Association for Information Systems
AIS Electronic Library (AISeL)

December 2004

Telecommunications Curricula in MIS Programs

Stephen Hawk
University of Wisconsin-Parkside

Thomas Witt
University of Wisconsin-Parkside

Follow this and additional works at: http://aisel.aisnet.org/amcis2004

Telecommunications Curricula in MIS Programs

Stephen Hawk
University of Wisconsin-Parkside
Email: hawks@uwp.edu

Thomas Witt
University of Wisconsin-Parkside
Email: witt@uwp.edu

ABSTRACT

This paper reports on an investigation of how undergraduate Management Information Systems (MIS) programs include telecommunications in their curricula. Two surveys were conducted by examining the curricula of a sample of undergraduate MIS programs. The first survey used a random sample of MIS programs and indicates that telecommunications typically is not an area of emphasis. Most MIS programs require only one telecommunications course. The second survey targeted MIS programs that allow students to specialize in telecommunications. The results show how these programs are structured. Implications and questions for further research are discussed.

Keywords

Telecommunications, networking, data communications, education, curriculum

INTRODUCTION

Business MIS programs vary considerably in the way that Telecommunications[1] issues are included in their curricula. Telecommunications typically is not a significant component of MIS curricula, with the main emphasis usually being placed on systems development subjects such as programming, database, and systems analysis and design. Out of the ten courses included in the ACM-AIS-AITP model curriculum for instance (IS2002, 2002), only one is devoted specifically to telecommunications while one other provides a background in computer hardware and operating systems as a prerequisite to the telecommunications course. This is understandable given that many MIS graduates start out in entry-level programming positions and see systems development as their initial career path. Additionally, employers that hire graduates of undergraduate MIS programs typically place them into entry-level software development positions.

A recent survey of 60 companies suggests that having a strong data communications knowledge background is important for job categories besides networking (Wilkins and Nolt 2000). Although never in the top 3 or 4 most important skills, their study showed that having a good background in data communications / networking was considered to be of mid-level of importance for occupations such as programmer, systems analyst and end user support. Assuming this view of telecommunication's importance is widespread, it would help to explain why the ACM-AIS-AITP model curriculum provides only one telecommunications course. This course may be intended more to provide background skills and knowledge that help MIS professionals function in a networked environment rather than being an area of emphasis in the MIS curriculum.

Anecdotal evidence from our MIS program over the years, however, suggests that there is a sizable minority of students who prefer a position in computer networking instead of seeking a systems development career path. In some cases this may result from them having strengths in technical areas besides programming. In others, students are simply drawn to the subjects of computer networking and MIS' technical infrastructure. Additionally, some employers of our graduates hire them into positions involving infrastructure support. Although these may not always be networking positions per se, they are usually in related areas that involve networking and are often viewed by students as an entry-level rung of a networking career ladder. Desktop support and technical support are common examples of this. Experience with such students and employment opportunities for them led to our interest in assessing how telecommunications is handled in MIS programs in

---

[1] For brevity, the term "telecommunications" will be used throughout this paper. Related terms include "data communications", and "computer networking". Although each has a somewhat different meaning, telecommunications will be used broadly to be inclusive of these other terms.

the United States.

One result of the increasing use of offshore programmers (Lacity and Willcocks, 2001) may be reduced growth in employment opportunities for domestically based software developers. Being more difficult to outsource offshore, demand by MIS departments for workers with telecommunications skills may be less threatened by the prospect of offshore outsourcing. This, along with the increasing reliance on networks by organizations suggests that at a minimum that the need for domestically based workers with these skills will not diminish anytime soon. A study conducted in the late 1990's suggests that significant demand exists for graduates with skills in telecommunications and infrastructure support (Gonzenbach 1998). Thus, telecommunications may represent a stable and perhaps growing area of opportunity for MIS graduates.

