IS Model Curriculum: Adoption Rate of IS 2010 Model Curriculum in AACSB Schools and Impacts of the Proposed 2020 Model Curriculum

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Abstract

As the skills and competencies needed by Information Systems (IS) undergraduates continues to grow, various IS professional societies have developed recommendations which are updated on a periodic basis. These recommendations known as 'model curricula' are a guide for faculty and institutions to consider when developing or evaluating the effectiveness of their program. This research is based on the IS2010 Model Curriculum to determine their adoption rates by schools that currently offer a major or concentration in IS. Based on the evaluation of over 300 schools and using the IS2010 model as a benchmark, the key findings include that of the six recommended upper-level core courses, four had above a 50% adoption rate, while the remaining two were adopted by less than 30% of the schools surveyed. It is interesting to note that the IS2020 Model (in draft at the time of this research) reflects the rapid change to the needs of employers and includes concepts from the software development, security, and analytics courses as core competencies. These were missing from the IS2010 Model core competencies. Our findings suggest that, in a technology field like Information Systems, a 10 year refresh rate to model curriculum is too long a period to wait as employer demands change more frequently.

Keywords: IS2010 Model Curriculum, Computing Curricula 2020, AACSB, Information Systems, Curriculum

1. INTRODUCTION

Curriculum for a rapidly changing field such as Information Systems (IS) can be a challenging area for academicians to manage. This challenge comes from ensuring that the courses offered by a MIS/CIS (Management Information Systems / Computer Information Systems) department for the major/concentration remain current and relevant while adapting to employer's changing needs.

To assist in this endeavor, professional societies in the information systems and computing fields have gathered input from a wide variety of colleagues around the world to issue guidelines for potential model curriculum. These guidelines are issued roughly every ten years. However, the

question remains: "How helpful are these guidelines and are they implemented?".

There has been a variety of research that examines the use of the IS2010 model curriculum (ACM, 2010). A study by Apigian and Gambill (2010) provided initial insights into the model curriculum as it was being developed in 2009. Later studies have also evaluated IS2010 in the context of ABET accreditation (Feinstein, D., Longenecker, B. and Shresthat, D., 2014). For this research, we build on prior studies that detailed the adoption patterns of AACSB (Association to Advance Collegiate Schools of Business) schools and their implementation of the IS2010 model curriculum (Bell, Mills and Fadel, 2013 & Mills, Velasquez, Fadel and Bell, 2012).

The current research summarizes the results from investigating the adoption rate of core and elective courses from the IS2010 Model Curriculum guidelines. Over 300 AACSB accredited schools were evaluated to determine which courses within the model curriculum were implemented as either core or elective courses across various IS programs. ACM (Association for Computing Machinery), AIS (Association for Information Systems) and others have updated the model curriculum (i.e., IS2020) with an initial draft in December of 2020 (ACM/AIS, 2020). Given the recent release of this draft, it would not be practical to measure their level of implementation. Thus, this paper is intended as an overview of current curriculum based on the previous model with the intent to serve as a guide moving forward. Additionally, it will also provide several recommendations on matching courses in the IS2020 model curriculum to employer needs projected for the next ten years as reported by the United States Bureau of Labor Statistics.

2. INFORMATION SYSTEMS (IS) MODEL CURRICULUM

Periodically, IS professional societies update the model IS discipline curriculum. The first model curricula were developed in the 1970s and have been updated regularly. In 2010, the Association for Information Systems (AIS) and the Association for Computing Machinery (ACM) provided guidance as far as courses and resources needed for Information Systems programs (ACM, 2010).

Per IS2010, the use of the report is "to provide a local academic unit with rationale to obtain proper resources to support its program. Often, the administration at a local institution is not aware of the resources, course offerings, computing hardware, software and laboratory resources needed for a viable program" (ACM 2010, p. v). These guidelines were built to provide a set of core courses as well as electives centered around specific careers in the IS field. The "core" courses were designed to provide a high-level of IS knowledge for business school students and non-business school students in the IS field. In addition to the core courses, all programs should have some elective courses prescribed to meet the institution's stakeholders' needs for specific career tracks.

IS 2010 Recommended Core Courses

This section will describe the high level IS conceptual courses that are recommended by the study as well as a brief description of the concepts included in that course or module. The number after the course title (e.g., 2010.1) reflects the model's coding for courses.

