## CONTENTS

About the Authors  v  
Preface  vii  
Acknowledgments  xi  
To the Students  xiii  
A List of Real-World Examples in This Textbook  xv  

**MODULE 1**  INTRODUCTION Defines business processes, AIS, and all foundational concepts. This module provides the knowledge building blocks to support the remaining chapters.

### 1 Introduction to AIS  1

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of Business Processes (Study Objective 1),</td>
<td>1</td>
</tr>
<tr>
<td>Overview of an Accounting Information System (Study Objective 2),</td>
<td>4</td>
</tr>
<tr>
<td>Business Process Linkage Throughout the Supply Chain (Study Objective 3),</td>
<td>5</td>
</tr>
<tr>
<td>IT Enablement of Business Processes (Study Objective 4),</td>
<td>7</td>
</tr>
<tr>
<td>Basic Computer and IT Concepts (Study Objective 5),</td>
<td>10</td>
</tr>
<tr>
<td>Basic Computer Data Structures,</td>
<td>10</td>
</tr>
<tr>
<td>File Access and Processing Modes,</td>
<td>11</td>
</tr>
<tr>
<td>Data Warehouse and Data Mining,</td>
<td>13</td>
</tr>
<tr>
<td>Structured, Unstructured, and Big Data,</td>
<td>13</td>
</tr>
<tr>
<td>Networks and the Internet,</td>
<td>14</td>
</tr>
<tr>
<td>Examples of IT Enablement (Study Objective 6),</td>
<td>16</td>
</tr>
<tr>
<td>E-Business,</td>
<td>16</td>
</tr>
<tr>
<td>Electronic Data Interchange,</td>
<td>16</td>
</tr>
<tr>
<td>Point of Sale System,</td>
<td>16</td>
</tr>
<tr>
<td>Automated Matching,</td>
<td>17</td>
</tr>
<tr>
<td>Evaluated Receipt Settlement,</td>
<td>17</td>
</tr>
<tr>
<td>E-Payables and Electronic Invoice Presentment and Payment,</td>
<td>17</td>
</tr>
<tr>
<td>Enterprise Resource Planning Systems,</td>
<td>17</td>
</tr>
<tr>
<td>Blockchain Technology,</td>
<td>18</td>
</tr>
</tbody>
</table>
The Internal Control Structure of Organizations (Study Objective 7), 19
 Enterprise Risk Management, 20
 A Code of Ethics, 22
 COSO Accounting Internal Control Structure, 22
 IT Controls, 22
 Corporate Governance, 23
 IT Governance, 23
 The Importance of Accounting Information Systems to Accountants (Study Objective 8), 24
 Users of the AIS, 24
 Design or Implementation Team, 24
 Auditors of the AIS, 24
 The Relation of Ethics to Accounting Information Systems (Study Objective 9), 25
 Summary of Study Objectives, 26
 Key Terms, 27
 End of Chapter Material, 28
 Concept Check, 28
 Discussion Questions, 28
 Brief Exercises, 29
 Problems, 29
 Cases, 31
 Solutions to Concept Check, 31

2 Foundational Concepts of the AIS 33
 Interrelationships of Business Processes and the AIS (Study Objective 1), 34
 Types of Accounting Information Systems (Study Objective 2), 36
 Manual Systems, 37
 Legacy Systems, 38
 Modern Integrated Systems, 40
 Client–Server Computing (Study Objective 3), 40
 Cloud Computing (Study Objective 4), 41
 Accounting Software Market Segments (Study Objective 5), 45
 Input Methods Used in Business Processes (Study Objective 6), 48
 Source Documents and Keying, 48
 Bar Codes, 49
 Point of Sale Systems, 49
 Electronic Data Interchange, 50
 E-Business and E-Commerce, 50
 Processing Accounting Data (Study Objective 7), 50
 Batch Processing, 50
 Online and Real-Time Processing, 52
 Outputs from the AIS Related to Business Processes (Study Objective 8), 52
MODULE 2  CONTROL ENVIRONMENT  Describes the proper control environment to oversee and control processes.

