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文 献 紹 介 (2)

前号に引きつづいて，ACM の Curriculum 68 の中級コースの関連文献を掲げる。用語，訳語等については，20号 p 37参照。(教育広報専門委員会)

2. 中級コース

I 1. データ構造

Although a great deal of material is available in this area, very little of it is appropriate for classroom use.

1. Association for Computing Machinery. ACM sort symposium, Nov. 29–30, 1962, Princeton, N. J. *Comm. ACM 6,* 5 (May 1963), 194–272.
   Seventeen papers on various aspects of sorting.
2. Association for Computing Machinery. Papers presented at the ACM Storage Allocation Symposium, June 23–24. 1961, Princeton, N. J. *Comm. ACM 4,* 10 (Oct. 1961), 416–464.
   Eleven papers on various techniques of storage allocation.
3. Association for Computing Machinery. Proceedings of the ACM Symposium on Symbolic and Algebraic Manipulation, Washington, D. C., Mar. 29–31, 1966. *Comm. ACM 9,* 8 (Aug. 1966), 547–643.
   Eleven papers some of which discuss applications of data structuring techniques. One paper by Knowlton describes the list language L^6
4. CLIMENSON, W. D. File organization and search techniques. In C. A. Cuadra (Ed.), *Annual Review of Information Science and Technology, Vol. 1,* (Amer. Doc. Inst., Ann. Rev. ser.), Interscience, New York, 1966, pp. 107–135. CR-6783-11,900.
   Surveys file organizations and data structures with particular emphasis on developments during 1965. Provides framework for some of the material covered by this course. An extensive bibliography.
5. COHEN, J. A use of fast and slow memories in list-processing languages. *Comm. ACM 10,* 2 (Feb. 1967), 82–86.
   Describes a paging scheme which keeps the "most often called pages in the fast memory" and involves a show down of 3 to 10 as compared with in-core operations.
6. Control Data Corporation. *3600/3800 INFOL Reference Manual.* Publication No. 60170300, CDC, Palo Alto, Calif., July 1966.
   Describes the *INFormation Oriented Language* which is designed for information storage and retrieval applications.
7. DAHL, O.-J., AND NYGAARD, K. SIMULA–an ALGOL-based simulation language. *Comm. ACM 9,* 9 (Sept. 1966), 671–678.
   Contains interesting data and control structures.

8. D'IMPERIO, M. Data structures and their representation in storage. In M. Halpern (Ed.), *Annual Review in Automatic Programming, Vol. 5,* Pergamon Press, New York, spring 1968.
Defines certain basic concepts involved in the representation of data and processes to be performed on data. Analyzes a problem and describes nine different solutions involving different data structures. Discusses ten list processing languages and gives examples of their data and storage structures.
9. FITZWATER, D. R. A storage allocation and reference structure. *Comm. ACM 7,* 9 (Sept. 1964), 542–545. CR-6561-6933.
Describes a method of structuring and referencing dynamic structures in AUTOCODER for the IBM 7070/72/74.
10. General Electric Company. *Integrated Data Store–A New Concept in Data Management.* Application Manual AS-CPB-483A, Revision of 7-67, GE Computer Division, Phoenix, Ariz., 1967.
Describes a sophisticated data management system which uses paging and chaining to develop complex data structures.
11. GRAY, J. C. Compound data structures for computer-aided design: a survey. Proc. ACM 22nd Nat. Conf., 1967, Thompson Book Co., Washington, D. C., pp. 355–365.
Considers requirements of a data structure software package and surveys a number of such packages.
12. HELLERMAN, H. Addressing multidimensional arrays. *Comm. ACM 5,* 4 (Apr. 1962), 205–207. CR-6235-2619.
Surveys direct and indirect methods for accessing arrays.
13. IVERSON, K. E. *A Programming Language.* Wiley, New York, 1962, 286 pp. CR-6671-9004.
Contains considerable material on data structures, graphs, trees, and sorting, as well as a language for describing these.
14. KLEIN, M. M. Scheduling project networks. *Comm. ACM 10,* 4 (Apr. 1967), 225–234. CR-6784-12,275.
Discusses project networking and describes the C-E-I-R critical path algorithm.
15. KNUTH, D. E. *The Art of Computer Programming, Vol. 1, Fundamental Algorithms.* Addison-Wesley, Reading, Mass., 1968, 634 pp.
Chap. 2 on "Information Structures" contains the first comprehensive classification of data structures to be published. Each structure considered is carefully motivated and generously illustrated. Includes a brief history of data structuring and an annotated bibliography.
16. LANDIN, P. J. The mechanical evaluation of expressions. *Comput. J. 6,* 4 (Jan. 1964), 308–320. CR-6456-6677.
Presents a mathematical language based on Church's λ-notation and uses it to describe computational structures such as expressions and lists.
17. LAWSON, H. W., JR. PL/I list processing. *Comm. ACM 10,* 6 (June 1967), 358–367.
Discusses the list processing facilities in PL/I.

18. MADNICK, S. E. String processing techniques. *Comm. ACM 10,* 7 (July 1967), 420–424.
Presents and evaluates six techniques for string data storage structures. One of these techniques is used for an implementation of SNOBOL on an IBM System/360.
19. MARRON, B. A., AND DE MAINE, P. A. D. Automatic data compression. *Comm. ACM 10,* 11 (Nov. 1967), 711–715.
Describes a three-part compressor which can be used on "any" body of information to reduce slow external storage requirements and to increase the rate of information transmission through a computer.
20. MEALY, G. H. Another look at data. Proc. AFIPS 1967 Fall Joint Comput, Conf., Vol. 31, Thompson Book Co., Washington, D. C., pp. 525–534.
Sketches a theory of data based on relations. Includes some rather precise definitions of concepts such as data structure, list processing, and representation.
21. MINKER, J., AND SABLE, J. File organization and data management. In C. A. Cuadra (Ed.), *Annual Review of Information Science and Technology, Vol. 2,* (Amer. Doc. Inst., Ann. Rev. ser.). Interscience, New York, 1967, pp. 123–160.
Surveys file organizations and generalized data management systems developed during 1966. Describes linkage types, data structures, storage structures, and how data structures have been mapped into storage structures. Extensive bibliography.
22. MORRIS, R. Scatter storage techniques. *Comm. ACM 11,* 1 (Jan. 1968), 38–44.
Surveys hashing schemes for symbol table algorithms.
23. ROSEN, S. (Ed.) *Programming Languages and Systems.* McGraw-Hill, New York, 1967, 734 pp.
Part 4 of this collection contains papers on IPL-V, COMIT, SLIP, SNOBOL, LISP and a comparison of list-processing computer languages.
24. ROSS, D. T. The AED free storage package. *Comm. ACM 10,* 8 (Aug. 1967), 481–492.
Describes a storage allocation and management system for the mixed n-component elements ("beads") needed for "plex programming."
25. SALTON, G. Data manipulation and programming problems in automatic information retrieval. *Comm. ACM 9,* 3 (Mar. 1966), 204–210. CR-6674-10,078.
Describes a variety of representations for tree structured data and examines their usefulness in retrieval applications.
26. SAVITT, D. A., LOVE, H. H., JR., AND TROOP, R. E. ASP: a new concept in language and machine organization. Proc. 1967 Spring Joint Comput. Conf., Vol. 30, Thompson Book Co., Washington, D. C., pp. 87–102.
Describes the data bases used in the "Association-Storing Processor." These structures are complex in organization and may vary dynamically in both organization and content.
27. SCHORR, H., AND WAITE, W. M. An efficient machine-independent procedure for garbage collection in various list structures. *Comm. ACM 10,* 8 (Aug. 1967), 501–506.
Reviews and compares past garbage collection methods and presents a new algorithm.

