthly, 1966- .

SIAM Journal on Mathematical Analysis. Philadelphia, PA: Society for Industrial and Applied Mathematics, bimonthly, 1964- . Alt. title: *SIAM Journal on Numerical Analysis*.

SIAM Journal on Scientific Computing. Philadelphia, PA: Society for Industrial and Applied Mathematics, bimonthly, 1993- .

Statistical Science: A Review Journal of the Institute of Mathematical Statistics. Hayward, CA: The

Institute, quarterly, 1986- .

The Statistician. Oxford, England: Institute of Statisticians, 5/yr, 1950- .

Statistics and Probability Letters. Amsterdam: North Holland, quarterly, 1950- .

Technometrics: A Journal of Statistics for the Physical, Chemical and Engineering Sciences. Rochester, NY: American Society for Quality Control, quarterly, 1959- .

Theory of Probability and Mathematical Statistics. Providence, RI: American Mathematical Society, semiannual, 1974- .

Appendix

I. ONLINE VENDOR INFORMATION

Because there are changes in the licensing arrangements made by database content owners for online and CD-ROM distribution of their wares, it is recommended that users refer to current directories of electronic vendors. Two of these directories are:

Gale Directory of Databases. Detroit: Gale Research, 1993- .

Available electronically through the online services: Data-Star, ORBIT Search Service, and Quest.

The CD-ROM Directory (with multimedia CD's) London: TFPL, 1986-

A new edition of this directory is published every 6 months on CD-ROM, and once per year as a book.

II. STATISTICAL SOFTWARE

An ever-increasing number of commercial statistical packages can be purchased. The *Journal Computational Statistics and Data Analysis* publishes a *Statistical Software Newsletter*, which includes listings of statistical workshops and a biennial *Statistical Software Guide.* The largest and most comprehensive commercial software system is the *Statistical Analysis System* or *SAS*. Also available is *SYSTAT*, a useful package of analysis and graphical tools.

Guide to Available Mathematical Software (GAMS).
URL:http://gams.nist.gov

This internet site is a cross index of over 5000 software modules in both public and commercial packages according to a comprehensive taxonomy of mathematical and statistical problems. The index may be searched by type of problem, package name, module name, or text words in the abstracts. Other useful links may also be found at this site.