Although there has been a description of a specific MIS telecommunications program (Minch and Tabor 2003) and of telecommunications programs in other disciplines (Shariat and Benjamin 1999, Thompson 2003), our research discovered no recent academic literature that is devoted to an in-depth examination of how telecommunications is included as part of MIS curricula across a sample of universities. Thus, this study is perhaps the first attempt to shed light on how MIS programs have been structured to prepare graduates for work in this area.

Two surveys were conducted to investigate this issue, both drawing on samples of business MIS programs. The first survey addressed the following question:

> *How is telecommunications typically included in MIS curricula?*

This survey was conducted in part to confirm our impression that telecommunication receives relatively little attention in most MIS programs. Additionally, this survey will show how telecommunications subject matter is normally included in MIS curricula by identifying required and elective telecommunications courses.

The second survey was conduced to address the question:

> *How are MIS programs that identify themselves as having a telecommunications specialization structured?*

This latter question is the main interest of our paper. That is, what telecommunications curricula have been implemented within business programs in order to satisfy the educational needs of students seeking a telecommunications position as well as the needs of employers that seek graduates with telecommunications backgrounds? A previous investigation (Thompson, 2003) provided a high-level overview of how a telecommunications specialization could be offered within a number of disciplines such as computer science, engineering, and business, but did not provide much detail on telecommunications within MIS. Presumably MIS programs might have different requirements than telecommunications specializations housed in CS or engineering programs. As a first step in understanding how telecommunications could be included within MIS programs as an area of specialization, this study will describe in some detail how this has already been accomplished in a number of universities.

An inclusive view of what constitutes relevant courses will be taken in attempting to answer both of the above questions. Telecommunications courses with technical and managerial orientation will be included. Telecommunications builds on and is complementary with other areas such as technical infrastructure (hardware & operating systems), computer and network security, and the legal and regulatory environment of telecommunications. All these types of courses will be considered as part of telecommunications curricula and will be the main focus of the analyses. Although MIS courses in areas such as programming, database, e-commerce systems and systems analysis and design provide important background for the telecommunications field, they are not the main emphasis of this research. Finally, some courses had titles such as "network programming" or "internet programming" suggesting the inclusion of telecommunications content. Courses with such titles sometimes turned out to be web-based client/server programming courses that happened to involve the Internet as a delivery system. Unless there was some emphasis on networking issues per se, these courses were not considered as telecommunications courses.

Telecommunications can appear in different kinds of programs such as computer science, electrical engineering, communications, broadcast communication as well as interdisciplinary programs (Thompson, 2003). Telecommunications can also be offered at the undergraduate and graduate levels. The focus of the current study is on undergraduate business

programs. Whether a telecommunications specialization is a major or a concentration, our interest is on programs that are part of a business curriculum. That is, students who specialize in telecommunications would take much the same sequence of general education and business foundation courses as other business areas such as finance, marketing or accounting. Requirements for telecommunications students would differ primarily by taking a specialized sequence of courses to fulfill the requirements of the concentration or major. Finally, we found some universities in which students could get a minor or second major in telecommunications. The criteria for determining whether such programs were included in the current study was whether students would be able to complete the requirements for this minor or double major within the institution's normal total credits required to graduate (typically 120).   Many combinations are possible at several universities if students are willing to take 150 or more credits and spend 5 or more years as a student. We limited this study to those programs that allow students to graduate within the same time frame and credit load as for most other undergraduate degrees.

RESEARCH METHOD

The sample for the first survey was drawn from the list of AACSB accredited business programs (AACSB, 2004). Undergraduate programs were selected at random and were examined to determine whether the school offered an undergraduate degree or concentration in MIS [2]. Sampling was accomplished by assigning random numbers to each AACSB business program and selecting programs with the highest random numbers. Programs without an MIS concentration or major were not included in the sample since our interest is in examining the content of MIS programs instead of the overall business curricula.   Randomly selected business school web sites were examined until 30 MIS programs were located. This required going through 41 business programs to find the 30 MIS programs. A sample size of 30 was chosen since it could allow for relatively small confidence intervals around estimates if desired. Eleven business programs either had no MIS degree or concentration or, in a few cases, provided so little information on their web sites that we were unable to determine what specializations were offered. Web sites of the business programs were examined to provide information on structure of their curriculum and information on networking related classes. Appendix A lists the MIS programs included in this survey.

