Survey of Master's Degree Programs in Information Systems

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Abstract

The need of professional master's degree program in Information systems (MSIS) has been in great demand during the past few years. There may be several reasons for the people to pursue this particular degree. May be that obtaining MSIS degree help the people to climb to the next level of their current position, or as a source to networking with other people for future jobs, or for self esteem and their satisfaction, or as a graceful exit from the long road to a PhD program. Whatever the reason may be there is increase in demand for MSIS program. The purpose of this paper is to survey the MSIS degree programs and their curriculums from twenty colleges and universities across the United States. The information gathered from this survey as well as information gathered in previous such surveys is evaluated and used to create a suggested program curriculum, which provides useful information for academic heads and faculty who are interested in starting a new MSIS program, or revising an existing program.

Introduction

The main objective of this paper is to evaluate the current status of MS programs in Information Systems, as they pertain to suggested curriculum. The joint ACM/AIS report, MSIS 2000 -Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems (Gorgone, 2000) will be used as the base model for research comparison. The previous model curriculum reports, "Information Systems Curriculum Recommendations for the 80s: Undergraduate and Graduate Programs" (Nunamaker, 1982) and "Curriculum Recommendations for Graduate Professional Programs in Information Systems" (Ashenhurst, 1972) has also been used in this evaluation. Although this comprehensive report remains a valuable course reference, the rapidly changing IS field requires a more timely evaluation process.

Mission

As technology and its effect upon the business community continues to evolve at an ever-increasing pace, the needs of employers and the expectations of students continue to expand into more and more areas, it becomes impossible for any one program to cover all of the available options. The mission of the MSIS program should be to offer a core set of courses that provide all students with a common set of skills that will be recognized by potential employers. It should provide the opportunity for students to concentrate on specific areas or fields of knowledge, based upon individual goals. And finally, it should provide the students with the ability for growth, and to interact with other aspects of the business community.

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MSIS 2000

The MSIS 2000 report (Gorgone, 2000) detailed many aspects of the continuing development of the master's program in Information Systems. The study reviews the history of the program, the increasing variety of programs and specializations, implementation, utilization of resources, and graduate objectives to name a few. The most important of these is the model curriculum (Appendix A). The model curriculum was developed to assist in implementing a graduate program in information systems, and to help current institutions modify existing programs to keep in touch the changing needs of students.

This model suggests a collection of courses intended to give students a common body of knowledge and skills, regardless of the institution where the degree was earned The MSIS study divided the course outline into four sections. The Foundation courses, which includes both IS courses and general business courses; the IS Core, dealing more specifically with Information Systems; Integration, understanding the various relationships between the courses; and Career Electives, allowing students to specialize, and focusing on individual career tracks.

The Foundation section of this model curriculum has two components, the IS requirements and the business requirements. These courses are essential to the student seeking a degree in Information Systems, providing the skills necessary to advance further into the program, and to succeed after entering the job market. The IS foundation has been broken down into three courses:

- Fundamental of Information Systems
- Information Technology Hardware and Software
- Programming, Data and Object Structures

These courses revolve around basic principles of Information Systems, basic terminology and procedure, programming, logic, as well as current hardware and software. The business foundation is also divided into three suggested courses:

- Financial Accounting
- Organizational Behavior
- Marketing

The intent of the business foundation is to provide a general knowledge of the business environment. Basic marketing and accounting principles are emphasized, as well as an understanding of business practices and methods. As the IS field continues to change and increase its scope, it becomes increasingly more important for the exiting MS graduate to have the ability to integrate into more and more aspects of business. Information Systems professionals are no longer being looked upon as solely technical, but are expected to take increasing roles in the leadership and continued development of their respective companies.

The IS Core section of the MSIS 2000 Model Curriculum encompasses a more "in-depth" approach to Information Systems. These courses are designed to increase the knowledge and skills of the student, as they directly pertain to the IS field. The model curriculum identifies the suggested IS courses as follows:

- Data Management
- Analysis, Modeling and Design
- Data Communication and Networking
- Project and Change Management
- IS Policy and Strategy

The IS Core will provide students with the detailed specific knowledge needed in the Information Systems field, while maintaining a common ground for programs offered by various different institutions. Students should also be able understand the relationships of the various concepts learned in the foundation and core courses, and integrate them within business practice.

The Integration of all this knowledge is the next section of the MSIS 2000 report. "The need for integration is driven by the need for innovation, coordination, and speed. These three characteristics are the result of competition, globalization, emerging technologies, and organizational change. These phenomena demand integration of organizational and technological perspectives" (Gorgone, 1998). The report suggests at least one integration course, outlined as follows:

- Integrating the Enterprise
- Integrating the IS Function
- Integrating IS Technologies
- Integrating the Enterprise, IS Function, and IS Technologies

These individual courses or a combination of the three would provide needed skills previously not stressed in Information Systems programs.