28. STANDISH, T. A. A data definition facility for programming languages, Ph.D. Thesis, Carnegie Institute of Technology, Pittsburgh, Pa., 1967.
Presents a descriptive notation for data structures which is embedded in a programming language.
29. WEGNER, P. (Ed.) *Introduction to Systems Programming.* Academic Press, New York, 1965, 316 pp. CR-6455-6300.
Contains a collection of papers of which the following are of special interest for this course: Iliffe, pp. 256–275; Jenkins, pp. 283–293; and Burge, pp. 294–312.
30. WEGNER, P. *Programming Languages, Information Structures, and Machine Organization.* McGraw-Hill, New York, 1968, about 410 pp.
Introduces information structures and uses them in describing computer organization and programming languages.

I 2. プログラミング言語

1. American Standards Association X3.4.1 Working Group. Toward better documentation of programming languages. *Comm. ACM 6,* 3 (Mar. 1963), 76–92.
A series of papers describing the documentation of significant current programming languages.
2. Association for Computing Machinery. Proceedings of the ACM programming languages and pragmatics conference, San Dimas, Calif., August 8–12, 1965. *Comm. ACM 9,* 3 (Mar. 1966), 137–232.
Includes a number of papers applicable to this course.
3. Association for Computing Machinery. Proceedings of the ACM symposium on symbolic and algebraic manipulation, Washington, D. C., March 29–31, 1966. *Comm. ACM 9,* 8 (Aug. 1966), 547–643.
A number of languages for symbolic and algebraic manipulation are described in this special issue.
4. DAHL, O.-J., AND NYGAARD, K. SIMULA–an ALGOL-based simulation language. *Comm. ACM 9,* 9 (Sept. 1966), 671–678.
Describes a language encompassing ALGOL, but having many additional features including those needed for simulation.
5. GALLER, B. A., AND PERLIS, A. J. A proposal for definitions in ALGOL. *Comm. ACM 10,* 4 (Apr. 1967), 204–219.
Describes a generalization of ALGOL which allows new data types and operators to be declared.
6. GOODMAN, R. (Ed.) *Annual Review in Automatic Programming, Vols. 1, 2, 3, 4.* Pergamon Press, New York, 1960 to 1965. CR-6123-0811, CR-6235-2602, and CR-6564-7901.
These volumes contain several papers which are applicable to this course.
7. HALSTEAD, M. H. *Machine-Independent Computer Programming.* Spartan Books, New York, 1962.
Contains both internal and external specifications of the NELIAC programming language.

8. IEEE Computer Group. The special issue on computer languages. *IEEE Trans. EC-13,* 4 (Aug. 1964), 343–462.
Contains articles on ALGOL, FORTRAN, FORMAC, SOL and other computer languages.
9. International Business Machines. PL/I Language Specification. Form C28-6571-4, IBM System/360 Operating System, IBM Corporation, White Plains, N. Y., 1967.
A specification of the PL/I language.
10. International Standards Organization Technical Committee 97, Subcommittee 5. Survey of programming languages and processor. *Comm. ACM 6,* 3 (Mar. 1963), 93–99.
An international survey of current and imminent programming languages.
11. KNUTH, D. E. The remaining trouble spots in ALGOL 60. *Comm. ACM 10,* 10 (Oct. 1967), 611–618.
This paper lists the ambiguities which remain in ALGOL 60 and which have been noticed since the publication of the Revised ALGOL 60 Report in 1963.
12. MARKOWITZ, H. M., KARR, H. W., AND HAUSNER, B. *SIMSCRIPT: A Simulation Programming Language.* Prentice-Hall, Englewood Cliffs, N. J., 1963, 138 pp.
A description of the SIMSCRIPT simulation language. There is a new SIMSCRIPT 1.5 supplement now available which describes a generalization of the original language.
13. MOOERS, C. N. TRAC, a procedure-describing language for the reactive typewriter. *Comm. ACM 9,* 3 (Mar. 1966), 215–219. CR-6674-10,079.
Describes a language for the manipulation of text from an online typewriter.
14. NAUR, P. (Ed.) Revised report on the algorithmic language, ALGOL 60. *Comm. ACM 6,* 1 (Jan. 1963), 1–17. CR-6016-0323.
The Backus normal form notation was developed to help describe the syntax of ALGOL in the original version of this report (*Comm. ACM 3,* 5 (May 1960), 299–314).
15. PERLIS, A. J. The synthesis of algorithmic systems–first annual A. M. Turing lecture. *J. ACM 14,* 1 (Jan. 1967), 1–9. CR-6782-11,512.
A stimulating talk on the nature of programming languages and the considerations which should underlie their future development.
16. ROSEN, S. (Ed.) *Programming Systems and Languages.* McGraw-Hill, New York, 1967, 734 pp.
This collection of papers contains many of the important references for this course. In particular, Parts 1 and 2 of the collection are useful for Parts A and B of the course and Part 4 of the collection is useful for Part C of the course.
17. SHAW, C. J. A comparative evaluation of JOVIAL and FORTRAN IV. *Automatic Programming Inf., No. 22.* Technical College, Brighton, England, Aug. 1964, 15 pp. CR-6562-7265.
A descriptive point-by-point comparison of these two languages. Concerned mainly with the features of the languages rather than their processors.
18. SHAW, C. J. A programmer's look at JOVIAL, in an ALGOL perspective. *Datamation 7,* 10 (Oct. 1961), 46–50. CR-6233-1933.
An interesting article showing how ALGOL and JOVIAL evolved from ALGOL 58 and how they differ.

