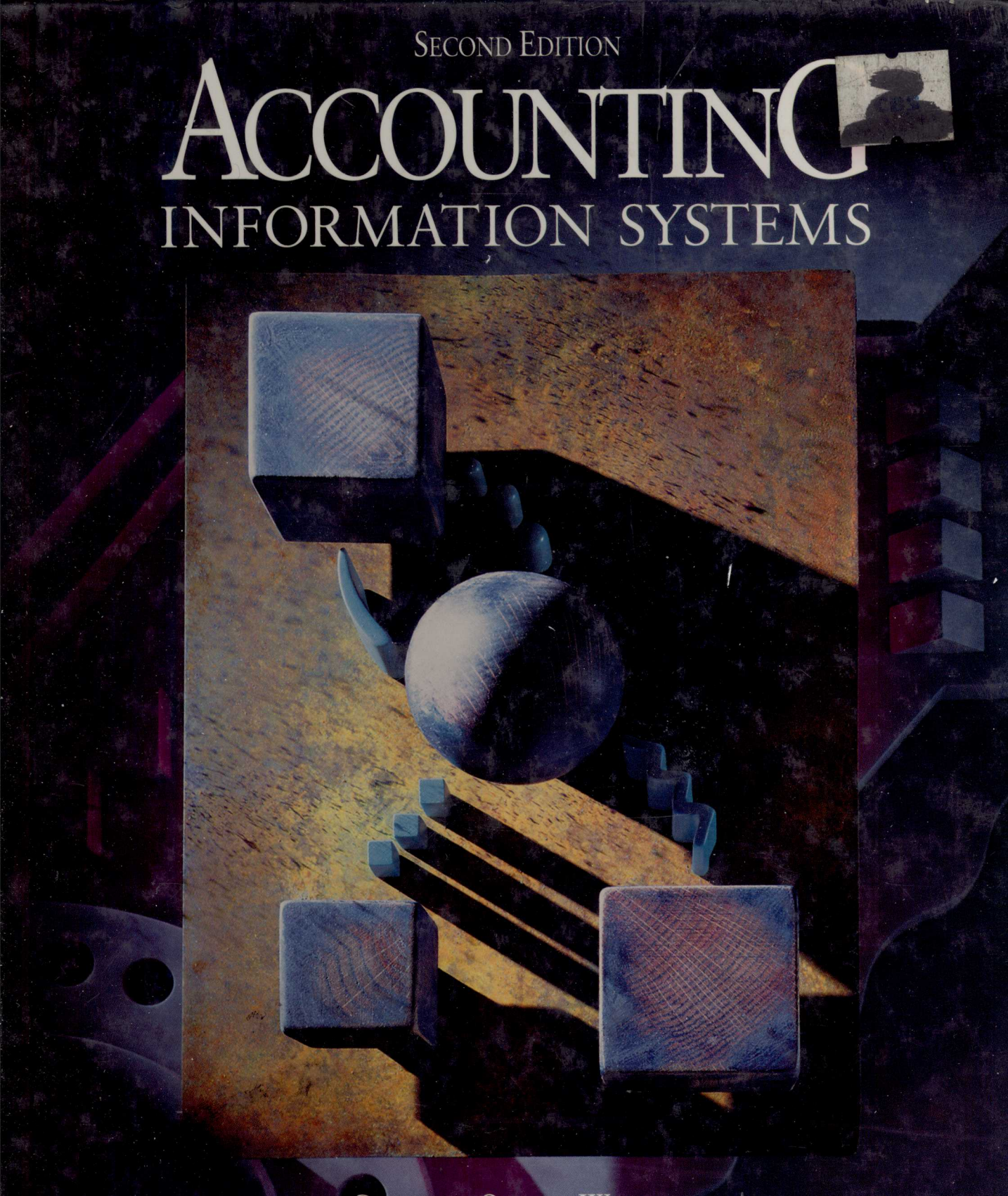
SECOND EDITION

# ACCOUNTING

## INFORMATION SYSTEMS



SECOND EDITION

# ACCOUNTING INFORMATION SYSTEMS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*To our wives, Roxanne, Bev, and Joanne,*
*for their patience and support throughout this project*

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# PREFACE

## TO THE AIS STUDENT

First, we[1] thank you for choosing our text for your study of Accounting Information Systems (AIS). We're confident that you will be happy with your choice. We are equally confident that your AIS studies will give you a competitive edge upon graduation; such has been true with our students. Our text is structured to support the way we teach the AIS course at Bentley College, where the course is required for all accounting majors and is a prerequisite for the principles of auditing course. However, the text's organization is flexible enough to be used in several alternative course designs.