The second survey was conducted in order to provide information on undergraduate programs that offered a telecommunications degree, concentration, specialization or area of emphasis. Web searches were performed using various search engines to identify these programs. Terms such as telecommunications, data communications or networking were used along with terms such as major, concentration, specialization and business to identify these programs. Programs were included in the sample if they were offered as part of a business MIS program.

Data were collected in both surveys by copying and pasting program requirements and course descriptions for MIS and telecommunications courses into a document that described each program. These documents were then used as the raw data for creating the results tables.

RESULTS

Survey 1: Telecommunications Courses in MIS programs

The results from the first survey are shown in tables 1, 2 and 3.   Table 1 shows the number of required telecommunications courses in MIS programs that are not identified as having a telecommunications emphasis. For programs where we could distinguish required from elective courses, 64% (14 out of 22) programs had one or more required telecommunications courses. Only one program required two telecommunications courses of its majors. A required telecommunications course was found more often in MIS degree programs (69%) than in MIS concentrations (50%).   One explanation for this is MIS degrees required more credits (26.7) on average than MIS concentrations (16.2 credits) thereby allowing a wider variety of courses.

---

[2] The term concentration will be used to include MIS programs that were identified using terms such as specializations, tracks, or areas of emphases. All MIS degrees and concentrations included in the sample were part of business curriculum. MIS in this paper also includes Computer Information Systems (CIS), technically oriented ecommerce programs, and Information Technology programs as long as they were housed within a business program.

Table 2 shows the number of telecommunications courses offered as part of the MIS programs. The counts shown in table 2 include the required courses shown in table 1 as well as other telecommunications courses that were identified in the MIS curriculum. All but three MIS programs offered at least one telecommunications course. Although the MIS concentrations fared well on the criterion of including a telecommunications course in the curriculum, the only programs that provided two or three possible telecommunications courses to their students were MIS degrees. MIS majors and MIS concentrations provided an average of 1.33 and 0.89 telecommunications courses respectively. These results are similar to those reported in 1998 study that showed that 81% of accredited business programs offered a data communications course (Gambill and Maier, 1998). The current results differ somewhat in that a telecommunications course was present as a required course more often than the 42% of the programs included in this earlier study.

MIS program type	Number of Telecommunications / Infrastructure Courses Required in the Program				
	0	**Unable to determine**	**1**	**2**	**Totals**
Concentration in a Business Degree	3	3	3		9
MIS Degree	5	5	10	1	21
Grand Total	8	8	13	1	30

Table 1. Number of Required Telecommunications Courses in MIS Programs

MIS program type	Number of Telecommunications / Infrastructure Courses Available in the Program (Required or Elective)				
	0	**1**	**2**	**3**	**Totals**
Concentration in a Business Degree	1	8	0	0	9
MIS Degree	2	11	7	1	21
Grand Total	3	19	7	1	30

Table 2. Number of Telecommunications Courses Available in MIS Programs

Table 3 shows types of courses offered in the MIS programs. By far the most common course was an introductory telecommunication course. Additionally, all but two of the required telecommunications courses were in this category. There was some variation in how much courses in this category emphasized telecommunications concepts (such as layered models, telecommunication hardware and media, protocols, security and network design) vs. trying to include hands-on experiences (e.g. setting up a local area network). These courses, however, largely represent implementations of the IS 2002 curriculum's "Networks and Telecommunications" IS2002.6 course, as well as the data communications course investigated by Johnson, Stellar, and Tanner (1999).