19. USA Standards Institute. Standards X3.9-1966, FORTRAN and X3.10-1966, Basic FORTRAN. USASI, 10 East 40th Street, New York, N. Y. 10016, 1966.
Standard definitions of essentially FORTRAN II and FORTRAN IV. These also appeared in almost final form in *Comm. ACM 7,* 10 (Oct. 1964), 591–625.
20. WEGNER, P. *Programming Languages, Information Structures, and Machine Organization.* McGraw-Hill, New York, 1968, about 410 pp.
Develops a unified approach to the study of programming languages emphasizing the treatment of such languages as information structures. First two chapters devoted to machine organization, machine language, and assembly language, but much of Chap. 3 and essentially all of Chap. 4 devoted to the topics of this course.
21. WIRTH, N. A generalization of ALGOL. *Comm. ACM 6,* 9 (Sept. 1963), 547–554. CR-6451-5030.
Proposes a generalization of ALGOL which involves the elimination of "type" declarations and the replacement of procedure declarations by an assignment of a so-called "quotation."
22. WIRTH, N., AND WEBER, H. EULER–a generalization of ALGOL and its formal definition, Parts I and II. *Comm. ACM 9,* 1 (Jan. 1966), 13–23, and 2 (Feb. 1966), 89–99.
Develops a method for defining programming languages which introduces a rigorous relationship between structure and meaning. The structure of a language is defined by a phrase structure syntax and the meaning is defined in terms of the effects which the execution of a sequence of interpretation rules has upon a fixed set of variables called the "environment."

I 3. 計算機組織

As indicated, several of the books listed below might possibly be used as texts for this course, but it probably would be good to supplement any of them with additional material. Only a few of the many references on computer description languages and programs for simulating computer designs are listed; no annotations are given for these.

General textbooks

1. BARTEE, T. C. *Digital Computer Fundamentals.* McGraw-Hill, New York, 1960, 1966, 401 pp. CR-6676-10,647.
Not advanced enough but a very useful supplement for circuits and equipment.
2. BARTEE, T. C., LEBOW, I. L., AND REED, I. S. *Theory and Design of Digital Systems.* McGraw-Hill, New York, 1962, 324 pp. CR-6344-4416.
Very mathematical and somewhat out-of-date. An interesting reference.
3. BRAUN, E. L. *Digital Computer Design–Logic, Circuitry, and Synthesis.* Academic Press, New York, 1963, 606 pp. CR-6453-5484.
Somewhat out-of-date for a text but useful as a reference.
4. BUCHHOLZ, W. *Planning a Computer System.* McGraw-Hill, New York, 1962, 336 pp. CR-6346-4786.
Good reference on systems concepts but somewhat dated.

5. Burroughs Corporation. *Digital Computer Principles.* McGraw-Hill, New York, 1962, 507 pp.
   Restricted scope (engineering oriented) and dated, but could be used as a reference.
6. CHU, Y. *Digital Computer Design Fundamentals.* McGraw-Hill, New York, 1962, 481 pp. CR-6343-4198.
   Good reference which contains a wealth of material on logic design.
7. FLORES, I. *Computer Logic.* Prentice-Hall, Englewood Cliffs, N. J., 1960, 458 pp. CR-6122-0641 and CR-6124-0936.
   Dated and unorthodox but possibly useful for supplementary reading.
8. FLORES, I. *The Logic of Computer Arithmetic.* Prentice-Hall, Englewood Cliffs, N. J., 1963, 493 pp. CR-6452-5458.
   Very detailed, unorthodox treatment of computer arithmetic.
9. GSCHWIND, H. W. *Design of Digital Computers.* Springer-Verlag, New York, 1967.
   A possible text.
10. HELLERMAN, H. *Digital Computer System Principles.* McGraw-Hill, New York, 1967, 424 pp.
    A possible text. Uses Iverson notation throughout. Would have to be supplemented on circuits and equipment as well as novel organizations.
11. MALEY, G. A., AND SKIKO, E. J. *Modern Digital Computers.* Prentice-Hall, Englewood Cliffs, N. J., 1964, 216 pp. CR-6561-7081.
    A possible reference. Somewhat dated but contains a good description of the IBM 7090 and 7080 machines.
12. MURTHA, J. C. Highly parallel information processing systems. In F. L. Alt (Ed.), *Advances in Computers, Vol. 7.* Academic Press, New York, 1966, pp. 1–116. CR-6782-11,678.
    A useful reference on highly parallel systems.
13. PHISTER, M., JR. *Logical Design of Digital Computers.* Wiley, New York, 1958, 408 pp.
    Somewhat dated. Relies heavily on sequential circuit theory and concentrates on serial, clocked machines.
14. RICHARDS, R. K. *Arithmetic Operations in Digital Computers.* D. Van Nostrand, Princeton, N. J., 1955, 397 pp.
    Somewhat dated but still a good reference for arithmetic.
15. RICHARDS, R. K. *Electtonic Digital Systems.* Wiley, New York, 1966, 637 pp. CR-6676-10,649.
    An interesting reference for reliability and design automation. Discusses telephone systems and data transmission.

References on computer description languages

16. CHU, Y. An ALGOL-Like computer design language. *Comm. ACM 8,* 10 (Oct. 1965), 607–615. CR-6672-9315.
17. FALKHOFF, A. D., IVERSON, K. E., AND SUSSENGUTH, E. H. A formal description of System/360. *IBM Syst. J. 3,* 3 (1964), 198–263.
18. GORMAN, D. F., AND ANDERSON, J. P. A logic design translator. Proc. AFIPS 1962 Fall Joint Comput. Conf., Vol. 22, Spartan Books, New York, pp. 251–261.
19. IVERSON, K. E. *A Programming Language.* Wiley, New York, 1962, 286 pp. CR-6671-9004.

20. McCLURE, R. M. A programming language for simulating digital systems. *J. ACM 12,* 1 (Jan. 1965), 14–22. CR-6563-7634.
21. PARNAS, D. L., AND DARRINGER, J. A. SODAS and a methodology for system design. Proc. AFIPS 1967 Fall Joint Comput. Conf., Vol. 31, Thompson Book Co., Washington, D. C., pp. 449–474.
22. WILBER, J. A. A language for describing digital computers. M.S. Thesis, Report No. 197, Dept. of Comput. Sci., U. of Illinois, Urbana, Ill., Feb. 15, 1966.