In the past few years, we have been pleased to see that the wisdom (or luck) of some of the decisions we made in the early design of this text have been confirmed by other researchers. First, the "Bedford Report" on the future of accounting education, a study by a twelve-member committee of accounting teachers and practitioners from public accounting, industry, and government, concluded that "accounting education as it is currently approached requires a major reorientation between now and the year 2000." The committee recommended that colleges and universities "approach accounting education as an *information development and distribution function* for economic decision making" (emphasis added).[2] Consequently, the Bedford committee's curriculum recommendations placed great emphasis on courses that include (1) design and use of information systems, (2) communication, (3) use of information in decision making, and (4) financial information and public reporting. We believe that the AIS course can be the catalyst for encouraging accounting and business curriculum changes such as those suggested by the Bedford Report's conclusions. Our text reflects this belief.

A second report that focuses more directly on AIS, the"Mock Report" (for short), was released in 1986.[3] It also validates how we have designed our AIS course, positioned the course in our curriculum, and patterned this text. Among

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[1] First, a few words on pronouns. We (Gelinas, Oram, and Wiggins) address you, the reader, as "you." We call ourselves "we." As to the "he" and "she" issue, we dislike with a passion the neutered language of "person" talk. We think that talking that way is bland and ignores reality. Therefore, in this text the "chairman" of the board is the chief, whether male or female. The indians also come in two sexes. So we may call the vice-president of finance a "she," the controller a "he," an auditor a "she," and so on. We use both pronouns on a random basis; you can audit us to see whether we've done a fair job of balancing the two. Our use of "he" and "she" reflects the reality of the workplace—namely, neither gender has a monopoly on the skills necessary to succeed in professional life.

[2] Norton Bedford, "Future Accounting Education: Preparing for the Expanding Profession," *Issues in Accounting Education*, (Spring 1986): 169.

[3] Theodore J. Mock, "Report of the AAA Committee on Contemporary Approaches to Teaching Accounting Information Systems," *Journal of Information Systems*, (Spring 1987).

other things, the report recommends that students complete two introductory computer or data processing courses as prerequisites for AIS (if you don't have this much computer background, we encourage you to review Appendices A through C). Further, the report advocates that AIS be a prerequisite to the basic auditing course.

Many good AIS books have been published. So, is there really a need for another one? Although it may be self-serving, we think that our text does indeed fill a need. For one thing, we've tried to use a writing style that will make our text more accessible to you, the student. Obviously, we can't make this the great American novel because it is, after all, a textbook. However, we trust that it is not as "textbooky" as some books you have used in accounting. Our text also has the advantage of including the most current coverage of topics as is possible at the time of publication. Certainly, the topical coverage reflects all of the recommendations of the American Accounting Association Committee on Contemporary Approaches to Teaching Accounting Information Systems (the Mock Committee).

Figure P.1 depicts some other distinguishing features of this text. Let's examine each of these briefly.

### *Accountants' Focus*

We have assumed that many of you are planning to have careers in accounting. Therefore, we approach AIS from the perspective of the career roles that you, the accountant, will play. You could be an *auditor* of AIS and its outputs; in this role, you would be primarily concerned about whether the AIS is properly controlled. We introduce control concepts and procedures in Chapters 5 through 8, and then *apply* the controls to specific AIS subsystems (or applications) in Chapters 9 through 15. You also could be the *designer* of systems; Chapters 16 through 20 stress this role for the accountant. Finally, you certainly will be an information system *user* (and/or *evaluator*). As such, you will be concerned with the system's effectiveness and efficiency, topics that permeate the entire text.

