

# CIS/MIS Curriculums in AACSB and Non-AACSB Accredited Colleges of Business

Stanley E. Gambill

J. Lee Maier

P.O. Box 45

Middle Tennessee State University

Murfreesboro, Tennessee 37132

615-898-5938

## INTRODUCTION

Today's Management Information Systems (MIS) and Computer Information Systems (CIS) departments face the responsibility of educating future Information Systems (IS) professionals. Potential employers expect graduates to have the proper mix of skills and knowledge to ensure success on the job. A rapidly evolving business environment and advances in information technology require up-to-date curricula.

Until recently, maintaining up-to-date curricula did not pose major problems. It was not uncommon for CIS/MIS departments to redesign or update their curriculum once every four - five years. Today, because of rapidly changing social, business, and economic environments, such long redesign cycles are unacceptable. To continue these long redesign cycles is to run the risk of graduating students who have outdated or inadequate skills.

The purpose of this research was to find out what courses are currently offered in CIS/MIS programs and then to profile a typical CIS/MIS curriculum. The goal is twofold: (1) establish a baseline from which comparisons can be made via longitudinal studies and (2) provide curriculum developers a point of reference for their particular CIS/MIS program. This research will be repeated in 3 - 4 years in an effort to help understand how curriculums are evolving. The following sections will present the research methodology, results, and conclusions.

## METHODOLOGY

The objective of this research was to profile a typical CIS/MIS curriculum. No attempt was made to manipulate the conditions of the research. The survey research strategy was used to collect data. The scope of the research included colleges and universities that offer four-year undergraduate degrees or majors in CIS/MIS. Graduate programs were not included in the research.

## Survey Instrument

A survey instrument with accompanying course definitions was developed. The initial instrument was changed and finalized after pilot testing. A cover letter accompanying the survey stressed that the respondent should not consider an IT related topic a "course" unless the topic was the major focus of study for the entire term.

## Sample

The Directory of Management Information Systems Faculty [1] was used to identify all colleges and universities with four-year undergraduate majors in CIS/MIS. A total of 186 colleges and universities, representing every geographical region in the United States, met these criteria. In the spring of 1994, a letter of introduction and survey form was mailed to the departmental chairperson of each of the 186 colleges and universities. Sixty-nine surveys were returned for an overall response rate of 37%. American Assembly of Collegiate Schools of Business (AACSB) accredited responses were 43 of 108 for a response rate of 39.8%. Non-AACSB accredited responses were 26 of 78 for a response rate of 33.3%.

## RESULTS

### Demographics

The most widely reported names for this program of study were Computer Information Systems (CIS) and Management Information Systems (MIS). Seventy-four percent of the programs were on the semester system and 26% were on the quarter system. Microcomputers were used as the primary hardware platform in 33.3% of the programs; minicomputers were used in 4.4% of the programs; and 60.9% of the programs use a combination of micro and mainframe computers. Interestingly, only one respondent identified mainframe computers as their primary hardware platform.

### Courses Offered

The overall results of the survey are shown in Appendix A which lists courses in descending order based on the percent of programs that offer the course either as a required or an elective course. Appendix B lists courses in descending order based on the percent of programs that require students to take the course in the CIS/MIS major. Appendices A and B categorize data in the following three ways; by AACSB accredited schools; non-AACSB accredited schools; and a combination of the two.

### Survey Results

The results lead to some interesting observations. The data

presented in Appendix A focuses attention on the implied importance and popularity of certain courses. Based on frequency of offering (i.e., popularity), there is little difference in the 15 most offered courses between accredited and non-accredited schools. Thirteen of the top 15 courses are present in both categories. Computer Based Simulation and Systems Analysis I are not included in the top 15 of non-accredited schools. Operating Systems and Systems Design & Implementation are not included in the top most offered courses at accredited schools.