1. Foundations of Information Systems (2010.1)
   This course is a basic introduction to Information systems for all students within the major as well as non-IS majors. Topics include:
   - Digital World Characteristics
   - IS Components (Hardware / Software / Networks / Data)
   - IS in Organizations (Value/Strategic)
   - Globalization
   - Valuing Information Systems
   - Infrastructure
   - Security
   - Business Intelligence
   - Ethics
   - Development and Acquisition
   - Enterprise Wide

2. Data and Information Management (2010.2)
   Introduce the core concepts in data and information management. Topics include:
   - Database approaches
   - Basic file processing
   - Physical and logical models
   - Languages
   - Data Security
   - Data Quality
   - Use in Business Intelligence

3. Enterprise Architecture (2010.3)
   The design, selection and implementation of enterprise-wide IT solutions. Topics include:
   - Service oriented architecture
   - Integration
   - Role of Open Source software
   - System Administration

- IT Controls
- Risk Management

4. Infrastructure Architecture (2010.4)
   Topics pertinent to systems architecture and communication networks. Topics include:
   - Operating Systems
   - Computing systems architecture and organizing structures
   - Data Centers
   - Security infrastructure
   - Cloud, grid, "as service"
   - Performance analysis

5. Project Management (2010.5)
   Introduction to the methods, tools, controls to manage IS projects. Topics include:
   - Project Management (PM) Lifecycle
   - Managing IS Teams
   - Communications
   - Scope
   - Scheduling
   - Quality
   - Risk

6. Systems Analysis and Design (2010.6)
   Discuss the approaches to solve business problems or opportunities. Topics include:
   - Identify opportunities
   - Understand business requirements
   - Analysis of project feasibility
   - Different approaches to analysis and design
   - Approaches to implementing systems

7. IS Strategy, Management and Acquisition (2010.7)
   How the IS function integrates and supports the overall organizational strategies and operations. Topics include:
   - IS strategic alignment
   - Strategic use of information
   - Managing the IS function
   - Financing and evaluation
   - IS/IT governance frameworks

Elective Courses as described in the IS2010 model.
As mentioned earlier, the elective courses should be chosen to meet the institution's stakeholders' need to support specific career tracks. This list of electives follows.

E1. Application Development
   Introduce the concepts of building applications. Topics include:
   - Design
   - Modular design
   - Program Structures
   - Variables/Procedures
   - Coding
   - Testing
   - Development Approaches

E2. Business Process Management
   Understanding and designing business processes. Topics include:
   - Organizational Processes
   - Process assessment/improvement
   - Using IT for mgt and improvement
   - Understanding the customer
   - Outsourcing

E3. Enterprise Systems
   Discussion of the theoretic and practical issues related to enterprise systems in organizations. Topics include:
   - Business Processes
   - Justification of enterprise systems
   - Strategic alignment
   - User commitment
   - Job redesign
   - Governance of processes

E4. Introduction to Human Computer Interaction (HCI)
   Overview of the interdisciplinary field that integrates psychology, design and computer science. Topics include:
   - Principles of HCI
   - User Centered Design
   - HCI issues related to age/disabilities
   - individuals
   - Development techniques
   - Evaluation Methods

E5. IT Audit and Controls
   Understanding information controls and the management. Topics include:
   - Need for audit and controls
   - Definition of risks
   - Ethics, guidelines and standards in the profession
   - Controls
   - Assessment techniques

E6. IT Innovation and Technologies
   Impact of new innovations related to technologies on organizations. Topics include:
   - Globalization
   - Technologies shaping the electronic world
   - Process of IS innovation
   - Strategic importance of the Web as a platform

E7. IT Security and Risk Management

Learn the concepts of security principles and the developing and monitoring of security tasks. Topics include:

- Inspection
- Protection / Detection / Reaction
- Risk Assessment Frameworks
- Physical Aspects
- Connected system security concepts
- Security engineering

3. METHODOLOGY

To evaluate the implementation of the 2010 model curriculum in current MIS/CIS programs, a list of all AACSB accredited schools within the United States was utilized. AACSB International provides accreditation for both business schools and accounting programs that meet specific standards (more information may be found at https://www.aacsb.edu/). AACSB schools were chosen because the accreditation requires participating schools to consider model curriculum in their programs.