### *Organizational Framework for AIS Subsystems*

Because the AIS exists within organizations, we introduce (in Chapter 1) the notion of horizontal and vertical information flows within the organization. In Chapter 2, we cover principles of drawing organization charts, and we use the organization as the context for discussing basic information concepts. Then, in the application chapters, we reinforce the idea of horizontal and vertical information flows by showing and discussing the "cast of characters" who play the key roles in each subsystem.

### *Structured Documentation Tools and Techniques*

Take a few minutes to study Figure P.2, which presents two different views of a hypothetical college course registration procedure. Which view—the systems flowchart or the data flow diagram (DFD)—paints the clearer picture? We won't debate the answer here; each view has something to recommend it, depending on what you are trying to analyze. In Chapter 3, we teach you how to draw both of them; and we introduce you to other documentation tools as well. One advantage of the DFD is that it allows us to examine the essence of "what" a system does

**FIGURE *P.1*** Distinguishing features of this text

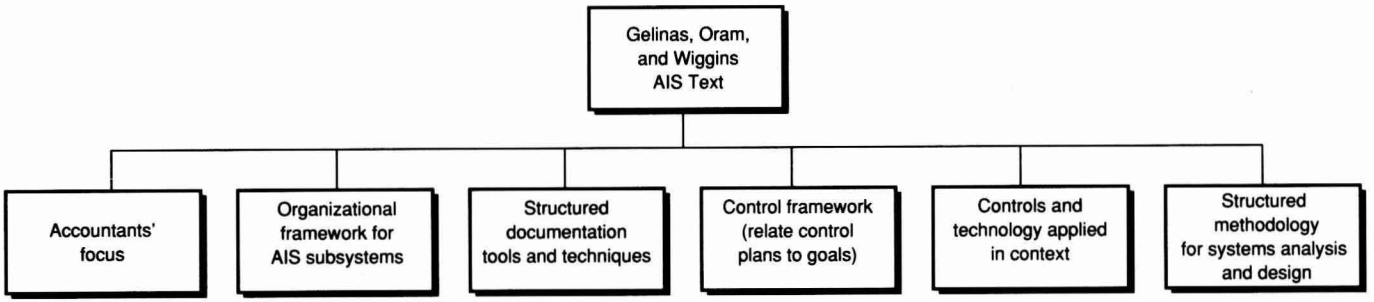
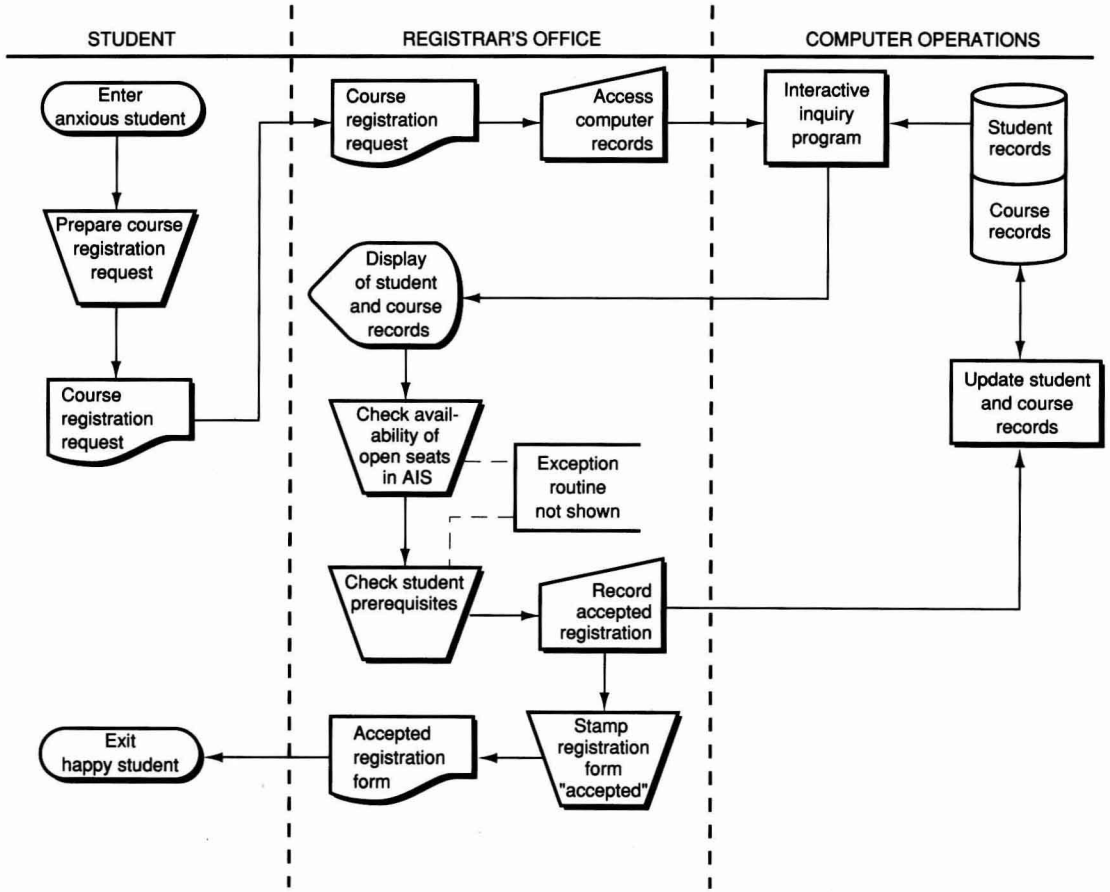