There were three cases each of a computer and network security course and a hardware and network operating systems course. This latter represents implementations of the model curriculum's IS2002.4 course: "Information Technology Hardware and System Software." Two programs that had a required telecommunications-related infrastructure course required students to take this hardware / OS course instead of the introductory telecommunications networking course.

Although tables 1, 2 and 3 do not show the overall curricula of these programs, courses in areas such as programming, database, systems analysis and design were core courses included in almost all MIS programs whereas telecommunications was more of a supportive component. By requiring fewer total credits on average, concentrations tended to focus more on these core areas while providing fewer courses outside of it. This was reflected in two results: Concentrations didn't require a telecommunications course as often as MIS majors, and, more telecommunications course options were provided in MIS degree programs.

Course	Number of times Course Included in Curricula	Number of Times Course Was Required
Introduction to Networking	27	13
Computer and Network Security	3	0
Hardware and Operating Systems	3	2
Management of Telecommunications	1	0
Other	2	0
Total	36	15

Table 3. Telecommunications Courses Offered in MIS Programs

Not shown on these three tables is that two of these programs were among those included in the second survey (Boise State and University of Mississippi). The results for these two programs that are included in Tables 1, 2 and 3 show the requirements and suggested electives for MIS students who choose to concentrate in areas other than telecommunications.

Survey 2: Telecommunications Programs

Eleven telecommunications programs were found that met the criteria described in the introduction; majors or concentrations that were part of a business MIS program that could be finished within the normal credits required for undergraduate degree completion. Ten of the programs were found using various search engines using a combination of search terms for telecommunications in conjunction with terms for programs such as BBA, bachelors, business, specialization, track, concentration, major, and degree. Searches were also normally limited to sites in the edu domain to limit the number of hits. It would also be unlikely for academic programs to provide their main web presence using other domains such as com or net. Two institutions offering a telecommunications programs were among the random sample of MIS programs in undergraduate AACSB institutions. One of these (Boise State University) was among the programs found using search engines. University of Mississippi was found only by examining the AACSB programs.

Nine of the telecommunications programs had web sites that clearly indicated the telecommunications specialization was included as a concentration or major within the business MIS program. Dakota State's MIS program, on the other hand, made no mention of the possibility of specializing in telecommunications. Dakota State, however, offered a non-business CIS degree that had seven networking-related courses that could be taken by MIS majors. Due to the large number of electives provided in the MIS program, 9 credits required in computer science or CIS and 18 credits of largely unrestricted courses, MIS majors could put together a strong telecommunications specialization although no such specialization was so designated. The website for University of Mississippi's MIS major also made no mention of a telecommunications specialization. This university, however, offered a telecommunications program that was referred to as an emphasis, a minor and a certificate program. This program was designed in a way that would make it possible for MIS students to meet its requirements as part of completing the MIS major.

The results in Table 4 show the structure of these programs by summarizing the content of telecommunications curricula on different dimensions. The number of credits required in the core business courses ranged from 30 to 51. These credits were in addition to university requirements for general education in areas such as science, the humanities, and social sciences. Some business programs also had a separate pre-business / business foundations sequence of courses (e.g. economics, math, and business law). This typically was the case for programs on the lower end of the range of total credits required in the business core as shown in Table 4. The purpose of this paper, however, is not to document all requirements for graduation, but rather to confirm that the MIS telecommunications specializations were fully embedded in business programs instead of

merely drawing upon a select, smaller grouping of courses designed to give a highly technical program a business-oriented flavor.