3  Fraud, Ethics, and Internal Control  

Introduction to the Need for a Code of Ethics and Internal Controls (Study Objective 1), 69
Accounting-Related Fraud (Study Objective 2), 72
Categories of Accounting-Related Fraud, 74
The Nature of Management Fraud (Study Objective 3), 75
The Nature of Employee Fraud (Study Objective 4), 76
The Nature of Customer Fraud (Study Objective 5), 78
The Nature of Vendor Fraud (Study Objective 6), 78
The Nature of Computer Fraud (Study Objective 7), 78
Internal Sources of Computer Fraud, 79
External Sources of Computer Fraud, 80
Policies to Assist in the Avoidance of Fraud and Errors (Study Objective 8), 82
Maintenance of a Code of Ethics (Study Objective 9), 82
Maintenance of Accounting Internal Controls (Study Objective 10), 83
The Details of the COSO Report, 85
Reasonable Assurance of Internal Controls, 93
Maintenance of Information Technology Controls (Study Objective 11), 94
The Sarbanes-Oxley Act of 2002 (Study Objective 12), 96
Section 404—Management Assessment of Internal Controls, 97
Section 406—Code of Ethics for Senior Financial Officers, 97
Summary of Study Objectives, 98
Key Terms, 99
4 Internal Controls and Risks in IT Systems

An Overview of Internal Controls for IT Systems (Study Objective 1), 107
General Controls for IT Systems (Study Objective 2), 110
  Authentication of Users and Limiting Unauthorized Users, 110
  Hacking and Other Network Break-Ins, 113
  Organizational Structure, 116
  Physical Environment and Security, 117
  Business Continuity, 119
General Controls from an AICPA Trust Services Criteria Perspective (Study Objective 3), 120
  Risks in Not Limiting Unauthorized Users, 122
  Risks from Hacking or Other Network Break-Ins, 123
  Hacking and Network Break-Ins Related to Blockchain, 124
  Risks from Environmental Factors, 124
  Physical Access Risks, 125
  Business Continuity Risks, 125
Hardware and Software Exposures in IT Systems (Study Objective 4), 125
  The Operating System, 127
  The Database, 128
  The Database Management System, 129
  LANs and WANs, 130
  Wireless Networks, 130
  The Internet and World Wide Web, 131
  Telecommuting Workers and Mobile Workers, 132
  Electronic Data Interchange, 132
  Cloud Computing, 133
Application Software and Application Controls (Study Objective 5), 135
  Input Controls, 136
  Processing Controls, 142
  Output Controls, 142
Ethical Issues in IT Systems (Study Objective 6), 143
Summary of Study Objectives, 144
Key Terms, 145
End of Chapter Material, 146
  ■ Concept Check, 146
  ■ Discussion Questions, 147
  ■ Brief Exercises, 147
5 IT Governance

Introduction to IT Governance (Study Objective 1), 153
An Overview of the SDLC (Study Objective 2), 157
The Phases of the SDLC, 160
Elements of the Systems Planning Phase of the SDLC (Study Objective 3), 160
  The Match of IT Systems to Strategic Objectives, 161
  Feasibility Study, 161
  Planning and Oversight of the Proposed Changes, 163
Elements of the Systems Analysis Phase of the SDLC (Study Objective 4), 163
  Preliminary Investigation, 163
  System Survey: The Study of the Current System, 163
  Determination of User Requirements, 165
  Analysis of the System Survey, 166
  Systems Analysis Report, 166
Elements of the Systems Design Phase of the SDLC (Study Objective 5), 167
  The Purchase of Software, 168
  In-House Design, 169
  Conceptual Design, 169
  Evaluation and Selection, 170
  Cloud Computing as a Conceptual Design, 172
  Detailed Design, 172
Elements of the Systems Implementation Phase of the SDLC (Study Objective 6), 174
  Software Programming, 175
  Training Employees, 175
  Software Testing, 176
  Documenting the System, 176
  Data Conversion, 176
  System Conversion, 176
  User Acceptance, 177
  Post-Implementation Review, 177
Elements of the Operation and Maintenance Phase of the SDLC (Study Objective 7), 177
The Critical Importance of IT Governance in an Organization (Study Objective 8), 178
  SDLC as Part of Strategic Management, 178
  SDLC as an Internal Control, 178
Ethical Considerations Related to IT Governance (Study Objective 9), 179
  Ethical Considerations for Management, 179
  Ethical Considerations for Employees, 180
  Ethical Considerations for Consultants, 180
6 Enterprise Resource Planning (ERP) Systems