**FIGURE *P.2*** Two different views of student registration



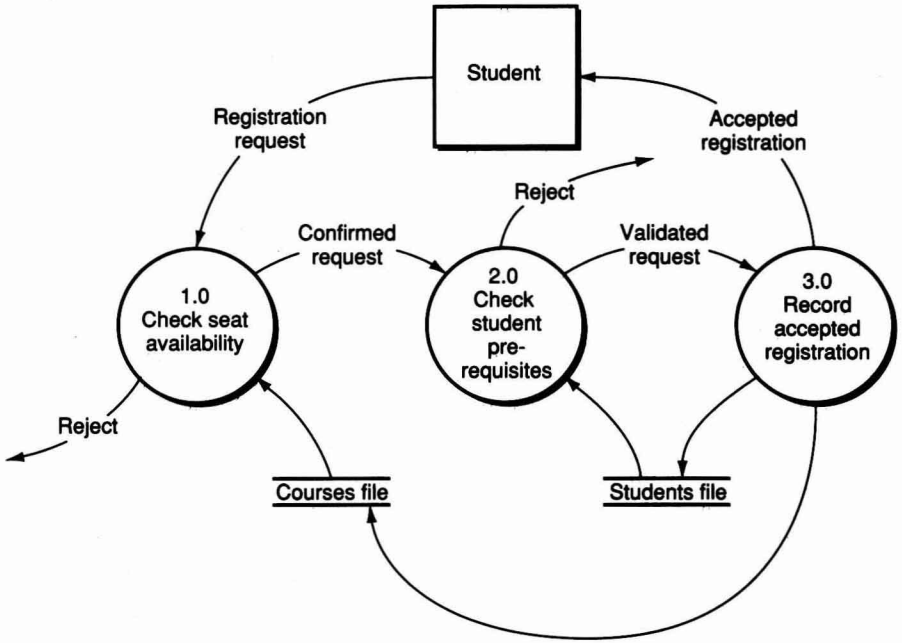

(a) Systems flowchart view

without getting bogged down in the details of "who" does it or "how" it is done. For example, the DFD (Figure P.2b) doesn't force us to know that the registration system is computerized. Because DFDs allow us to concentrate on a system's *essence*—on its *functional logic*—we use this tool extensively throughout the text.

## *Control Framework*

We think it is senseless to have AIS students memorize long lists of control procedures unless they can relate those procedures to the *goals* that the procedures are intended to achieve. Thus, an essential component of the text's design is the *control framework,* introduced in Chapter 5. We then use the framework to teach

**FIGURE *P.2***
Continued




(b) Data flow diagram view

controls in Chapters 9 through 14. Based on an approach used by Coopers & Lybrand, one of the "Big Six" public accounting firms, the control framework requires that you first specify a system's control goals, and then recommend control *plans* (procedures) that will accomplish those specific goals.