Although the top 15 courses are similar for accredited and non-accredited schools, the number of schools offering a particular course drops off quickly after the top three or four courses. For accredited schools, the top four courses are DBMS Concepts (90.7%), Data Communications (81.4%), COBOL I (72.1%), and DSS/ES/ESS/NN (65.1%). For non-accredited schools, the top four courses are COBOL I (92.3%), DBMS Concepts I (80.8%), COBOL II (73.1%), and Data Communications (73.1%). This implies that beyond a small core of courses, there is considerable diversity in the courses that most programs offer. This diversity of course offerings shows the difficulty CIS/MIS faculty face in trying to build a curriculum that keeps pace with the changing IT environment.

It is surprising to find the programming language, COBOL, near the top of the list of most offered courses. Procedural languages, such as the COBOL course sequence, are representative of the dilemma CIS/MIS faculty face when deciding course offerings and whether to make a course required or elective. Because of the increasing use of fourth generation and object oriented languages, many have suggested that COBOL is no longer a viable business programming language [6] [9] [12] [14]. Others have suggested that COBOL is alive, well and here to stay [3] [4] [11] [13]. Survey results show 93% of accredited schools and 100% of non-accredited schools offer at least one course in COBOL. In addition, results show 86% of accredited schools and 92.3% of non-accredited schools require at least one course in COBOL.

C/C++ is another procedural language that is commonly used in business. While this is an important language, it does not enjoy the "required" status of COBOL. C/C++ is offered in 44.2% of accredited schools and 69.2% of non-accredited schools. However, only 14% of accredited schools and 15.4% of non-accredited schools require C/C++. DSS/ES/ESS/NN and Data Communications are two courses that are very popular as elective courses. Eighty-one percent of accredited schools and 73% of non-accredited schools offer Data Communications. However, only 42% of accredited schools and 31% of non-accredited schools require Data Communications. Sixty-five percent of accredited schools and 61.5% of non-accredited schools offer a combined DSS/ES/ESS/NN course. However, only 18.6% of accredited schools and 11.5% of non-accredited schools require DSS/ES/ESS/NN.

Closer examination of the data suggests that CIS/MIS curricula may indeed be slow in responding to current business needs. Several courses are noticeably absent from the top 15 list. For example, there is much practitioner and academic literature [2] [10] extolling the merits and use of object oriented systems analysis, information engineering, and IS planning. However, only six schools offered courses

in information engineering, one in IS planning and, one in object oriented systems analysis. Other IT knowledge and skills currently needed in the business community, such as International IS Concepts and Applications, Computer Graphics, and Software Engineering are the focus of courses in six or fewer programs. Additionally, some courses are required in only one or two programs. These include Information Center Concepts Applications, Office Automation, Audit and Security Management, ADA, Visual Basic, Assembly Language, and IS Planning. Whether the programs requiring these courses represent the beginning or the end of a trend in CIS/MIS curricula cannot be decided from this research. The evolution of the curriculum can only be determined through planned longitudinal studies.

### Typical CIS/MIS Curriculum

The researchers made several assumptions to construct a typical CIS/MIS curriculum. These are:

1. The typical program offers 12 courses in the major. This is based on the average number of courses offered at the responding schools (the range went from a low of 5 to a high of 21 courses offered with a standard deviation of 3.84);
2. Courses that appear to "overlap" were combined into a single course (i.e., Systems Analysis I and Systems Analysis and Design Combined);
3. The decision to include a course in the profile was based on the relative importance of the course as suggested by the percent of programs that offer the course and the percent of programs that require the course.

Based on these assumptions, results of the research suggest the courses included in Table 1 comprise the typical CIS/MIS curriculum currently being offered. Courses are listed in alphabetical order. Due to the diversity of programs, no attempt was made to label the courses as required, elective, upper or lower division. This profile simply contains those courses that appear to be the most important to developers of undergraduate CIS/MIS programs.