Overview of ERP Systems (Study Objective 1), 187
History of ERP Systems (Study Objective 2), 192
Current ERP System Characteristics (Study Objective 3), 194
ERP Modules (Study Objective 4), 195
Financials, 196
Human Resources, 196
Procurement and Logistics, 196
Product Development and Manufacturing, 196
Sales and Services, 196
Analytics, 196
Supply Chain Management (SCM), 197
Customer Relationship Management (CRM), 197
ERP Market Segments, Cloud Computing and Digital Transformation (Study Objective 5), 197
Tier One Software, 198
Tier Two Software, 199
Cloud-Based ERP, 199
Implementation of ERP Systems (Study Objective 6), 201
Hiring a Consulting Firm, 201
The Best-Fit ERP System, 202
Which Modules to Implement, 202
Best-of-Breed versus ERP Modules, 202
Business Process Reengineering, 203
Customization of the ERP System, 203
The Costs of Hardware and Software, 204
Testing of the ERP System, 204
Data Conversion, 204
Training of Employees, 204
The Methods of Conversion to the ERP System, 205
Benefits and Risks of ERP Systems (Study Objective 7), 207
Benefits of ERP Systems, 207
Risks of ERP Systems, 209
ERP Systems and the Sarbanes–Oxley Act (Study Objective 8), 210
Summary of Study Objectives, 212
Key Terms, 214
MODULE 3  BUSINESS PROCESSES  The sets of business processes and the internal controls in organizations.
With process maps, document flowcharts, and data flow diagrams, the core business processes are described and the necessary controls to manage risk are discussed.
8 Revenue and Cash Collection Processes and Controls

Introduction to Revenue Processes (Study Objective 1), 256
Sales Processes (Study Objective 2), 261
Risks and Controls in Sales Processes (Study Objective 2, Continued), 268
  Authorization of Transactions, 268
  Segregation of Duties, 268
  Adequate Records and Documents, 269
  Security of Assets and Documents, 269
  Independent Checks and Reconciliation, 270
  Cost-Benefit Considerations, 270
Sales Return Processes (Study Objective 3), 272
Risks and Controls in the Sales Return Processes (Study Objective 3, Continued), 272
  Authorization of Transactions, 272
  Segregation of Duties, 275
  Adequate Records and Documents, 275
  Security of Assets and Documents, 276
  Independent Checks and Reconciliation, 276
  Cost-Benefit Considerations, 276
Cash Collection Processes (Study Objective 4), 277
Risks and Controls in the Cash Collection Processes (Study Objective 4, Continued), 278
  Authorization of Transactions, 278
  Segregation of Duties, 278
  Adequate Records and Documents, 282
  Security of Assets and Documents, 282
  Independent Checks and Reconciliation, 283
  Cost-Benefit Considerations, 283
IT-Enabled Systems of Revenue and Cash Collection Processes (Study Objective 5), 285
E-Business Systems and the Related Risks and Controls (Study Objective 6), 287
  Security and Confidentiality Risks, 289
  Processing Integrity Risks, 289
  Availability Risks, 290
Electronic Data Interchange (EDI) Systems and the Risks and Controls (Study Objective 7), 290
Point of Sale (POS) Systems and the Related Risks and Controls (Study Objective 8), 294
Ethical Issues Related to Revenue Processes (Study Objective 9), 295
Corporate Governance in Revenue Processes (Study Objective 10), 297
Summary of Study Objectives, 298
Key Terms, 300
End of Chapter Material, 300
  • Concept Check, 300
  • Discussion Questions, 301
Expenditures Processes and Controls—Purchases

## Contents

- Brief Exercises, 302
- Problems, 303
- Cases, 308
- Solutions to Concept Check, 312