### *Controls and Technology Applied in Context*

As we mentioned, Chapters 9 through 15 cover AIS subsystems or applications. In these chapters, we teach you to *apply* control *concepts* to particular subsystems. We do likewise with computer technology. Rather than talk about the various technologies in the abstract, we implement each subsystem using a different technology. For instance, in Chapter 9, the order entry/sales system uses online technology with remote data entry. The billing/accounts receivable/cash receipts system in Chapter 10, on the other hand, employs batch processing through a centralized electronic data processing (EDP) department. By discussing controls and technology in the context of particular subsystems, we believe we make the material easier for you to understand and more interesting as well!

## *Structured Methodology for Systems Analysis and Design*

We use a *structured* approach to systems development in Chapters 16 through 20. This approach uses structured tools (that is, the DFDs and data dictionaries mentioned previously) and other structured methods that result in the development of "better" information systems. In Chapter 16, we explain the criteria that we use to define a "better" system, and also why structured development tools and techniques are more effective and efficient in achieving better systems.

No book (not even ours) can help you to succeed in AIS unless you come to the course with the proper mind-set. We're not talking about your technical background in accounting or computers. Rather, we're referring to less tangible preparation, such as:

- Your willingness to take responsibility for your education. You can't wait to be spoon-fed the material. You've got to do the required reading and other homework assignments in advance and come to class prepared—prepared to challenge and to be challenged.
- Your capacity to cope with uncertainty. In other words, you must be able to succeed in a course where there are no right and wrong answers. In AIS, you will be asked to solve problems—that is, to identify what the problem is, consider alternative solutions, select a solution, and then defend your choice.
- Your ability and willingness to accept change as the only real constant in life and to prepare yourself to deal with change in your careers. Because technology is rapidly outdated, learning facts about the current state of affairs will pay dividends only in the short run. What's important for your long-term success is that, in college, you "learn how to learn," and you continue to learn for the rest of your lives. AIS can help you learn how to learn.
- In summary, to you, the students, we wish you success in AIS. Enjoy!

## SUMMARY OF CHANGES MADE IN THE SECOND EDITION

We received feedback regarding the first edition from numerous reviewers, over 60 questionnaires and from colleagues. We combined this with our own experience using the first edition and have made the following changes for the second edition:

**Technology.** We have updated our discussions of technology and have moved all presentations of technology and other current topics to sidebars, which are typeset to make them stand out from the text. Since the unique typeset allows you to easily locate the sidebars within each chapter, you can read about a particular technology without having to read the entire chapter. There are three types of sidebars:

1. *Technology Summaries* define and discuss a major topic. For example, Technology Summary 9.1 describes recent innovations in automating order entry/sales systems.
2. *Technology Applications* present short examples—taken from actual practice—of using a technology. For example, Technology Application 8.1 summarizes some uses of expert systems to enhance accountants' productivity.

3. *Technology Excerpts* contain article reprints. For example, Technology Excerpt 8.1 contains a reprint of an article from *Computerworld* that discusses the use of expert systems at the Internal Revenue Service.

Among the specific topics that have received expanded and updated coverage are: expert systems, electronic data interchange (EDI), computer-assisted software engineering (CASE), image processing, open systems, sales force automation software, using billing systems to gain competitive advantage, managing cash receipts, data base management systems (DBMS), point of sale (POS) systems, concurrent engineering, activity-based costing (ABC) systems, outsourcing of information systems services, object-oriented programming, contingency planning, and perspectives on control (computer fraud and software piracy, legal, practical and professional responsibilities of management, Treadway commission, and so on).

**Controls.** We have repackaged our presentation of controls into three chapters (5 through 7). Chapter 5 introduces the control framework, and Chapter 6 presents pervasive and general controls. A new Chapter 7 introduces the immediate and periodic modes of processing and presents the online and batch controls appropriate for those technologies. These changes make it clear that some of the technology-related controls can apply to any AIS application. Also, the three chapters present a centralized source of information on internal control.

When presenting the application of the control framework to specific systems in Chapters 7 and 9–13, we have moved the discussion of recommended control plans to a separate exhibit. The relocation not only makes it easier to locate the discussion but also reinforces the concept that the explanation of the control plans is an integral element of the control matrix.

**Glossary.** We have added a glossary containing definitions of all terms that are defined in the text and in the appendices.