**TABLE 1: Typical CIS/MIS Curriculum**

COBOL I	DSS/ES/ESS/NN
COBOL II	IS Concepts
Computer Concepts	IS Projects
DBMS Concepts I	Management of IS
Data Communications	Microcomputer Applications
Data/File Structure	Systems Analysis and Design

This profile compares favorably with the IS'95 curriculum model [5], which was developed jointly by ACM (Association for Computing Machinery), AIS (Association of Information Systems), DPMA (Data Processing Management Association), and ICIS (International Conference on Information Systems). The IS'95 model recommends an IS program of 11 courses. Using descriptions of IS'95 courses and descriptions of courses provided to survey respondents, a comparison was done to see if there was any similarity between individual courses in each group. The results of the comparison are listed in Table 2, which shows that

the curriculum profile presented in this research matches up very well with the IS'95 Model. The only course recommended by IS'95 absent from the curriculum profile is "IS'95.2 - Personal Productivity With IS Technology." This course deals primarily with end-user computing. DSS/ES/ESS/NN was the only course listed in the curriculum profile that was not included in the IS'95 model. This is understandable since only 15.9% of the responding schools actually require the course while 47.9% offer the course as an elective.

The only other course that did not match up well was Systems Analysis and Design. The IS'95 model recommends a two-course sequence for Systems Analysis and Design while 59.4% of the respondents offer a single combined course in Systems Analysis and Design. The remaining 40.6% offer a two-course sequence for Systems Analysis and Design. It is encouraging to note that most CIS/MIS departments are already offering degree programs that closely match the IS'95 model. It is also noteworthy that should the IS'95 Model become the "standard" by which individual curriculums are measured, many existing programs will require little or no change.

**TABLE 2: Comparison of IS'95 Curriculum Model and Typical CIS/MIS Curriculum Profile of the Current Research**

IS'95 Courses	Curriculum Profile
IS'95.0 - Knowledge Work Software Tool Kit	Microcomputer Applications
IS'95.1 - Fundamentals of Information Systems	IS Concepts
IS'95.2 - Personal Productivity With IS Technology	None
IS'95.3 - Information Systems Theory and Practice	Management of IS
IS'95.4 - Information Technology Hardware and Software	Computer Concepts
IS'95.5 - Programming, Data, File and Object Structure	Data/File Structure COBOL I & II
IS'95.6 - Telecommunications	Data Communications
IS'95.7 - Analysis and Logical Design	Systems Analysis & Design
IS'95.8 - Physical Design and Implementation With DBMS	DBMS Concepts I
IS'95.9 - Physical Design and Implementation with Programming Environments	Systems Analysis & Design
IS'95.10 - Project Management and Practice	IS Projects

A comparison of the typical CIS/MIS curriculum with two recent studies of MIS skills for the future provides valuable insights for CIS/MIS curriculum planners. Research by Leitheiser [9] suggests the demand for end-user support, MIS planning, artificial intelligence, and computer aided software engineering (CASE) skills will experience significant growth during this decade. Interestingly, courses that focus on these topics are not included in the typical CIS/MIS curriculum. This research results show that only a few programs are offering these type courses.

Research by Lee, Trauth, and Farwell [7] suggest a shift away from the traditional, central IS organization toward an end-user oriented, decentralized organization. The emphases for this new IS organization are on aligning IS solutions with business goals and building the infrastructure for technological integration. According to Lee, et.al. [7], many IS programs are not well aligned with business needs. This does not appear to be supported by this research. For example, they argue that some courses like DSS/ES, which are offered in many programs are considered low priorities by the respondents of their study. This research indicates that while a course in DSS/ES is included in the typical CIS/MIS curriculum, it is required by only 15.9% of the respondent schools.

This low percentage may indicate that current CIS/MIS programs are giving the same "low priority" to this IT skill/knowledge as the respondents in the Lee, et.al. study. Lee, et.al. [7] also argue that university curricula often lag in updating critical new technologies such as networks and telecommunications. The research presented in this paper does not appear to support this argument. Results show that 78.3% of the responding schools offer a course in telecommunications.

Lee, et.al. [7] believe that a generic curriculum model that meets the needs of all future IS professionals is obsolete. They argue that "new career-driven IS programs will require the adoption of multi-disciplinary approaches and educational innovations for adding breadth, depth, and relevance to the curriculum in accordance with the focused mission of each specific program" [8]. In contrast, the IS'95 curriculum model proposes a generic 11 course program. While there is certainly a need for specialization in the field of information systems, there is a growing demand for IS professionals with a strong business foundation and a broad base of information technology skills. These opposing views and demands show the dilemma academicians face when designing CIS/MIS curricula.