### 9 Expenditures Processes and Controls—Purchases

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Expenditures Processes (Study Objective 1)</td>
<td>314</td>
</tr>
<tr>
<td>Purchasing Processes (Study Objective 2)</td>
<td>317</td>
</tr>
<tr>
<td>Risks and Controls in the Purchasing Process (Study Objective 2,</td>
<td>327</td>
</tr>
<tr>
<td>Continued)</td>
<td></td>
</tr>
<tr>
<td>Authorization of Transactions,</td>
<td>327</td>
</tr>
<tr>
<td>Segregation of Duties,</td>
<td>327</td>
</tr>
<tr>
<td>Adequate Records and Documents,</td>
<td>328</td>
</tr>
<tr>
<td>Security of Assets and Documents,</td>
<td>328</td>
</tr>
<tr>
<td>Independent Checks and Reconciliation,</td>
<td>329</td>
</tr>
<tr>
<td>Cost-Benefit Considerations,</td>
<td>329</td>
</tr>
<tr>
<td>Purchase Return Process (Study Objective 3)</td>
<td>331</td>
</tr>
<tr>
<td>Risks and Controls in the Purchase Return Processes (Study Objective 3, Continued)</td>
<td>335</td>
</tr>
<tr>
<td>Authorization of Transactions,</td>
<td>335</td>
</tr>
<tr>
<td>Segregation of Duties,</td>
<td>335</td>
</tr>
<tr>
<td>Adequate Records and Documents,</td>
<td>335</td>
</tr>
<tr>
<td>Security of Assets and Documents,</td>
<td>336</td>
</tr>
<tr>
<td>Independent Checks and Reconciliation,</td>
<td>336</td>
</tr>
<tr>
<td>Cost-Benefit Considerations,</td>
<td>336</td>
</tr>
<tr>
<td>Cash Disbursement Processes (Study Objective 4)</td>
<td>337</td>
</tr>
<tr>
<td>Risks and Controls in the Cash Disbursement Processes (Study Objective 4, Continued)</td>
<td>343</td>
</tr>
<tr>
<td>Authorization of Transactions,</td>
<td>343</td>
</tr>
<tr>
<td>Segregation of Duties,</td>
<td>344</td>
</tr>
<tr>
<td>Adequate Records and Documents,</td>
<td>344</td>
</tr>
<tr>
<td>Security of Assets and Documents,</td>
<td>344</td>
</tr>
<tr>
<td>Independent Checks and Reconciliation,</td>
<td>344</td>
</tr>
<tr>
<td>Cost-Benefit Considerations,</td>
<td>345</td>
</tr>
<tr>
<td>IT Systems of Expenditures and Cash Disbursement Processes (Study Objective 5)</td>
<td>346</td>
</tr>
<tr>
<td>Computer-Based Matching (Study Objective 6),</td>
<td>348</td>
</tr>
<tr>
<td>Risks and Controls in Computer-Based Matching (Study Objective 6,</td>
<td>349</td>
</tr>
<tr>
<td>Continued)</td>
<td></td>
</tr>
<tr>
<td>Security and Confidentiality Risks,</td>
<td>349</td>
</tr>
<tr>
<td>Processing Integrity Risks,</td>
<td>350</td>
</tr>
<tr>
<td>Availability Risks,</td>
<td>350</td>
</tr>
<tr>
<td>Evaluated Receipt Settlement (Study Objective 7)</td>
<td>350</td>
</tr>
<tr>
<td>Risks and Controls in Evaluated Receipt Settlement (Study Objective 7, Continued)</td>
<td>351</td>
</tr>
</tbody>
</table>
Security and Confidentiality, 352
Processing Integrity, 352
Availability, 352
E-Business and Electronic Data Interchange (EDI), 352
(Study Objective 8), 352
Risks and Controls in E-Business and EDI (Study Objective 8, 353
Continued), 353
Security and Confidentiality, 353
Processing Integrity, 354
Availability, 355
E-Payables (Study Objective 9), 355
Procurement Cards (Study Objective 10), 356
Ethical Issues Related to Expenditures Processes 356
(Study Objective 11),
Corporate Governance in Expenditure Processes 358
(Study Objective 12),
Summary of Study Objectives, 359
Key Terms, 361
End of Chapter Material, 362
■ CONCEPT CHECK, 362
■ DISCUSSION QUESTIONS, 363
■ BRIEF EXERCISES, 364
■ PROBLEMS, 364
■ CASES, 367
Solutions to Concept Check, 371

10 Expenditures Processes and Controls—Payroll and Fixed Assets 373
Introduction to Payroll and Fixed Asset Processes (Study Objective 1), 373
Payroll Processes (Study Objective 2), 377
Risks and Controls in the Payroll Processes (Study Objective 3), 385
Authorization of Transactions, 385
Segregation of Duties, 386
Adequate Records and Documents, 386
Security of Assets and Documents, 386
Independent Checks and Reconciliation, 387
Cost–Benefit Considerations, 387
IT Systems of Payroll Processes (Study Objective 4), 387
Fixed Asset Processes (Study Objective 5), 390
Fixed Asset Acquisitions, 390
Fixed Asset Continuance, 394
Fixed Asset Disposals, 395
Risks and Controls in Fixed Asset Processes (Study Objective 6), 398
Authorization of Transactions, 398
Segregation of Duties, 399
Adequate Records and Documents, 399
Security of Assets and Documents, 399
Independent Checks and Reconciliation, 399
Cost-Benefit Considerations, 400
IT Systems of Fixed Asset Processes (Study Objective 7), 401
Ethical Issues Related to Payroll and Fixed Asset Processes (Study Objective 8), 403
Corporate Governance in Payroll and Fixed Asset Processes (Study Objective 9), 405
Summary of Study Objectives, 407
Key Terms, 408
End of Chapter Material,
  ■ Concept Check, 408
  ■ Discussion Questions, 410
  ■ Brief Exercises, 410
  ■ Problems, 411
  ■ Cases, 412
Solutions to Concept Check, 414