**Data base management systems.** Our presentation of data base management systems in Chapter 11 was modified to emphasize the relational data base. Also, we added discussions at various points in the text to emphasize that an AIS application's files—the accounts receivable master file, for example—could be a view of the entity-wide data base.

**End-of-chapter questions and problems.** To provide you additional practice in documenting systems, we have added nine short "capsule cases"—drawn from actual real-world systems—to the twenty case narratives that existed in the first edition. These new capsule cases are contained in Chapter 9, problem 4; Chapter 10, problem 5; and Chapter 11, problem 6.

In addition, we have updated the question and problem material to reflect new topical coverage. For instance, we have added discussion questions on expert systems, image processing and electronic data interchange. We have also added problem material to Chapter 5 and the new Chapter 7.

**Summaries of inputs, processes, outputs and files.** After discussing each AIS subsystem's logical features (Chapters 9–13), we have added a table to summarize

that system's inputs, processes, outputs and files. The table will help you to review each system's basic elements before proceeding to the system's physical description. In addition to these tables, we have ensured that each file shown in the logical system is described or formally defined with a data dictionary definition.

**Miscellaneous.** Although we found very few errors in the first edition, we did make several minor edits to respond to comments received. For example, one reviewer asked for expanded explanations in Chapter 3 on how to draw a flowchart. Another asked that we compare a manual accounting system with an automated system; Chapter 1 now contains such a discussion.

## To the AIS Instructor

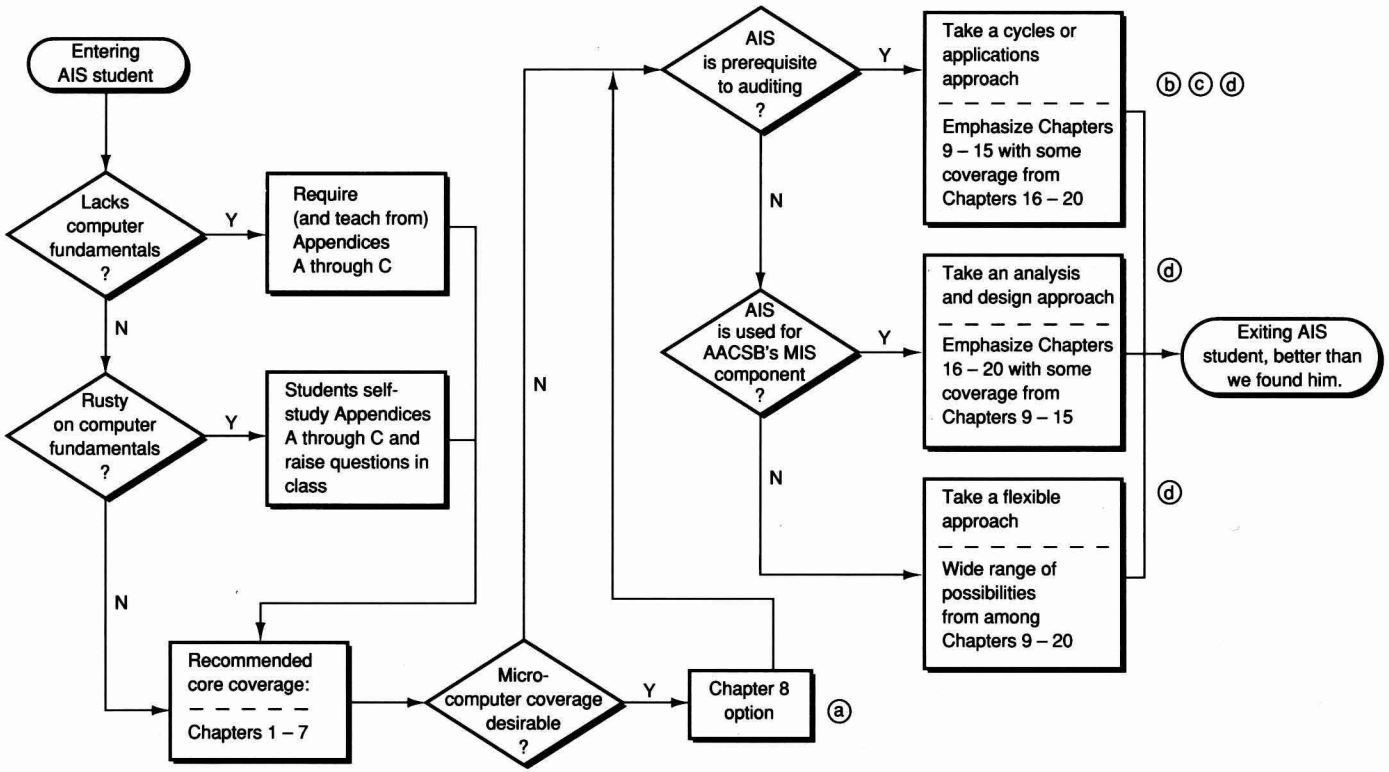
Although we thought at one time that we could write *the* "definitive" AIS book, one that could meet the diversity of needs that exists, we were soon dissuaded of that notion.