## CONCLUSIONS

Keeping pace with changes and trends occurring in the information technology environment poses significant challenges for Departments of CIS/MIS. This exploratory research represents a first attempt to profile a typical, currently offered CIS/MIS curriculum and establish a baseline from which future studies can trace the evolution of CIS/MIS programs. The curriculum profile presented in this research matches up well with the IS'95 curriculum model. Though recent research suggests certain deficiencies in IS curricula, it appears that only minor adjustments would be required to bring most programs in line with the IS'95 model. This does not mean that our job as curriculum planners is done. We must continue to monitor the environment and make the necessary adjustments to keep our curriculums current.

Indications of an evolving curriculum are evident even in this early effort. Mainframe computers, the platform of choice for many years, are used as the primary platform in only one program. In contrast, microcomputers are used in 96% of the programs that responded to this research. Other indications of curriculum evolution are the complete absence of FORTRAN from all programs, the number of programs now offering C/C++, and the inclusion of contemporary topics covered in courses such as International IS Concepts and Applications and Alternative Analysis and Design.

The inclusion of only one management type course in the profile of the typical CIS/MIS curriculum suggests that most CIS/MIS programs are very technical in nature. This may lend credence to the claim by many practitioners that CIS/MIS graduates lack many interpersonal skills needed to succeed in the business environment. However, this research focused on CIS/MIS curriculum only and did not address other courses required in the CIS/MIS curriculum (i.e., business core courses). It is not unreasonable to expect that these additional courses offer the opportunity for students to gain experience in many business related subjects.

Further research is needed in this area. In addition, the virtual absence of IT topics such as End-User Computing, CASE and Object Oriented Analysis strengthens the concerns of IT practitioners about outdated curricula.

Developing and maintaining a CIS/MIS program of study that meets the needs of business is the responsibility of CIS/MIS departments. This research is an attempt to increase the understanding of CIS/MIS faculty in that effort.

## FUTURE RESEARCH

The results of this research have established information on current curriculums and as such, forms the basis for future research opportunities. One extension of this research would be a survey of the business community to find out the strengths and weaknesses of recent CIS/MIS graduates. Ideas on industry trends and their potential impact on curriculums also should be gathered. A second area for future research would be to identify schools that have developed new and innovative CIS/MIS curriculums. Detailed case studies of these newly designed programs would be of interest to others in academe. Graduates of these redesigned programs could be tracked and their performance compared to other graduates from more traditional programs.

## BIBLIOGRAPHY

1. 1992 Directory of Management Information Systems Faculty, McGraw-Hill.
2. Anderson, S. "How Information Engineering Helped CILCO Beat the Clock," Chief Information Officer Journal, Winter 1992.
3. Cashin, J. "Language Update: COBOL -- A child of Its Times," Software Magazine, March 1988.
4. Colborn, K. "COBOL, Now and Forever," Datamation, March 1, 1993.
5. Couger, J. Daniel, Davis, Gordon B., Dologite, Dorothy G., Feinstein, David L., Gorgone, John T., Jenkins, A. Milton, Kasper, George M., Little, Joyce Currie, Longenecker, Herbert E., Jr., and Valacich, Joseph S. "IS'95: Guideline for Undergraduate IS Curriculum," MIS Quarterly, September, 1995.
6. Cunningham, J. "Language Brouhaha: Is Cobol Dead? - Soundoff!," Computerworld, April 25, 1994.
7. Lee, Denis M.S., Trauth, Eileen M., and Farwell, Douglas. "Critical Skills and Knowledge Requirements of IS Professionals: A Joint Academic/Industry Investigation," MIS Quarterly, September, 1995.
8. Lee, Denis M.S., Trauth, Eileen M., and Farwell, Douglas. "Critical Skills and Knowledge Requirements of IS Professionals: A Joint Academic/Industry Investigation," MIS Quarterly, September, 1995, pp. 314.
9. Leitheiser, R.L. "MIS Skills for the 1990s: A Survey of MIS Managers' Perceptions," Journal of Management Information Systems, Summer 1992.
10. Premkumar, G. and King, W.R. "The Evolution of Strategic Information Systems Planning," Information and Management, June 1994.
11. Pursell, A. "Language Brouhaha: Is COBOL Dead?," Computerworld, April 25, 1994.
12. Shukla, A. "The Evolution of Languages," Computing Canada, September 27, 1993.
13. Snell, N. "Are You Ready for Cutting Edge COBOL?," Datamation, October 15, 1992.
14. Tucker, M. "Tech Talk: Ada's Rising Stature to Give COBOL a Run for Its Money," Computerworld, December 2, 1987.