11 Conversion Processes and Controls 416

Basic Features of Conversion Processes (Study Objective 1), 416
Components of the Logistics Function (Study Objective 2), 419
Planning, 419
Resource Management, 421
Operations, 423
Cost Accounting Reports Generated by Conversion Processes (Study Objective 3), 427
Risks and Controls in Conversion Processes (Study Objective 4), 428
Authorization of Transactions, 428
Segregation of Duties, 428
Adequate Records and Documents, 429
Security of Assets and Documents, 429
Independent Checks and Reconciliation, 429
Cost-Benefit Considerations, 430
IT Systems of Conversion Processes (Study Objective 5), 431
The Supply Chain and Enterprise (ERP) Systems (Study Objective 6), 435
Ethical Issues Related to Conversion Processes (Study Objective 7), 437
Corporate Governance in Conversion Processes (Study Objective 8), 438
Summary of Study Objectives, 438
Key Terms, 439
End of Chapter Material,
  ■ Concept Check, 440
  ■ Discussion Questions, 441
MODULE 4  IT INFRASTRUCTURE TO ENABLE PROCESSES  The hardware, software, and systems that support business processes.
13 Data and Databases

The Need for Data Collection and Storage (Study Objective 1), 476
Storing and Accessing Data (Study Objective 2), 478
Data Storage Terminology, 479
Data Storage Media, 479
Data Processing Techniques (Study Objective 3), 480
Databases (Study Objective 4), 481
The History of Databases, 483
The Need for Normalized Data (Study Objective 5), 485
Trade-Offs in Database Storage, 487
Use of a Data Warehouse to Analyze Data (Study Objective 6), 488
Build the Data Warehouse, 489
Identify the Data, 489
Standardize the Data, 489
Cleanse, or Scrub, the Data, 490
Upload the Data, 491
Data Analysis Tools (Study Objective 7), 491
Data Mining, 491
OLAP, 492
Distributed Data Processing (Study Objective 8), 493
DDP and DDB, 494
Cloud-Based Databases (Study Objective 9), 495
Big Data and Data Analytics (Study Objective 10), 497
Data Visualization, 498
IT Controls for Data and Databases (Study Objective 11), 499
Ethical Issues Related to Data Collection and Storage
(Study Objective 12), 499
Ethical Responsibilities of the Company, 500
Ethical Responsibilities of Employees, 501
Ethical Responsibilities of Customers, 502
Summary of Study Objectives, 502
Key Terms, 504
End of Chapter Material,
- Concept Check, 504
- Discussion Questions, 505
- Brief Exercises, 506
- Problems, 507
- Cases, 507
Solutions to Concept Check, 508

14 E-Commerce and E-Business

Introduction to E-Commerce and E-Business (Study Objective 1), 510
The History of the Internet (Study Objective 2), 512
The Physical Structure and Standards of the Internet (Study Objective 3), 514
   The Network, 514
   The Common Standards of the Internet, 516
E-Commerce and Its Benefits (Study Objective 4), 518
   Benefits and Disadvantages of E-Commerce for the Customer, 519
   Benefits and Disadvantages of E-Commerce for the Business, 520
   The Combination of E-Commerce and Traditional Commerce, 521
Privacy Expectations in E-Commerce (Study Objective 5), 522
E-Business and IT Enablement (Study Objective 6), 523
   B2B: A Part of E-Business, 526
E-Business Enablement Examples and Digital Transformation (Study Objective 7), 527
   Digital Transformation, 529
Intranets and Extranets to Enable E-Business (Study Objective 8), 530
   Internal Controls for the Internet, Intranets, and Extranets (Study Objective 9), 532
XML and XBRL as Tools to Enable E-Business (Study Objective 10), 533
   XML in Internet EDI, 533
   XBRL for Financial Statement Reporting, 535
Ethical Issues Related to E-Business and E-Commerce (Study Objective 11), 536
Summary of Study Objectives, 538
Key Terms, 540
End of Chapter Material, 540
   ■ Concept Check, 540
   ■ Discussion Questions, 541
   ■ Brief Exercises, 541
   ■ Problems, 542
   ■ Cases, 542
Solutions to Concept Check, 543

Index I-1