I 4. システム・プログラミング

In addition to the following sources of information, there are many manuals available from manufacturers which describe specific systems programs for a wide range of computers.

1. CHOROFAS, D. N. *Programming Systems for Electronic Computers.* Butterworths, London, 1962, 188 pp. CR-6566-8553.
   Chapters 14, 15, and 16 contain a general discourse on the control and diagnostic functions of operating systems.
2. CLARK W. A., MEALY, G. H., AND WITT, B. I. The functional structure of OS/360. *IBM Syst. J. 5,* 1 (1966), 3–51.
   A general description in three parts of the operating system for the IBM System/360. Part I (Mealy), Introductory Survey; Part II (Witt), Job and Task Management; and Part III (Clark), Data Management.
3. DESMONDE, W. H. *Real-Time Data Processing Systems. Introductory Concepts.* Prentice-Hall, Englewood Cliffs, N. J., 1964, 192 pp. CR-6562-7236.
   An elementary survey of the design and programming of real-time data processing systems based on three IBM systems: Sabre, Mercury, and Gemini.
4. ERDWINN, J. D. (Ch.) Executive control programs–Session 8. Proc. AFIPS 1967 Fall Joint Comput. Conf., Vol. 31, Thompson Book Co., Washington, D. C., pp. 201–254.
   Five papers on control programs for a variety of circumstances.
5. FISCHER, F. P., AND SWINDLE, G. G. *Computer Programming Systems.* Holt, Rinehart and Winston, New York, 1964, 643 pp. CR-6455-6299.
   Sets out to "discuss the entire field of computer programming systems," but in reality considers primarily the systems programs for the IBM 1401; "other computer systems are mentioned only where a particular characteristic of a programming system, found on that computer, warrants discussion." Only IBM computer systems and (with a very few exceptions) only IBM literature are referenced.
6. FLORES, I. *Computer Software.* Prentice-Hall, Englewood Cliffs, N. J., 1965, 464 pp. CR-6671-8995.
   Elementary and conversational text primarily concerned with assembly systems using FLAP (Flores Assembly Program) as its example. Some material on service programs, supervisors and loaders.

7. GLASER, E. (Ch.) A new remote accessed man-machine system–Session 6. Proc. AFIPS 1965 Fall Joint Comput. Conf., Vol. 27, Pt. I, Spartan Books, New York, pp. 185–241. (Reprints available from the General Electric Company.)
Six papers on the MULTICS system.
8. HEISTAND, R. E. An executive system implemented as a finite-state automaton. *Comm. ACM 7,* 11 (Nov. 1964), 669–677. CR-6562-7282.
Describes the executive system for the 473L command and control system. The system was considered as a finite automaton and the author claims this approach forced a modularity on the resulting program.
9. LEONARD, G. F., AND GOODROE, J. R. An environment for an operating system. Proc. ACM 19th Nat. Conf., 1964, Association for Computing Machinery, New York, pp. E2.3-1 to E2.3-11. CR-6561-6546.
An approach to computer utilization involving the extension of the operations of a computer with software so as to provide a proper environment for an operating system.
10. MARTIN, J. *Design of Real-Time Computer Systems.* Prentice-Hall, Englewood Cliffs, N. J., 1967, 629 pp.
A general text covering many aspects of real-time data processing systems including design, applications, management, and operation.
11. MARTIN, J. *Programming Real-Time Computer Systems.* Prentice-Hall, Englewood Cliffs, N. J., 1965, 386 pp.
Based on some of the early systems such as Sage, Project Mercury, Sabre, and Panamac. A general coverage designed for managers, systems analysts, programmers, salesmen, students.
12. MILLER, A. E. (Ch.) Analysis of time-shared computer system performance–Session 5. Proc. ACM 22nd Nat. Conf., 1967, Thompson Book Co., Washington, D. C., pp. 85–109.
Three papers on measurement of time-shared system performance.
13. M.I.T. Computation Center. *Compatible Time-Sharing System: A Programmer's Guide,* 2nd ed. M.I.T. Press, Cambridge, Mass., 1965.
A handbook on the use of CTSS which contains valuable information and guidelines on the implementation of such systems.
14. Project MAC. *MULTICS System Programmer's Manual.* Project MAC, M.I.T., Cambridge, Mass., 1967, (limited distribution).
A description of and guide to systems programming for MULTICS.
15. ROSEN, S. (Ed.) *Programming Systems and Languages.* McGraw-Hill, New York, 1967, 734 pp.
Collection of important papers in the area of which Part 5 (Operating Systems) is particularly relevant to this course.
16. ROSENBERG, A. M. (Ch.) Program structures for the multiprogramming environment–Session 6A. Proc. ACM 21st Nat. Conf., 1966, Thompson Book Co., Washington, D. C., pp. 223–239.
Two papers: one on program behavior under paging; the other on analytic design of look-ahead and program segmenting systems.
17. ROSENBERG, A. M. (Ch.) Time-sharing and on-line systems–Session 7. Proc. ACM 22nd Nat. Conf., 1967, Thompson Book Co., Washington, D. C., pp. 135–175.
Three papers on various topics related to the subject.

18. SALTZER, J. H. Traffic control in a multiplexed computer system. M.I.T. Ph.D. Thesis, June 1966. (Also available as Project MAC publication MAC-TR-30.)
On traffic control in the MULTICS system.
19. SMITH, J. W. (Ch.) Time-shared scheduling—Session 5A. Proc. ACM 21dt Nat. Conf., 1966, Thompson Book Co., Washington, D. C. pp. 139–177.
Four papers on time-sharing which are more general than the session title indicates.
20. THOMPSON, R. N., AND WILKINSON, J. A. The D825 automatic operating and scheduling program. Proc. AFIPS 1963 Spring Joint Comput. Conf., Vol. 23, Spartan Books, New York, pp. 41–49. CR-6453-5699.
A general description of an executive system program for handling a multiple computer system tied to an automatic input-output exchange containing a number of input-output control modules. Discusses many of the problems encountered in such systems and the general plan of attack in solving these problems.
21. WEGNER, P. (Ed.) *Introduction to System Programming.* Academic Press, New York, 1965, 316 pp. CR-6455-6300.
Contains a collection of papers of which the following are of special interest for this course: Gill, pp. 214–226; Howarth, pp. 227–238; and Nash, pp. 239–249.