APPENDIX A

Listing by Percent Offering Course					
All Schools n = 69		AACSB Accredited Schools n = 43		Non-AACSB Accredited Schools n = 26	
Rank	Course Name		Course Name	Course Name	
1	DBMS Concepts I	87.0%	DBMS Concepts I	COBOL I	92.3%
2	COBOL I	79.7%	Data Communications	DBMS Concepts I	80.8%
3	Data Communications	78.3%	COBOL I	COBOL II	73.1%
4	COBOL II	65.2%	DSS/ES/ESS/NN	Data Communications	73.1%
5	DSS/ES/ESS/NN	63.8%	Computer Concepts	C / C++	69.2%
6	Systems Analysis & Design Combined	59.4%	Systems Analysis & Design Combined	IS Projects	65.4%
7	Management of IS	59.4%	COBOL II	DSS/ES/ESS/NN	61.5%
8	Computer Concepts	56.5%	Management of IS	Data / File Structure	61.5%
9	IS Projects	56.5%	IS Projects	Management of IS	61.5%
10	C / C++	53.6%	Micro Applications Basic	Systems Analysis & Design Combined	57.7%
11	Data / File Structure	50.7%	Data / File Structure	Operating Systems	53.9%
12	Micro Applications Basic	46.4%	C / C++	IS Concepts	53.9%
13	IS Concepts	44.9%	Computer Based Simulation	Micro Applications Basic	50.0%
14	Operating Systems	39.1%	IS Concepts	Computer Concepts	50.0%
15	Computer Based Simulation	37.7%	Systems Analysis I	Systems Design & Implementation	42.3%
16	Systems Analysis I	37.7%	DBMS Concepts II	Micro Advanced Spreadsheets	42.3%
17	Micro Advanced Spreadsheets	34.8%	Micro Advanced Spreadsheets	Systems Analysis I	38.5%
18	Information Resource Management	33.3%	Information Resource Management	Micro Advanced Database	38.5%
19	Systems Design & Implementation	33.3%	Operating Systems	Information Resource Management	38.5%
20	DBMS Concepts II	33.3%	Systems Design & Implementation	PASCAL	34.6%
21	Micro Advanced Database	27.5%	Alternative Analysis & Design	DBMS Concepts II	34.6%
22	PASCAL	24.6%	IS Development Tools & Techniques	Computer Based Simulation	30.8%
23	IS Development Tools & Techniques	23.2%	Distributed Processing	Office Automation	26.9%
24	Office Automation	20.3%	Micro Advanced Database	Software Engineering	26.9%
25	Software Engineering	20.3%	COBOL combined	RPG	23.1%
26	Alternative Analysis & Design	20.3%	PASCAL	IS Development Tools & Techniques	23.1%
27	Distributed Processing	18.8%	Software Engineering	Computer Graphics	19.2%
28	COBOL combined	15.9%	Info Center Concepts Applications	Info Center Concepts Applications	15.4%
29	Info Center Concepts Applications	15.9%	Office Automation	Alternative Analysis & Design	15.4%
30	RPG	15.9%	Audit & Security Mgmt	Distributed Processing	15.4%
31	Computer Graphics	14.5%	International IS Concepts & Applications	Information Engineering	15.4%
32	Audit & Security Mgmt	11.6%	RPG	IS Professionalism & Ethics	11.5%
33	ADA	10.1%	Computer Graphics	COBOL combined	7.7%
34	Information Engineering	8.7%	ADA	Human Computer Interaction	7.7%
35	Human Computer Interaction	8.7%	Human Computer Interaction	Audit & Security Mgmt	7.7%
36	International IS Concepts & Applications	8.7%	Information Engineering	ADA	7.7%
37	IS Professionalism & Ethics	7.3%	Visual Basic	Assembly Language	3.9%
38	Visual Basic	2.9%	IS Professionalism & Ethics	International IS Concepts & Applications	3.9%
39	Assembly Language	2.9%	Business Expert Systems	Computing Studies Seminar	3.9%
40	Basic	2.9%	UNIX	Hardware & Software Architecture	3.9%
41	IS Planning	1.5%	Total Quality Management & IS	Object Oriented Systems Analysis	3.9%
42	Hardware & Software Architecture	1.5%	Artificial Intelligence	Basic	3.9%
43	Computing Studies Seminar	1.5%	Assembly Language	FORTRAN	0.0%
44	Managerial Decision Models	1.5%	Basic	Computers & Society	0.0%
45	UNIX	1.5%	Survey of Computer Systems	IS Planning	0.0%
46	Quantitative Business Analysis	1.5%	Quantitative Business Analysis	Managerial Decision Models	0.0%
47	Survey of Computer Systems	1.5%	IS Planning	Other Programming Languages	0.0%
48	Artificial Intelligence	1.5%	Managerial Decision Models	Survey of Computer Systems	0.0%
49	Total Quality Management & IS	1.5%	Computers & Society	Quantitative Business Analysis	0.0%
50	Business Expert Systems	1.5%	Computing Studies Seminar	Total Quality Management & IS	0.0%
51	Object Oriented Systems Analysis	1.5%	Other Programming Languages	Artificial Intelligence	0.0%
52	Computers & Society	0.0%	FORTRAN	UNIX	0.0%
53	Other Programming Languages	0.0%	Hardware & Software Architecture	Business Expert Systems	0.0%
54	FORTRAN	0.0%	Object Oriented Systems Analysis	Visual Basic	0.0%