This list of AACSB schools was further divided into three categories. Based on the Carnegie Classification of Institutions of Higher Education (https://carnegieclassifications.iu.edu/), two of the categories were based on Doctoral Universities classified as either Very High Research Activity (i.e., R1) or High Research Activity (i.e., R2). All universities within these 2 categories that had an AACSB accredited business program were evaluated. For the last category, 100 of the remaining 300 universities (not classified as R1 or R2) were randomly selected to evaluate. This number (i.e., 100) was chosen in order to make an equivalent comparison to the R1 and R2 categories. The final number evaluated was 329 universities.

Procedures

Once the list of universities was compiled, the authors then evaluated each one to determine if it contained an information system major or concentration within the business school. Minors, certificates, and programs outside of the business school were not included.

The most common program names included Management Information Systems (35%), Information Systems (27%) and Computer Information Systems (11%) (a complete list of program names can be found in Appendix A). For this paper, we will be referring to all programs as Information Systems (IS). Additionally, universities provided a variety of bachelor's programs but were primarily either a Bachelor of Science (64% of universities analyzed) or a Bachelor of Business Administration (34% of universities).

Classification	IS Major	No Major	Total
R1	75 (63%)	45 (38%)	120
R2	76 (70%)	33 (30%)	109
Other	58 (58%)	42 (42%)	100
Total	209 (64%)	120 (36%)	329

Table 1. Universities with/without IS Majors

The final number of universities which included either a major or concentration in IS was 209 (64%) universities while 120 (36%) universities did not have one. A complete view based on classification categories can be found in Table 1.

If the university had a major/concentration, we then collected all the required and elective courses that were included as part of the program. Only the courses specifically concerning information systems were included in the final list. For example, a small number of schools listed all business courses as required for the IS major but only the courses related specifically to IS were included in the total number of hours. This was to be consistent with the majority of universities and how they list the IS major.

The list of required and elective courses was then evaluated based on the IS2010 Model Curriculum. This included matching the course title to the model curriculum and when needed, further evaluating the course description to ensure it matched the model curriculum description. To ensure interrater reliability, each author took a random sample of the other author's evaluated schools to ensure the ratings were similar. The observations from this analysis are discussed in the next section.

4. OBSERVATIONS

Overall, the schools studied were very similar in the number of credits required for the major or concentration (see Table 2). The average total number of courses across all categories was 8 (24 hours) with an average of 21 hours for R1 institutions, 24 hours for R2, and 25 hours for the other institutions. The average number of required courses was approximately 6 courses with an additional 2 courses as electives.

	Avg. # of Program Hours	Avg. # of Required Courses	Avg. # of Elective Courses
R1	20.95	5.49	1.60
R2	24.43	5.92	2.05
Other	25.91	6.17	2.16
Total	24.04	5.98	1.93

Table 2: Number of credits required for the IS major

The IS2010 model recommends seven core courses, one of which is the Introduction to Management Information Systems course. As this course is generally required of all business majors in AACSB schools, it was excluded from the analysis because most universities do not list this as a required course specifically under the major or concentration. A list of the remaining core courses can be found in Table 3.

The top three required courses adopted across AACSB schools as part of their core classes include: Data and Information Management (90%), System Analysis and Design (85%) and Infrastructure Architecture (52%). The least adopted required courses were Project Management (37%), IS Strategy (18%) and Enterprise Architecture (17%). These percentages only include programs that have core courses as required for major/concentration.

Model Curriculum Core	Data and Info Mgt		System Analysis and Design		Infra-structure Architec-ture		Project Mgt		IS Strategy Mgt and Acquisition		Enterprise Architec-ture	
R1												
Required	67	89%	61	81%	35	47%	27	36%	14	19%	11	15%
Elective	1	1%	3	4%	11	15%	13	17%	8	11%	2	3%
R2												
Required	70	92%	66	87%	35	46%	30	39%	12	16%	15	20%
Elective	2	3%	3	4%	11	14%	16	21%	4	5%	5	7%
Other												
Required	53	91%	52	90%	39	67%	21	36%	11	19%	9	16%
Elective	1	2%	1	2%	7	12%	11	19%	6	10%	5	9%
Total of All Universities Adopting Core Courses												
Required	190	90%	179	85%	109	52%	78	37%	37	18%	35	17%
Elective	4	2%	7	3%	29	14%	40	19%	18	9%	12	6%
Total	194	92%	186	88%	138	66%	118	56%	55	27%	47	23%

Table 3 – Adoption of IS 2010 Model Curriculum Recommended Core Courses by AASCB Schools in order of the total percentage of adoption

Note: the first column is the raw number of schools adopting that course into the curriculum and the second column is the % of schools adopting a particular course divided by all AACSB schools in that category (R1/R2/Other).