I 5. コンパイラーの作成

1. ACM Compiler Symposium. Papers presented at the ACM Compiler Symposium, November 17–18, 1960, Washington, D. C., *Comm. ACM 4,* 1 (Jan. 1961), 3–84.
Contains a number of relevant papers including one by R. W. Floyd entitled "An Algorithm for Coding Efficient Arithmetic Operations" and one by P. Z. Ingerman on "Thunks."
2. ARDEN, B. W., GALLER, B. A., AND GRAHAM, R. M. An algorithm for translating Boolean expressions. *J. ACM 9,* 2 (Apr. 1962), 222–239. CR-6341-3567.
Description of code generation in the MAD Compiler.
3. BRINCH-HANSEN, P., AND HOUSE, R. The COBOL compiler for the Siemens 3003. *BIT 6,* 1 (1966), 1–23.
Describes the design of a ten-pass compiler with extensive error detection.
4. CHEATHAM, T. E., JR. The TGS-II translator generator system. Proc. IFIP Congress, New York, 1965, Vol. 2, Spartan Books, New York, pp. 592–593.
A report on the "current position" of Computer Associates "translator generator system."
5. CHEATHAM, T. E., JR. *The Theory and Construction of Compilers.* Document CA-6606-0111, Computer Associates, Inc., Wakefield, Mass., June 2, 1966, limited distribution.
Notes for course AM 295 at Harvard, fall 1967.
6. CHEATHAM, T. E., JR., AND SATTLEY, K. Syntax-directed compiling. Proc. AFIPS 1964 Spring Joint Comput. Conf., Vol. 25, Spartan Books, New York, pp. 31–57. CR-6455-6304.
An introduction to top-down syntax directed compilers.

7. CONWAY, M. E. Design of a separable transition-diagram compiler. *Comm. ACM 6,* 7 (July 1963), 396–408. CR-6451-5024.
Describes the organization of a COBOL compiler. The methods are largely applicable to construction of compilers for other languages such as ALGOL.
8. CONWAY, R. W., AND MAXWELL, W. L. CORC–the Cornell computing language. *Comm. ACM 6,* 6 (June 1963), 317–321.
Description of a language and compiler which are designed to provide extensive error diagnostics and other aids to the programmer.
9. ERSHOV, A. P. ALPHA–an automatic programming system of high efficiency. *J. ACM 13,* 1 (Jan. 1966), 17–24. CR-6673-9720.
Describes a compiler for a language which includes most of ALGOL as a subset. Several techniques for optimizing both the compiler and the object code are presented.
10. ERSHOV, A. P. *Programming Programme for the BESM computer,* transl. by M. Nadler. Pergamon Press, New York, 1959, 158 pp. CR-6235-2595.
One of the earliest works on compilers. Introduced the use of stacks and the removal of common subexpressions.
11. ERSHOV, A. P. On programming of arithmetic operations. *Comm. ACM 1,* 8 (Aug. 1958), 3–6 and 9 (Sept. 1958), 16.
Gives an algorithm for creating rough machine language instructions in pseudoform and then altering them into a more efficient form.
12. FREEMAN, D. N. Error correction in CORC. Proc. AFIPS 1964 Fall Joint Computer Conf., Vol. 26, Part I, Spartan Books, New York, pp. 15–34.
Discusses techniques of correcting errors in programs written in the Cornell computing language.
13. GARWICK, J. V. GARGOYLE, a language for compiler writing. *Comm. ACM 7,* 1 (Jan. 1964), 16–20. CR-6453-5675.
Describes an ALGOL-like language which uses syntax-directed methods.
14. GEAR, C. W. High speed compilation of efficient object code. *Comm. ACM 8,* 8 (Aug. 1965), 483–488. CR-6671-9000.
Describes a three-pass compiler which represents a compromise between compilation speed and object code efficiency. Primary attention is given to the optimization performed by the compiler
15. GRIES, D., PAUL, M., AND WIEHLE, H. R. Some techniques used in the ALCOR ILLINOIS 7090. *Comm. ACM 8,* 8 (Aug. 1965), 496–500. CR-6566-8556.
Describes portions of an ALGOL compiler for the IBM 7090.
16. HAWKINS, E. N., AND HUXTABLE, D. H. R. A multipass translation scheme for ALGOL 60. In R. Goodman (Ed.), *Annual Review in Automatic Programming, Vol. 3,* Pergamon Press, New York, 1963, pp. 163–206.
Discusses local and global optimization techniques.
17. HORWITZ, L. P., KARP, R. M., MILLER, R. E., AND WINOGRAD, S. Index register allocation. *J. ACM 13,* 1 (Jan. 1966), 43–61. CR-6674-10,068.
A mathematical treatment of the problem. Useful in compiler writing.

18. International Computation Centre (Eds.) *Symbolic Languages in Data Processing,* Proceedings of the Symposium in Rome, March 26–31, 1962. Gordon and Breach, New York, 1962, 849 pp.
The twelve papers listed under "Construction of Processors for Syntactically highly Structured Languages" in this volume are particularly of interest for this course.
19. KNUTH, D. E. A history of writing compilers. *Comput. Autom. 11,* 12 (Dec. 1962), 8–18.
Describes some of the early techniques used in writing American compilers.
20. MCCLURE, R. M. TMG—a syntax directed compiler. Proc. ACM 20th Nat. Conf., 1965, Association for Computing Machinery, New York, pp. 262–274.
The compiler writing system described in this paper was designed to facilitate the construction of simple one-pass translators for some specialized languages. It has features which simplify the handling of declarative information and errors.
21. NAUR, P. The design of the GIER ALGOL compiler. In R. Goodman (Ed.), *Annual Review in Automatic Programming, Vol. 4,* Pergamon Press, New York, 1964, pp. 49–85. CR-6564-7904.
Describes a multipass compiler written for a computer with a small high-speed memory.
22. RANDELL, B., AND RUSSELL, L. J. *ALGOL 60 Implementation.* Academic Press, New York, 1964, 418 pp. CR-6565-8246.
Contains a survey of ALGOL implementation techniques and a description of an error-checking and debugging compiler for the KDF9 computer.
23. REYNOLDS, J. C. An introduction to the COGENT programming system. Proc. ACM 20th Nat. Conf., 1965, Association for Computing Machinery, New York, pp. 422-436.
Describes the structure and major facilities of a compiler-compiler system which couples the notion of syntax-directed compiling with that of recursive list processing.
24. ROSEN, S. (Ed.) *Programming Systems and Languages.* McGraw-Hill, New York, 1967, 734 pp.
A collection of papers of which the following are of special interest for this course: Backus, et al., pp. 29–47; Bauer and Samelson, pp. 206–220; Dijkstra, pp. 221–227; Kanner, Kosinski, and Robinson, pp. 228–252; Rosen, Spurgeon, and Donnelly, pp. 264–297; and Rosen, pp. 306–331.
25. SCHORRE, D. V. META II, a syntax-oriented compiler writing language. Proc. ACM 19th Nat. Conf., 1964, Association for Computing Machinery, New York, pp. D1.3-1 to D1.3-11. CR-6561-6943.
Describes a compiler writing language in which its own compiler can be written.
26. WEGNER, P. (Ed.) *Introduction to System Programming.* Academic Press, New York, 1965, 316 pp. CR-6455-6300.
Contains a collection of papers of which the following are of special interest for this course: Pyle, pp. 86–100; Wegner, pp. 101–121; Randell, pp. 122–136; Huxtable, pp. 137–155; Hoare, pp. 156–165; and d'Agapeyeff, pp. 199–214.