Institution	Degree / specialization name	General MIS Program Requirements										Requirements Specific to the Networking Program			Total Degree credits Beyond Business Core
		Business Core	Programming	Database	SA & Design	Web Development & Ecommerce	IS Policy & Strategy	Other	IS Elective	Networking	Technical Infrastructure	Required Courses	Elective	Total Networking-related credits required	
Golden Gate University	BBA with Concentration In Telecom Mgmt.	33										9	6	15	15
Boise State University	BBA Networking & Telecommunications	36	6		3	3	3				3	9	6	18	33
Our Lady of the Lake University	BS in E-commerce & IS - Web/Network Admin. Track	33	9	3	6	3				3	3	9	3	18	39
Eastern Illinois University	CIS Major with a Telecommunications Concentration	33	6	3	3					3		9	3	15	27
Milwaukee School of Engineering	BBA MIS with Computer Systems Infrastructure Concentration	30	5	2	2	4	2			2	5	0	14	21	36
Dakota State University	Bachelors MIS, up to 21 telecom credits possible for electives	49	9	3					0-21			0	0-21	0-21	33
Arkansas State University	MIS degree with Networking Emphasis	39	3	3	3					6		12		18	27
Auburn Univ Montgomery	B.S.B.A. in Information Systems with Data Communications Option	39	3	3					3			12		12	21
California State Univ, Hayward	B.S. Telecommunications Management	37	5.3									10.7		10.7	16
University of Mississippi	BBA MIS - with telecom emphasis	51	6	3	6			12				9	3	12	39
W. Michigan University	BBA Telecommunications & Information Management	?	4.5	3	4.5			6				12	6	18	36

Table 4. Structure of Telecommunications Programs

Table 4 also shows each program's "General MIS Program Requirements." This includes MIS courses that are required of most MIS majors (including the telecommunications specialization). Most of the Universities shown in this table offered more than one MIS specialization. Therefore, credits shown under General MIS Program Requirements for the most part represent common requirements for the different MIS specializations. As can be seen in Table 4, some of the telecommunications programs were not really part of a traditionally-structured MIS program. Golden Gate University's program is an extreme example of this in that its content is nothing but telecommunications with no courses in other MIS areas. Dakota State University and University of California at Hayward also have limited MIS requirements outside of telecommunications. The remainder of the programs seem to provide more traditional MIS curricula, with courses in programming, database management and systems analysis and design along with various combinations of courses in other areas such as web development, networking and IS policy / strategy.

The next set of columns in Table 4 show the requirements of the telecommunications programs that were above any telecommunications-related courses that may have been required of all MIS students. We attempted to be conservative in determining what was reported in these columns. In a few cases telecommunications programs included non-telecommunications courses such as e-commerce, introductory MIS, programming, mass-media, and database systems among telecommunications program requirements. These were pulled out and shown separately among the columns listing these other types of courses in Table 4. Table 4 also shows some fractional credits. In some cases this resulted from converting quarter hours to their semester hour equivalents (Milwaukee School of Engineering and California State University-Hayward) or splitting a course's credits into two separate courses (U. of Western Michigan had a capstone field project course that featured project management and programming). The credits shown in the telecommunications columns of table 4 therefore, are in courses specifically related to telecommunications or technical infrastructure-related topics.

Telecommunications courses were broken down in terms of being specific required courses vs. credits where students could select from one or more electives. The overall telecommunications curricula of these eleven programs can be summarized as follows:

o   On average, the programs had 10.61 credits of required telecommunications-related courses. This came from the required networking and technical infrastructure courses that were required of all MIS students (2.27 credits on average) and from the required telecommunications-related courses that were specific to the telecommunications specialization (8.37 credits on average).
o   Above the 10.61 credits in specifically required courses, telecommunications students were required to take 5.64 credits of telecommunications electives on average.
o   Summing the prior two figures results in overall requirements of 16.25 telecommunications-related credits on average, with totals ranging from 10.7 to 21 credits.