Model Curriculum Electives	Software Develop-ment		Security / Risk Mgt		10E Enterprise System		Business Process Mgt		Innovation / New Technolog y		HCI		Audit / Controls	
R1														
Required	57	76%	13	17%	4	5%	5	7%	3	4%	0	0%	0	0%
Elective	6	8%	24	32%	8	11%	7	9%	8	11%	0	0%	4	5%
R2														
Core	69	91%	19	25%	12	16%	6	8%	2	3%	1	1%	1	1%
Elective	4	5%	22	29%	14	18%	4	5%	8	11%	3	4%	0	0%
Other														
Core	44	76%	13	22%	4	7%	3	5%	2	3%	1	2%	0	0%
Elective	4	7%	18	31%	2	3%	3	5%	4	7%	2	3%	1	2%
Total of All Universities Adopting Elective Courses														
Core	170	81%	45	21%	20	9%	14	7%	7	3%	2	1%	1	0.5%
Elective	14	7%	64	30%	24	11%	14	7%	20	9%	5	2%	5	2%
Total	184	88%	109	51%	44	20%	28	14%	27	12%	7	3%	6	2.5%

Table 4 – Adoption of IS 2010 Model Curriculum Recommended Elective Courses by AASCB Schools

Model Curriculum	Capstone		Data Analytics	
R1				
Core	10	13%	12	16%
Elective	0	0%	31	41%
R2				
Core	18	24%	17	22%
Elective	0	0%	25	33%
Other				
Core	19	33%	15	26%
Elective	6	10%	18	31%
All Schools				
Core	47	22%	44	21%
Elective	6	3%	74	35%

Table 5 – Adoption of new courses not detailed in the model curriculum

Table 4 details the adoption of the elective courses from the elective list of courses found in the model curriculum. It details the adoption of these courses into the school's major/concentration as part of their required or elective list of courses.

Interestingly, one of the recommended elective courses has a higher adoption rate than four of the model curriculum core courses. This course is Software Development Concepts which is a required course in over 80% of the schools analyzed. Additionally, Security and Risk Management has a high adoption as a required course (21%). The recommended elective courses of HCI and Audit and Controls have been adopted by only 3 to 4% of AACSB schools.

The researchers found two other courses that had a higher implementation rate compared to other required or elective courses (see Table 5). Data Analytics, which is an emerging field, has worked its way into over 20% of the AACSB schools as a required course and over 30% as an elective course. We noticed that a "Capstone" course that was adopted by over 20% of the schools as a required course. We should mention it was difficult to determine what the learning concepts were in the Capstone courses and these learning concepts may overlap with other required or elective courses.

5. DISCUSSION

Observations from the curriculum analysis showed mixed results. Some courses such as Data Management and Systems Analysis/Design have become standard in many programs while others such as Strategy and Enterprise are still not widely included in IS programs at AACSB schools. To understand these differences and where the field may be moving, the following sections provide an attempt to address these

concerns. First, a discussion concerning how programs may be shifting their curriculum to meet employer demands is presented. This is followed by a discussion of the implications from the recent curriculum report (i.e., Computing Curriculum 2020). Finally, the findings are compared to the release of the IS2020 Model Curriculum draft released.

Aligning Curriculum with Industry Demands

A goal of any education program should be to have a high placement rate for its graduates. This may be one reason our results show elective courses such as software development, security and data analytics are being adopted at higher rates compared to some of the 2010 suggested core courses.

According to the United States Bureau of Labor Statistics (BLS), there is significant demand for computer and computer related professionals (Bureau of Labor Statistics, Computer and Information Technology Occupations, 2021). As mentioned in the overview of the model curriculum guidelines, its elective options have been suggested to assist in developing career tracks for graduates. This may be the reason we are seeing increases in programs offering a software development class as a required course. As can be seen in Table 6, software developers are not only the second fastest growing occupation by percentage, but also highest in terms of new positions (316,000).