As is indicated, several of the books listed below could be used as texts for this course, but it probably would be desirable to supplement any of them with additional material.

General textbooks

1. CALDWELL, S. H. *Switching Circuits and Logical Design.* Wiley, New York, 1958, 686 pp.
   The classic book on relay-oriented switching theory.
2. HARRISON, M. A. *Introduction to Switching and Automata Theory.* McGraw-Hill, New York, 1965, 499 pp. CR-6671-9109.
   A mathematical and abstract reference for advanced topics.
3. HIGONNET, R. A., AND GREA, R. A. *Logical Design of Electrical Circuits.* McGraw-Hill, New York, 1958, 220 pp.
   Almost exclusively devoted to relay networks.
4. HUMPHREY, W. S., JR. *Switching Circuits with Computer Applications.* McGraw-Hill, New York, 1958, 264 pp.
   A somewhat out-of-date undergraduate level text.
5. KRIEGER, M. *Basic Switching Circuit Theory.* Macmillan, New York, 1967, 256 pp. CR-6784-12,510.
   Basic elementary treatment which does not discuss hazards or codes.
6. MCCLUSKEY, E. J., JR. *Introduction to the Theory of Switching Circuits.* McGraw-Hill, New York, 1965, 318 pp. CR-6673-9834.
   A possible text for this course.
7. MCCLUSKEY, E. J., JR., AND BARTEE, T. C. (Eds.) *A Survey of Switching Circuit Theory.* McGraw-Hill, New York, 1962, 205 pp. CR-6342-3958.
   A collection of papers. Weak as a text since there are no problems. Possibly of some value as reading to illustrate different approaches.
8. MALEY, G. A., AND EARLE, J. *The Logic Design of Transistor Digital Computers.* Prentice-Hall, Englewood Cliffs, N. J., 1963, 322 pp. CR-6345-4582.
   Despite its title, this book covers a considerable amount of switching theory. Emphasis is on NOR circuits and asynchronous systems, and on techniques rather than theorems. Numerous examples.
9. MARCUS, M. P. *Switching Circuits for Engineers.* Prentice-Hall, Englewood Cliffs, N. J., 1962, 296 pp. CR-6341-3681.
   Broad but not too mathematical coverage of switching theory.
10. MILLER, R. E. *Switching Theory, Vol. 1, Combinational Circuits.* Wiley, New York, 1965, 351 pp. CR-6565-8369.
    Highly mathematical and somewhat advanced for an undergraduate course. Interesting discussion of the effects of delays.
11. PRATHER, R. E. *Introduction to Switching Theory: A Mathematical Approach.* Allyn and Bacon, Boston, 1967, 496 pp.
    A highly mathematical and broad coverage of both combinatorial switching theory and sequential machine theory.

12. TORNG, H. C. *Introduction to the Logical Design of Switching Systems.* Addison-Wesley, Reading, Mass., 1965, 286 pp. CR-6456-6806.
General elementary coverage including a discussion of switching elements and magnetic logic. Outmoded discussion of iterative (cascaded) networks. Many computer-related examples.
13. WARFIELD, J. N. *Principles of Logic Design.* Ginn and Co., Boston, 1963, 291 pp. CR-6451-5136.
Covers some elementary switching theory in the context of computer logic.

More specialized books

14. CURTIS, V. A. *A New Approach to the Design of Switching Circuits.* D. Van Nostrand, Princeton, N. J., 1962, 635 pp. CR-6346-4818.
Devoted mainly to decomposition theory for combinational circuits. Useful as a reference in this area and as a source of examples since it contains many detailed sample problems.
15. DERTOUZOS, M. L. *Threshold Logic: A Synthesis Approach.* M.I.T. Press, Cambridge, Mass., 1965, 256 pp. CR-6676-10,929.
Concentrates on the characterization and application of threshold elements in terms of logical design.
16. HU, S. T. *Threshold Logic.* University of California Press, Berkeley, Calif., 1965, 338 pp.
A comprehensive reference which also contains some of the author's original research.
17. LEWIS, P. M., AND COATES, C. L. *Threshold Logic.* Wiley, New York, 1967, 483 pp.
Emphasizes single and multigate networks for controlled sensitivity.
18. PHISTER, M., JR. *Logical Design of Digital Computers.* Wiley, New York, 1958, 401 pp.
Covers the application of sequential circuit theory to design of computer logic. Considers only clocked circuits and (for the most part) serial operation.

I 7. 順序機械

Except for two survey articles, only books are included in the following list. Since this field has developed within the last fifteen years, much of the material is still in the periodical literature.

1. CAIANIELLO, E. R. (Ed.) *Automata Theory.* Academic Press, New York, 1966, 343 pp. CR-6676-10,935.
A collection of research and tutorial papers on automata, formal languages, graph theory, logic, algorithms, recursive function theory, and neural nets, which, because of varying interest and difficulty, might be useful for supplementary reading by ambitious students.
2. FISCHER, P. C. Multitape and infinite-state automata—a survey. *Comm. ACM 8,* 12 (Dec. 1965), 799–805. CR-6675-10,561.
A survey of machines which are more powerful than finite automata and less powerful than Turing machines. Also an extensive bibliography.