Instead, we settled for producing a text that gives you maximum flexibility to accomplish *your* objectives. Figure P.3 *suggests* different paths through the text. Over the years, we've experimented with most of them, in our search for the "one right answer." (In the *Instructor's Resource Manual* [IRM] that accompanies this text, we present additional options based on variables other than those considered in Figure P.3.) Our text also includes the following features, all of which have been *class-tested,* to assist you in teaching AIS:

- Completely original (none from professional examinations) end-of-chapter discussion questions and problems that are focused on the material covered in each corresponding chapter.
- Some twenty mini cases at the end of Chapters 4 and 9 through 13. These system narratives also support problem requirements in some of the systems development chapters (Chapters 17 through 19).
- Nine capsule cases, new to the second edition, adapted from actual real-world systems (see Chapter 9, problem 4; Chapter 10, problem 5; and Chapter 11, problem 6). We have made these system descriptions shorter than those in the mini cases to allow you another vehicle for having your students acquire proficiency in documenting systems.
- A series of Acme Life Insurance Company review problems related to the Acme case studies included in Chapters 17 through 20. In this second edition, the review problems are located in the *Instructor's Resource Manual.* Both the review-problems and case studies are based on an actual, major insurance company's systems development project.

We can't speak for you, but when we adopt any accounting text, the quality of the ancillaries and the quality and quantity of the question and problem material contained therein are as crucial to our decision as is the text itself. In addition to the *Instructor's Resource Manual,* a *Test Bank, Computerized Test Bank,* and *Solutions Manual* also accompany this text. We believe the entire teaching package—text and ancillaries—is unrivaled in the AIS market, delivering *both* quality and quantity in this regard.

**FIGURE *P.3*** Alternative routes through the text




NOTES:

ⓐ Chapter 8 is a "transition" chapter between the introductory concepts and basic tools in Chapters 1 through 7 and the application of those concepts and tools in the remaining chapters. Chapter 8 examines microcomputer and networking technology, impact on the accountant, and control aspects. For an integrated unit on microcomputers, you might want to cover Chapter 14 right after Chapter 8, since 14 uses microcomputer technology to implement the General Ledger/Financial Reporting subsystem.

ⓑ Some might prefer to start with Chapter 14 (General Ledger/Financial Reporting) instead of Chapter 9 (Order Entry/Sales).

ⓒ Covering all of the application chapters (9-15) might be overkill. They can be covered selectively (e.g., cover all of the revenue cycle: Chapters 9, 10, 12, 13, and selected others).

ⓓ Interspersing analysis and design chapters (16-20) with application chapters (9-15) can be effective. A sequencing that we have used successfully is 9, 10, 16, 17, 18, two more application chapters, 19, 20.

In the IRM, we provide detailed lecture notes (written and on disk) and teaching suggestions for each chapter, as well as:

- Computer-based problems (data base, spreadsheet, and integrated accounting software problems), which are discussed in detail, including the logistics for obtaining and using Accounting Plus accounting software. The computer problems are furnished in both written and disk versions so that you can readily modify the problem facts and requirements to suit your own needs. The answers to these problems are supplied in the *Solutions Manual.*
- The ACME Life Insurance Company review problem, a series of problems (written and on disk) related to the systems development case studies included in chapters 17 through 20. The answers to these problems are supplied in the *Solutions Manual.*