In fact, Information Technology occupations are projected to grow 11% by 2029, which is higher than the projected growth of 4% for all occupations in the United States. Demand for these workers will grow from the greater emphasis on cloud computing, collection and storage of data and information security. Table 6 summarizes the US Bureau of Labor Statistics findings for technology occupations requiring a bachelor's degree.

As seen in Table 6, the top 3 highest growing occupations include security analysts, software developers and database administrators. Skills in the occupations are included in the top core course (Data Management) and the top elective courses (Development and Security). Overall, the demand for software developers, security analysts and system analysts are suggested to yield at least 400,000 new jobs in these three specific occupations in the next 10 years.

CC2020 and the Current IS Curriculum

The updated Computing Curriculum 2020 was released in the first quarter of 2021 (ACM, 2020). The previous edition was issued in 2005 (ACM, 2005) which provided a foundation for computing curriculum across various fields and was followed by specific curriculum reports for each field (e.g., IS2010). The draft of the IS2020 model curriculum was released in December of 2020.

Occupation	Description	# Jobs (as of 2019)	Projected new jobs (by 2029)	Growth Rate
Security Analysts	Plan and carry out security measures to protect networks and systems	131K	41K	31%
Software Developers	Create applications / systems that run on a computer or other device	1.5M	316K	22%
Database Administrators	Use specialized software to store and organize data	133K	13K	19%
Web Developers	Digital designers develop, create, test a website or other devices	174K	14K	8%
System Analyst	Study an organization's current system and find a solution that is more efficient and effective	632K	47K	7%
Network Architects	Design and build data communication networks	160K	8K	5%
Network Administrators	Responsible for day to day operation of networks	374K	16K	4%
Programmers	Write and test code	214K	-20K	-9%

Table 6: US Bureau of Labor Statistics, Computer and Information Technology Occupations (BLS, 2021)

The CC2020 focuses on competencies for various computing fields. This has been a shift from the previous report which focused on knowledge-based learning (ACM, 2005). These competencies focus on the qualities graduates should possess in order to be effective in their future role or function. The goal is to encompass knowledge ("know-what"), skills ("know-how") and dispositions ("know-why") instead of specific courses (ACM 2020).

The draft for key competencies in Information Systems (IS) include 9 broad categories followed by more specific competencies (for a total of 88) within each of these broad categories. These categories have been identified as the following (note: the number of specific competencies in each category is in parentheses):

1) Identifying and designing opportunities for IT enable organization improvement (14)
2) Analyzing trade-offs (5)
3) Designing and implementing IS solutions (10)
4) Managing ongoing IT operations (10)
5) Leadership and collaboration (16)
6) Communication (7)
7) Negotiation (5)
8) Analytic and critical thinking (17)
9) Mathematic foundations (4)

In addition to the CC2020, a draft of the IS2020 model curriculum was also released outlining potential competency areas that are needed within programs. This initial report appears to be closer to industry needs and reflects the changes that AACSB schools have implemented in their programs. Specifically, the areas of software development, security and data/business analysis have become part of the 'core competencies' recommended. Additionally, based on our analysis of over 200 IS programs, there were 2 courses referenced in Table 3 (the Strategy and the Enterprise Architecture courses) that are not being widely required in IS programs. These two courses have been removed from the core requirements as part of the IS2020 recommendations.

Recommendations for Future IS Model Curriculum

After evaluating IS programs against the 2010 model, it may be that ten years between releases is too long a period for updates to the model. Current areas of importance such as cloud, cyber security and data / business analytics were not envisioned in 2010, but clearly schools have adopted them into their curriculum. What will be the topics that evolve in the next few years and should be included? Perhaps an interim update to the model curriculum could be made on a 5-year cycle versus the current 10-year cycle.

6. LIMITATIONS

One of the limitations is that the authors were limited to the information available on public facing college websites. The data collected was based on reviewing both the course titles and descriptions. It is possible that some courses may have been miscategorized. Additionally, it is possible that a course might cover additional topics or different material we did not recognize. This is one reason we reviewed the course description as well to ensure we were capturing the correct courses listed in IS2010.

Additionally, this research only surveyed AACSB schools that offered either a major or concentration within IS. There are many schools that are not AACSB accredited with a major/concentration in IS. There are many academic units only offering minors that have not been included in this study. Additionally, some universities have moved these programs into schools specializing in technical fields (e.g., Schools of Informatics). Researchers that wish to expand our research should consider including non-AACSB accredited universities, because these may be seeking to follow the IS curriculum guidance but have not obtained AACSB accreditation or may not wish to apply for AACSB accreditation.