3. GILL, A. *Introduction to the Theory of Finite-State Machines.* McGraw-Hill, New York, 1962, 207 pp. CR-6343-4207.
An automata theory approach to finite-state machines which is somewhat engineering oriented and written at a fairly elementary level.
4. GINSBURG, S. *An Introduction to Mathematical Machine Theory.* Addison-Wesley, Reading, Mass., 1962, 137 pp. CR-6452-5431.
A text on the behavior of the sequential machines of Huffman-Moore-Mealy, abstract machines of Ginsburg, and tape recognition devices of Rabin and Scott.
5. GLUSHKOV, V. M. *Introduction to Cybernetics,* transl. by Scripta Technica, Inc. Academic Press, New York, 1966, 324 pp.
A translation of the Russian text which assumes only a limited background. Approaches subject from somewhat different point of view than most Western texts. Contains much relevant material.
6. HARRISON, M. *Introduction to Switching and Automata Theory,* McGraw-Hill, New York, 1965, 499 pp. CR-6671-9109.
This text for engineers and mathematicians develops the foundations of both switching and automata theory in abstract mathematical terms. Emphasis is on switching theory. Coverage includes sequential machines, regular events, definite events, probabilistic machines, and context-free languages.
7. HARTMANIS, J., AND STEARNS, R. E. *Algebraic Structure Theory of Sequential Machines.* Prentice-Hall, Englewood Cliffs, N. J., 1966, 211 pp. CR-6782-11,635.
The first thorough treatment of the structure theory of sequential machines and its applications to machine synthesis and machine decomposition. A research monograph selected from a series of papers by the authors and not written as a text. Practically no exercises.
8. HENNIE, F. C., III. *Iterative Arrays of Logical Circuits.* M.I.T. Press, Cambridge, Mass., and Wiley, New York, 1961, 242 pp. CR-6232-1733.
Currently the most complete treatise on iterative arrays.
9. KAUTZ, W. H. (Ed.) *Linear Sequential Switching Circuits–Selected Technical Papers.* Holden-Day, San Fransisco, 1965, 234 pp. CR-6674-10,205.
A collection of papers on linear sequential machines.
10. MCNAUGHTON, R. The theory of automata–a survey. In F. L. Alt (Ed.), *Advances in Computing, Vol. 2,* Academic Press, New York, 1961, pp. 379–421. CR-6342-3920.
Most of the areas of automata theory are included with the exception of switching theory and other engineering topics.
11. MILLER, R. E. *Switching Theory, Vol. 2, Sequential Circuits and Machines.* Wiley, New York, 1965, 250 pp. CR-6783-12,120.
Highly mathematical and somewhat advanced as a text for an undergraduate course.
12. MINSKY, M. *Computation: Finite and Infinite Machines.* Prentice-Hall, Englewood Cliffs, N. J., 1967, 317 pp.
The concept of an "effective procedure" is developed in this text. Also treats algorithms, Post productions, regular expressions, computability, infinite and finite-state models of digital computers, and computer languages.

13. MOORE, E. F. (Ed.) *Sequential Machines: Selected Papers.* Addison-Wesley, Reading, Mass., 1964, 266 pp.
This collection of classical papers on sequential machines includes an extensive bibliography by the editor.
14. PRATHER, R. E. *Introduction to Switching Theory: A Mathematical Approach.* Allyn and Bacon, Boston, 1967, 496 pp.
A mathematical and broad treatment of both combinatorial switching theory and sequential machines.
15. SHANNON, C. E., AND MCCARTHY, J. (Eds.) *Automata Studies.* Princeton University Press, Princeton, N. J., 1956, 285 pp.
A collection of many of the early papers on finite automata, Turing machines, and synthesis of automata which stimulated the development of automata theory. Philosophical papers, in addition to mathematical papers, are included, since the aim of the collection is to help explain the working of the human mind.

I 8. 数値解析 I

I 9. 数値解析 II

Listed below are some but by no means all of the books which could be used as texts and/or references for these courses. The more general texts normally include solution of polynomial and other nonlinear equations; interpolation, numerical quadrature, and numerical differentiation; ordinary differential equations; and linear algebra. Significant deviations from these are indicated by the annotations.

Besides listing books which might be used as texts for part or all of these courses, the following includes books for those desiring to go deeper into the various areas. In particular, Refs. 1, 3, 10, 17 and 18 have been included for linear algebra; Refs. 2 and 16 for partial differential equations; Ref. 15 for the solution of nonlinear equations; and Ref. 7 for ordinary differential equations.

1. FADDEEV, D. K., AND FADDEEVA, V. N. *Computational Methods of Linear Algebra,* transl. by R. C. Williams. W. H. Freeman, San Francisco, 1963, 621 pp. CR-6016-0374.
An excellent reference on the theory of computational methods in linear algebra. Does not treat the theory of computational errors. Introductory chapter could serve as a text for a course in linear algebra. Beginning analysis and an elementary knowledge of complex variables is assumed. Examples but no exercises.
2. FORSYTHE, G. E., AND WASOW, W. R. *Finite-Difference Methods for Partial Differential Equations.* Wiley, New York, 1960, 444 pp.
A fundamental reference on the numerical solution of partial differential equations by finite-difference methods. Provides a thorough treatment of hyperbolic, parabolic, and elliptic equations. Orientation is toward the use of high-speed computers, but it is not intended as a guide for programmers. For most of the book, advanced calculus and linear algebra provide sufficient background. Previous knowledge of partial differential equations not required. Some illustrative examples but no exercises.