APPENDIX B

Listing by Percent Offering Course

All Schools n = 69		AACSB Accredited Schools n = 43		Non-AACSB Accredited Schools n = 26		
Rank	Course Name		Course Name		Course Name	
1	DBMS Concepts I	75.4%	DBMS Concepts I	81.4%	COBOL I	84.6%
2	COBOL I	72.5%	Systems Analysis & Design Combined	76.7%	DBMS Concepts I	65.4%
3	Systems Analysis & Design Combined	69.6%	COBOL I	65.1%	COBOL II	61.5%
4	Computer Concepts	53.6%	Computer Concepts	55.8%	Systems Analysis & Design Combined	57.7%
5	COBOL II	47.8%	Data Communications	41.9%	Management of IS	53.9%
6	Management of IS	46.4%	Management of IS	41.9%	IS Projects	53.9%
7	IS Projects	40.6%	COBOL II	39.5%	Computer Concepts	50.0%
8	Data / File Structure	39.1%	Data / File Structure	34.9%	Data / File Structure	46.2%
9	Data Communications	37.7%	Systems Analysis I	34.9%	IS Concepts	46.2%
10	IS Concepts	37.7%	Micro Applications Basic	34.9%	Systems Design & Implementation	38.5%
11	Systems Analysis I	36.2%	IS Concepts	32.6%	Systems Analysis I	38.5%
12	Micro Applications Basic	34.8%	IS Projects	32.6%	Micro Applications Basic	34.6%
13	Systems Design & Implementation	30.4%	Systems Design & Implementation	25.6%	Data Communications	30.8%
14	DBMS Concepts II	20.3%	COBOL combined	20.9%	DBMS Concepts II	23.1%
15	Alternative Analysis & Design	15.9%	DBMS Concepts II	18.6%	PASCAL	19.2%
16	Operating Systems	15.9%	DSS/ES/ESS/NN	18.6%	Operating Systems	19.2%
17	COBOL combined	15.9%	Micro Advanced Spreadsheets	16.3%	Alternative Analysis & Design	15.4%
18	PASCAL	15.9%	Alternative Analysis & Design	16.3%	Micro Advanced Database	15.4%
19	DSS/ES/ESS/NN	15.9%	PASCAL	14.0%	IS Development Tools & Techniques	15.4%
20	C / C++	14.5%	IS Development Tools & Techniques	14.0%	C / C++	15.4%
21	IS Development Tools & Techniques	14.5%	C / C++	14.0%	Information Resource Management	11.5%
22	Information Resource Management	13.0%	Information Resource Management	14.0%	DSS/ES/ESS/NN	11.5%
23	Micro Advanced Spreadsheets	13.0%	Computer Based Simulation	14.0%	Distributed Processing	7.7%
24	Micro Advanced Database	13.0%	Operating Systems	14.0%	Human Computer Interaction	7.7%
25	Distributed Processing	10.1%	Distributed Processing	11.6%	COBOL combined	7.7%
26	Computer Based Simulation	8.7%	Micro Advanced Database	11.6%	Micro Advanced Spreadsheets	7.7%
27	Software Engineering	7.3%	Software Engineering	9.3%	IS Professionalism & Ethics	7.7%
28	Human Computer Interaction	4.4%	RPG	7.0%	Audit & Security Mgmt	3.9%
29	Audit & Security Mgmt	4.4%	ADA	4.7%	Information Engineering	3.9%