The results in Table 5 show the content of the telecommunications curricula by course. Judgment was used in attempting to classify courses into a single set. Course titles and descriptions were used in making the categorizations. In three cases, a course was offered by only one telecommunications program, but the description indicated that a significant portion of it would fall into two of the other courses offered in other programs. As an example, a course at Auburn University emphasized both Network Design and Management of Telecommunications (non-technical). To avoid introducing courses offered at only one University unless necessary, we divided the credits of these courses between two of the other courses shown in Table 5. Without further information regarding the specific proportion of the course devoted to the two areas, half of the total credits in the course were assigned to each of the other two courses.

Introductory telecommunications courses were the most commonly required courses in these programs. Whether a program offered one or two of these courses, they both included the range of topics found in the IS 2002 model curriculum's telecommunications course (IS2002.6). Programs offering a second, advanced introductory course tended to simply go into more depth in their coverage of these topics. The third most common course was one that approximated IS 2002's IT Hardware and System Software course (IS2002.4). In most cases this course provided a mix of computer hardware topics along with operating systems (typically Windows and / or Unix). This class also tended to incorporate extensive lab experiences for students.

The two next most frequently required courses, Network Administration & Management, and Local Area Networks, have some overlap in that they both involve network administration. The first of these, however, tended to treat network administration and management more from a conceptual standpoint that included LANs and WANs. The Local Area Network course focused on LAN technologies and administration and tended to provide more hands-on experiences than the

Network Administration & Management course. Windows was the most common operating system with one case of Novell NetWare being found. The difference between this course's inclusion of operating system issues and what was provided in the IT Hardware and System Software course is the emphasis on configuring the LAN OS for networking instead of broadly surveying the functions and configurations of operating systems. Finally other less frequently required courses include network design, the legal / regulatory environment of telecommunications, and computer and network security. Computer and network security, however, is a relatively common elective course in telecommunications programs.

Course	Number of credits in required telecom courses	Number of credits in telecom electives
Introduction to networking	2.27	.60
Advanced Introduction to networking	1.50	.60
Hardware & Operating Systems (Windows, Unix)	.93	1.60
Network Administration & Management (technical)	.75	.60
Local Area Networks	.73	.60
Network Design	.72	.60
Legal, regulatory, industry environment of telecom.	.57	.30
Computer and Network Security	.40	1.20
Advanced Technology	.30	1.10
Management of telecommunications (non-technical)	.30	.60
Internship	.30	.30
Windows certification (all Milwaukee School of Eng)	.27	1.40
Protocols (Usually TCP/IP)	.00	.60
Mobile / Wireless networks	.00	.60
Voice, telephony	.00	.60
A++ certification (Milwaukee School of Eng)	.00	.20
Other	.50	.60

Table 5. Courses Offered in Telecommunications Programs

It may also be interesting to note what was not found in this survey. There were only a few cases of curricula containing the type of highly technical courses that one might find in electrical engineering or advanced computer science courses. Although the courses were often very technical, they tended to be oriented to the needs of businesses that use networks instead of firms that develop the underlying network technologies. Second, there was a relatively low emphasis on proprietary knowledge such as teaching Windows 2000, NetWare, or CISCO solely for the purpose of preparing students for certification. Milwaukee School of Engineering was the only case found of this. Other programs used Windows, NetWare, or Unix but did so in a way that embedded these within a course teaching more general skills.

CONCLUSION

This research provides some insights into the issue of how telecommunication topics are included in undergraduate MIS programs. The results suggest that networking typically is not a major area of emphasis in MIS programs. The analysis of programs with telecommunication specializations provides models of how different Universities have attempted to deepen the preparation of their students for work in this area. The results showing how such programs have been structured could be useful for other MIS programs that are considering providing telecommunications as an alternative specialization to the more common systems development focus.

This research is a first step in understanding the telecommunications option within MIS degrees. Our future research on this issue will involve attempting to find other similar programs. Although the results of our attempts to locate programs using

search engines converged on the programs reported in Table 4 after a large number of attempts, it is possible that other internet search approaches could yield additional programs. Additionally, a brute-force approach of going through the entire list of AACSB schools may also uncover some other programs.