3. FOX, L. *An Introduction to Numerical Linear Algebra.* Oxford University Press, New York, 1964, 295 pp. CR-6456-6723.
   A basic reference on computational methods in linear algebra. Designed for engineers and scientists as well as mathematicians. Emphasis on the principles involved rather than the details of applications to computers. Intended to prepare the reader for a more advanced book such as Wilkinson's *The Algebraic Eigenvalue Problem.* Introductory chapter on matrix algebra. Illustrative examples and exercises.
4. FRÖBERG, C. E. *Introduction to Numerical Analysis.* Addison-Wesley, Reading, Mass., 1965, 340 pp. CR-6671-9037.
   Designed as a text for an undergraduate numerical analysis course. Includes, in addition to the standard topics, partial differential equations (briefly), approximation by Chebyshev polynomials and other functions, Monte Carlo methods, and linear programming. Emphasis on modern methods well-adapted for computers. Mathematically rigorous treatment with detailed error analysis given in typical cases. Presupposes differential and integral calculus and differential equations. Illustrative examples and exercises.
5. HAMMING, R. W. *Numerical Methods for Scientists and Engineers.* McGraw-Hill, New York, 1962, 411 pp. CR-6236-3367.
   Excellent as a reference. Provides interesting and different point of view. Treats interpolation and approximation; numerical differentiation and integration; and ordinary differential equations by polynomial and other methods such as Fourier methods, and exponentials. Brief treatments of nonlinear equations and linear algebra, simulation, and Monte Carlo methods. Presupposes beginning analysis, Fourier series, mathematical statistics, feed-back circuits, noise theory. Illustrative examples and exercises.
6. HENRICI, P. *Elements of Numerical Analysis.* Wiley, New York, 1964, 328 pp.
   Designed as a text for a one-semester course in numerical analysis. Covers the standard topics except linear algebra. Emphasis on numerical analysis as a mathematical discipline. A distinction is made between algorithms and theorems. Introductory chapters on complex variables and difference equations. Beginning analysis (12 semester hours) and ordinary differential equations are assumed. Illustrative examples and exercises.
7. HENRICI, P. *Discrete Variable Methods in Ordinary Differential Equations.* Wiley, New York, 1962, 407 pp. CR-6341-3733.
   A basic reference on the numerical methods for solving ordinary differential equations. Designed as a text for a senior-level course on ordinary differential equations. Includes a mathematically rigorous treatment of various methods. Emphasis is on the study of discretization errors and round-off errors. Presupposes differential equations, advanced calculus, linear algebra, and elementary complex variables (though large parts of the book do not require all of these topics). Illustrative examples and exercises.

8. HILDEBRAND, F. B. *Introduction to Numerical Analysis.* McGraw-Hill, New York, 1956, 511 pp.
A good book for supplementary reading though written in 1956. Gives primary emphasis to methods adapted for desk calculators. Includes standard topics except for linear algebra. Separate chapters on least-squares, polynomial approximation, Gaussian quadrature, and approximation of various types. Beginning analysis sufficient background for most of the book. An extensive of exercises.
9. HOUSEHOLDER, A. S. *Principles of Numerical Analysis.* McGraw-Hill, New York, 1953, 274 pp.
Good for supplementary reading. Designed as mathematical textbook rather than a compendium of computational rules. Published in 1953, the book includes many methods applicable only to hand computation though it was written with computers in mind. Includes the standard topics except ordinary differential equations. Presupposes beginning analysis plus some knowledge of probability and statistics. Some exercises.
10. HOUSEHOLDER, A. S. *The Theory of Matrices in Numerical Analysis.* Blaisdell, New York, 1964, 257 pp.
Good for supplementary reading. Considers the development and appraisal of computational methods in linear algebra from the theoretical point of view. Does not develop specific computer flowcharts or programs. Presupposes a knowledge of matrix algebra. Illustrative examples and exercises.
11. ISAACSON, E., AND KELLER, H. B. *Analysis of Numerical Methods.* Wiley, New York, 1966, 541 pp. CR-6783-11,966.
A very well written and rather comprehensive text presenting a careful analysis of numerous important numerical methods with a view toward their applicability to computers. With an appropriate selection of material the book lends itself well to use as a text; otherwise, it is an excellent reference.
12. MILNE, W. E. *Numerical Solution of Differential Equations.* Wiley, New York, 1953, 275 pp.
Since it was written in 1953, much of this material has been superseded by more recent work; yet it remains very suitable for supplemental reading. Ordinary and partial differential equations are treated as well as some problems in linear algebra. Many of the methods are adapted for hand computation rather than computers. Beginning analysis should provide sufficient background for most of the book. Illustrative examples and some exercises.
13. RALSTON, A. *A First Course in Numerical Analysis.* McGraw-Hill, New York, 1965, 578 pp. CR-6671-9035.
Designed as a text for a one-year course in numerical analysis (though not all of the material could be covered) to be taken by graduate students and advanced undergraduate students, primarily in mathematics. Although numerical analysis is treated as a full-fledged branch of applied mathematics, orientation is toward the use of digital computers. Basic topics in numerical analysis covered thoroughly. Separate chapters devoted to functional approximation by least-squares techniques and by minimum-maximum error techniques. Presupposes beginning analysis, advanced calculus, orthogonal polynomials, and complex variables. A course in linear algebra is assumed for the chapters in that area. An extensive set of illustrative examples and exercises.

14. TODD, J. (Ed.) *A Survey of Numerical Analysis.* McGraw-Hill, New York, 1962, 589 pp. CR-6236-3368.
Written by a number of authors. Some of the early chapters have been used in connection with introductory courses. Because of its breadth of coverage it is especially suited as a reference for these courses. Besides the usual topics, there are separate chapters on orthogonalizing codes, partial differential equations, integral equations, and problems in number theory. The prerequisites vary with the chapters but for early chapters beginning analysis and linear algebra would suffice. Exercises given in some of the early chapters.
15. TRAUB, J. F. *Iterative Methods for the Solution of Equations.* Prentice-Hall, Englewood Cliffs, N. J., 1964, 310 pp. CR-6672-9339.
A good reference on the numerical solution of equations and (briefly) systems of equations by iteration algorithms. The methods are treated with rigor, though rigor in itself is not the main object. Contains a considerable amount of new material. Many illustrative examples.
16. VARGA, RICHARD, *Matrix Iterative Analysis.* Prentice-Hall, Englewood Cliffs, N. J., 1962, 322 pp. CR-6343-4236.
An excellent reference giving theoretical basis behind methods for solving large systems of linear algebraic equations which arise in the numerical solution of partial differential equations by finite-difference methods. Designed as a text for a first-year graduate course in mathematics.
17. WILKINSON, J. H. *Rounding Errors in Algebraic Processes.* Prentice-Hall, Englewood Cliffs, N. J., 1964, 161 pp. CR-6455-6341.
Studies the cumulative effect of rounding errors in computations involving large numbers of arithmetic operations performed by digital computers. Special attention given to problems involving polynomials and matrices. A very important reference for a computer-oriented course in numerical analysis.
18. WILKINSON, J. H. *The Algebraic Eigenvalue Problem.* Clarendon Press, Oxford, England, 1965, 662 pp.
A basic reference on computational methods in linear algebra. Provides a thorough treatment of those methods with which the author has had direct numerical experience on the computer. Treats the methods theoretically and also from the stand-point of rounding error. Presupposes beginning analysis, linear algebra, and elementary complex variables. Illustrative examples but no exercises.