30	RPG	4.4%	Office Automation	4.7%	Basic	3.9%
31	Office Automation	4.4%	Computer Graphics	4.7%	Office Automation	3.9%
32	IS Professionalism & Ethics	4.4%	Audit & Security Mgmt	4.7%	Info Center Concepts Applications	3.9%
33	Info Center Concepts Applications	2.9%	Visual Basic	4.7%	Computing Studies Seminar	3.9%
34	Assembly Language	2.9%	IS Planning	2.3%	Software Engineering	3.9%
35	Visual Basic	2.9%	Managerial Decision Models	2.3%	Assembly Language	3.9%
36	Computer Graphics	2.9%	Assembly Language	2.3%	Survey of Computer Systems	0.0%
37	ADA	2.9%	International IS Concepts & Applications	2.3%	Quantitative Business Analysis	0.0%
38	International IS Concepts & Applications	1.5%	IS Professionalism & Ethics	2.3%	Business Expert Systems	0.0%
39	Quantitative Business Analysis	1.5%	Human Computer Interaction	2.3%	Total Quality Management & IS	0.0%
40	Computing Studies Seminar	1.5%	Info Center Concepts Applications	2.3%	Artificial Intelligence	0.0%
41	Basic	1.5%	Quantitative Business Analysis	2.3%	UNIX	0.0%
42	Information Engineering	1.5%	Total Quality Management & IS	0.0%	Managerial Decision Models	0.0%
43	Managerial Decision Models	1.5%	Other Programming Languages	0.0%	Other Programming Languages	0.0%
44	IS Planning	1.5%	Computers & Society	0.0%	Computer Graphics	0.0%
45	Other Programming Languages	0.0%	Object Oriented Systems Analysis	0.0%	IS Planning	0.0%
46	FORTRAN	0.0%	Business Expert Systems	0.0%	Computers & Society	0.0%
47	Hardware & Software Architecture	0.0%	Basic	0.0%	FORTRAN	0.0%
48	Total Quality Management & IS	0.0%	Artificial Intelligence	0.0%	Object Oriented Systems Analysis	0.0%
49	Computers & Society	0.0%	Survey of Computer Systems	0.0%	Hardware & Software Architecture	0.0%
50	Survey of Computer Systems	0.0%	UNIX	0.0%	International IS Concepts & Applications	0.0%
51	Artificial Intelligence	0.0%	Computing Studies Seminar	0.0%	ADA	0.0%
52	UNIX	0.0%	Hardware & Software Architecture	0.0%	RPG	0.0%
53	Business Expert Systems	0.0%	Information Engineering	0.0%	Computer Based Simulation	0.0%
54	Object Oriented Systems Analysis	0.0%	FORTRAN	0.0%	Visual Basic	0.0%



### **STATEMENT OF PEER REVIEW INTEGRITY**

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.

Copyright ©1998 by the Information Systems & Computing Academic Professionals, Inc. (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to the Editor-in-Chief, Journal of Information Systems Education, [editor@jise.org](mailto:editor@jise.org).

ISSN 1055-3096