A limitation of this research is that it does not provide much insight into why the institutions have structured their curricula as they have, nor how successful these programs are. We assume that these programs were designed to meet the needs of the prospective employers and students. What needs were determined and how did this lead to the curricula shown in Tables 4 and 5? What institutional and resource constraints influenced the design of these programs? How well are these programs working? That is, are these programs popular with students and how successful are graduates in finding employment upon graduation? Finally, it is not clear how potential employers would view graduates of MIS telecommunications programs versus graduates from other types of programs with a higher technical component. A continuation of the current study is to get further information on these issues from the programs and eventually by surveying potential employers.

REFERENCES

1. Gambill, S., Maier, J. (1998). CIS/MIS Curriculums in AACSB and Non-AACSB Accredited Colleges of Business, *Journal of Information Systems Education*

2. Gonzenbach, N. (1998). Developing an Information Systems' Curriculum with Input from Business and Industry, Office Systems Research Journal, 16, 1, 9-14.

3. IS2002, (2002). Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems, created by ACM, AIS & AITP, http://www.acm.org/education/is2002.pdf. (Viewed January 28, 2004).

4. Johnson, L., Stellar, J. and Tanner, J., (1999). An Empirical Analysis of the Content of the Data Communications Course: Academics' and Practitioners' Perspective, *Information Technology, Learning, and Performance Journal*, 17, 2, 1-14. available at: http://www.nyu.edu/education/alt/beprogram/osrajournal/vol17no2.html

5. Laity, M., and Willcocks, L, (2001). Global Information Technology Outsourcing: In Search of Business Outsourcing, Wiley, Chichester, UK.

6. Minch. R., and Tabor, S. (2003). Networking Education for the New Economy, *Journal of Information Technology Education*, 2, 51-59.

7. Shariat, M, and Benjamin, C. (1999). Contrasting Computer Networking and Data Communication Curricula. *1999 ASEE (American Society for Engineering Education) Annual Conference & Exposition* in Charlotte, NC, June 20-23, 1999.

8. Thompson, Richard, A. (2003). Telecommunications – A Discipline of Our Own" *Proceedings of the Second Annual Telecommunications/Information Technology Conference*, Louisville, KY, April 3-5.

9. Wilkins, M., and Nolt, C. (2000) Critical Skills of IS Professionals: Development a Curriculum for the Future. *Journal of Information Systems Education*, 11, 3-4, 105-110.

University	MIS Program Type
Babson College (Massachusetts)	Degree
Bentley College (Massachusetts	Degree
Boise State University (Idaho)	Degree
Indiana University Kokomo (Indiana)	Degree
Loyola Marymount University (California)	Degree
Miami University (Ohio)	Degree
Norfolk State University (Virginia)	Degree
Northeastern University (Massachusetts)	Degree
Northern Kentucky University (Kentucky)	Degree
Oklahoma State University (Oklahoma)	Degree
Pace University (New York)	Degree
Southern Illinois University Edwardsville (Illinois)	Degree
Temple University (Pennsylvania)	Degree
The Pennsylvania State University (Pennsylvania)	Degree
The University of Michigan (Michigan)	Degree
The University of New Mexico (New Mexico)	Degree
University of Notre Dame	Degree
University of Florida (Florida)	Degree
University of Houston-Downtown (Texas)	Degree
University of Mississippi (Mississippi)	Degree
Valparaiso University (Indiana)	Degree
Boston University (Massachusetts)	Concentration
Grand Valley State University (Michigan)	Concentration
Loyola University Chicago (Illinois)	Concentration
Rowan University (New Jersey)	Concentration
The University of Texas at Dallas (Texas)	Concentration
Truman State University (Missouri)	Concentration
University of San Diego (California)	Concentration
University of Toledo (Ohio)	Concentration
University of Virginia-McIntire (Virginia)	Concentration

Appendix A. MIS programs included in the 1st survey