In our AIS course, we have found this combination of materials has allowed us a wide range of possibilities in terms of:

- classroom delivery vehicles
- homework assignments (and rotating or altering those assignments over several semesters)
- grade determination (e.g., over the years, we have used various combinations of *team* hand-in assignments, oral class presentations, term-paper projects, and class participation—in addition to examinations—to evaluate student performance)

We trust that you will find the teaching package both flexible and enjoyable to work with. We earnestly solicit your feedback on both the text and the ancillaries, and appreciate knowing your criticisms and suggestions for improving the materials. In turn, we stand ready to respond to any questions or problems you may encounter. Please feel free to contact us through South-Western Publishing Company or directly at Bentley College. We wish you success in AIS. Enjoy!

**ACKNOWLEDGMENTS** In closing, we must acknowledge that the pronoun "we" as used in this text extends far beyond three authors. We owe so much to so many people who have helped us in this project that to name them all would leave little space for any AIS material. However, we do want to thank the several graduate assistants who have labored long and hard—and for little pay—to make this book a reality. In addition, the secretaries and work-study students in the Department of Accountancy and the staff of the Solomon R. Baker Library helped us all along the way. To the countless AIS students who have obliged us by letting us class-test our materials on them, we owe a special debt of gratitude. The authors also wish to thank Professor Karen K. Osterheld of Bentley College for her many helpful comments regarding the first edition, and in reviewing page proofs and solutions for this edition.

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*University of Cincinnati*

Finally, to our families—most particularly to our wives, to whom we dedicate this book—we promise to now turn our attention to some of the home-front responsibilities that we've neglected for far too long.

**Ulric J. Gelinas, Jr.**
**Allan E. Oram**
**William P. Wiggins**

# ABOUT THE AUTHORS

**Ulric J. (Joe) Gelinas, Jr., Ph.D.**, is Associate Professor of Accountancy at Bentley College, Waltham, Massachusetts. He received his A.B. in Economics from St. Michael's College, Winooski, Vermont and his M.B.A. and Ph.D. from the University of Massachusetts, Amherst. Dr. Gelinas has also taught at the University of Tennessee, and, as a Captain in the United States Air Force, he was Officer-in-Charge of EDP Operations. Dr. Gelinas was the founding editor of the *Journal of Accounting and Computers* (formerly the *Kent/Bentley Journal of Accounting and Computers* and the *Kent/Bentley Review*). Professor Gelinas has published articles on accounting information systems, computers in accounting education, and information privacy. During a recent sabbatical, Professor Gelinas worked as an EDP auditor at the Bank of Boston and has since consulted for the Corporate Audit Department at the Bank of Boston. Professor Gelinas has conducted training—using this textbook—at CSC Partners, a nationwide systems integration firm. He has made presentations for the New England Chapter of the EDP Auditors Association, the Massachusetts Risk Insurance Management Association, and other professional groups. He is a member of the American Accounting Association, the EDP Auditors Association, the Society for Information Management, the Association for Computing Machinery, Beta Alpha Psi, and Beta Gamma Sigma. In his spare time, Professor Gelinas is engaged in his favorite activities: sailing, scuba diving, antiquing and music—listening, not performing!

**Allan E. Oram, MBA, CPA**, is Professor Emeritus at Bentley College in Waltham, Massachusetts. He received his MBA and baccalaureate degrees from Northeastern University. His practical experience with Arthur Young & Company and with the Bank of New England support his teaching and research interests in accounting information systems, EDP auditing, and financial accounting. Professor Oram joined the Bentley faculty in 1963 and played key roles in curriculum development at the college. In 1981, he initiated and designed Bentley's undergraduate AIS course. This effort and his other endeavors to enhance the computer literacy of accounting students at the college resulted in his being chosen to participate in Coopers & Lybrand Foundation's first curriculum development grant for integrating the computer into the accounting curriculum. He has written for the *Journal of Accounting and Computers* and has served as an associate editor of that journal. In addition to his faculty functions, Professor Oram chaired the accounting department during a crucial period in the 1970s when the college expanded its offerings to include graduate programs in accounting and taxation. Since taking early retirement in 1990, he has divided his time between researching and writing this second edition and pursuing his hobbies of golf and tennis.

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