A final limitation of the current study concerns the model curriculum (i.e., 2010) used to evaluate programs. While these suggestions are over 10 years old, the researchers felt they provided good guidance to understand courses being offered in IS programs currently. Additional research is needed once the latest course curriculum suggestions are published.

7. CONCLUSIONS

This research has summarized the implementation of required and core courses. The research demonstrated those courses that are closest to the needs of employers appear to have the highest adoption rates. These courses and their matching potential occupations are shown in Table 8. Those courses in the core model curriculum that tend to be more conceptual (Enterprise Architecture, Strategy) and less skill based have the lowest adoption rates.

Finally, as with all programs, IS has limitations based upon university administration and AACSB requirements. While it would be valuable to

provide more courses, the average number of courses in IS programs is currently 8 (6 core and 2 electives). This may be why we see some recommended electives being included as required courses.

Course	Adopted Required/ Elective	Occupation Title
Security/Risk Management	52%	Security Analysts
Software Development	87%	Software Developers
		Web Developers
Data and Info Management	92%	Database Administrators
System Analysis and Design	88%	System Analyst
Infrastructure	65%	Network Architects

Table 8 – Matching Courses to Occupations in demand. Listed by Occupation Growth Rates

8. REFERENCES

ACM (2005). *Computing Curricula 2005 The Overview Report*, Association for Computing Machinery (ACM) and IEEE Computer Society; https://www.acm.org/binaries/content/assets/education/curricula-recommendations/cc2005-march06final.pdf

ACM (2010). *IS 2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems,* Association for Computing Machinery (ACM) and Association for Information Systems (AIS); https://doi.org/10.1145/2593310

ACM (2020). *Computing Curricula 2020 (CC2020): Paradigms for Global Computing Education*, Association for Computing Machinery (ACM) and IEEE Computer Society; https://www.acm.org/binaries/content/assets/education/curricula-recommendations/cc2020.pdf

ACM/AIS (2020) *IS2020 Competency Model for Undergraduate Programs in Information Systems (Draft) Joint ACM/AIS Task Force* – https://is2020.hosting2.acm.org/wp-content/uploads/2020/12/IS-2020-December-Draft.pdf

Apigian, C. H. & Gambill, S. E. (2010). Are We Teaching the IS 2009 Model Curriculum? *Journal of Information Systems Education,* 21(4), 411-420.

Bell, C., Mills, R., & Fadel, K. (2013). An Analysis of Undergraduate Information Systems Curricula: Adoption of the IS 2010 Curriculum Guidelines. Communications of the Association for Information Systems, 32, pp-pp. https://doi.org/10.17705/1CAIS.03202

Bureau of Labor Statistics, Computer and Information Technology Occupations, https://www.bls.gov/ooh/computer-and-information-technology/home.htm, Retrieved May 2017.

Feinstein, D., Longenecker, B., Shresthat, D. (2014). A Study of Information Systems Programs Accredited by ABET In Relation to IS 2010. *Information Systems Education Journal,* 12(3) pp 76-84.

IS Curriculum Guidelines for Undergraduate Degree Programs in Information Systems 2010 https://www.acm.org/binaries/content/assets/education/curricula-recommendations/is-2010-acm-final.pdf. Retrieved May 2021

Mills, R. J., Velasquez, N. F., Fadel, K. J., & Bell, C. C. (2012). Examining IS Curriculum Profiles and the IS 2010 Model Curriculum Guidelines in AACSB-Accredited Schools. *Journal of Information Systems Education,* 23(4), 417-428.

Appendix A. Various IS Program Names

Business Analytics and Information Systems
Business and Information Technology
Business Computer Information Systems
Business Informatics
Business Information & Technology
Business Information Management
Business Information Systems
Business System Management
Computer Information Science
Computer Information Systems
Computer Information Technology
Computer Science and Information Systems
Information Management
Information System Management
Information Systems
Information Systems & Decision Sciences
Information Systems & Technology
Information Systems & Technology Management
Information Systems and Business Analytics
Information Systems Technology
Information Systems/Supply Chain
Information Technology
Information Technology and Systems
Information Technology Management
Information Technology and Management Information Systems
Management Information Systems
Management Information Systems & Technology
Management of Information and Technology
Operations and Information Systems
Technology
Technology and Management