There are a large number of career options available for the graduating IS student, and this number continues to increase as businesses find new and improved ways to take advantage of current and emerging technologies. Institutions should offer the ability for students to obtain more career-choice related knowledge. The MSIS 2000 report lists this as the third and final section of the curriculum course requirements. The Career Electives section is designed for just this reason. To move a student further down a chosen career path, and to gear courses towards these individual paths. At least four career-oriented courses should be offered that would depend on the chosen career track. Career electives will vary between institutions, depending upon each individual institution resources and the direction the institution feels best suits to their students. These different career tracks will change over time, with some becoming obsolete and new one emerging as technology changes.

Statistics

One of the main objectives of the MSIS 2000 report was to identify the common courses that were being offered within the MS in Information Systems program. The report looked at core courses and electives, as well as optional courses. Due to the many different course titles among different colleges and universities, the IS '97(Davis, 1997) code was used to distinguish between courses. See Appendix C for the complete list of MSIS 2000 courses, which have been modified from the IS '97 course codes and titles.

Foundation Course

The foundation courses are segmented into two different areas by the MSIS 2000 report. The IS foundation courses and the business foundation courses. In this evaluation, we will also look at each component individually. The first component will be the IS foundation courses. As illustrated in Figure 1, a majority of the selected institutions are not basing their curriculum based upon MSIS 2000 recommendations. Out of the three IS foundation courses listed, the highest frequency of any course offered is IS '97.5 - Programming, Data and Object Structures with 7 institutions offering this course. The other two courses, IS '97.1 -Fundamentals of Information Systems and IS '97.4 -Information Technology Hardware and Software were offered by 4 institutions and 2 institutions, respectively.

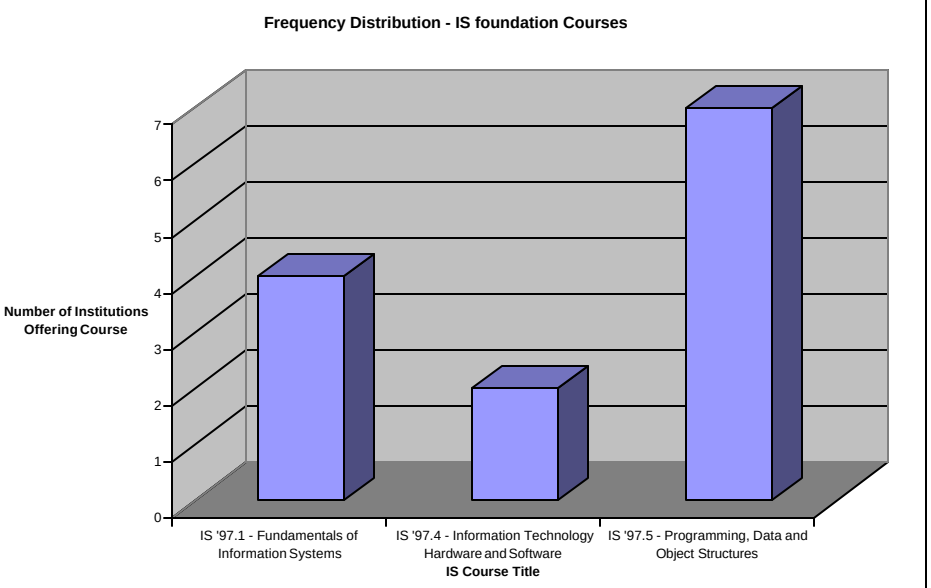

Figure 1

There may be several explanations for this lack of adherence to the MSIS suggested guidelines. First, many of the programs studied were geared towards students with previous information systems backgrounds. Indeed, some of the institutions would only allow students with the required IS prerequisites to enter the master's program. Another reason for this low frequency of courses could be an error in the gathering of data from the institutions. Even with using the MSIS standards for course descriptions, it is difficult to be certain that all offered coursed were represented. Many institutions have different catalog titles and course content. While it may appear that a particular course isn't offered, it may be in fact contained within another course's content, or simply have a different course title. Finally, with the changing field of Information Systems, some institutions may feel that these foundation courses simply don't fit their perceived needs. Different courses may be offered, or this foundation content may be dealt with in later coursework. Regardless, it is obvious that a strong base in Information Systems is beneficial, if not required, for the student entering the MS in Information Systems program. Institutions must insure that all of their students have the proper foundation in IS to succeed in the master's program, and this is accomplished by a thorough IS foundation course offering.

The second component of the MSIS 2000 foundation is the business component. The frequency distribution of the business foundation courses is shown in Figure 2. And although there is a higher concentration of courses, the frequency is still rather low. All the studied institutions offer no one course suggested by the MSIS 2000 model. In fact, no one course is offered by even 50% of the institutions selected for this study. Financial Accounting courses have the highest frequency, with eight institutions offering such a course. Organizational Behavior and Marketing both have the same frequency at five institutions offering similar courses.

The same reasoning used for the IS foundation course results can be applied similarly to the business component results. Many of the institutions do require business foundation courses in their programs, but which courses vary dramatically from institution to institution. Once again the individual needs of the institution may dictate the type of business course offered, or if any, business courses are offered at all. The same errors in data gathering will also come into play within the business foundation courses. Many of the MSIS 2000 Model Curriculum's course content may well indeed be being covered, but not in the obvious course descriptions put forth my the MSIS 2000 report.

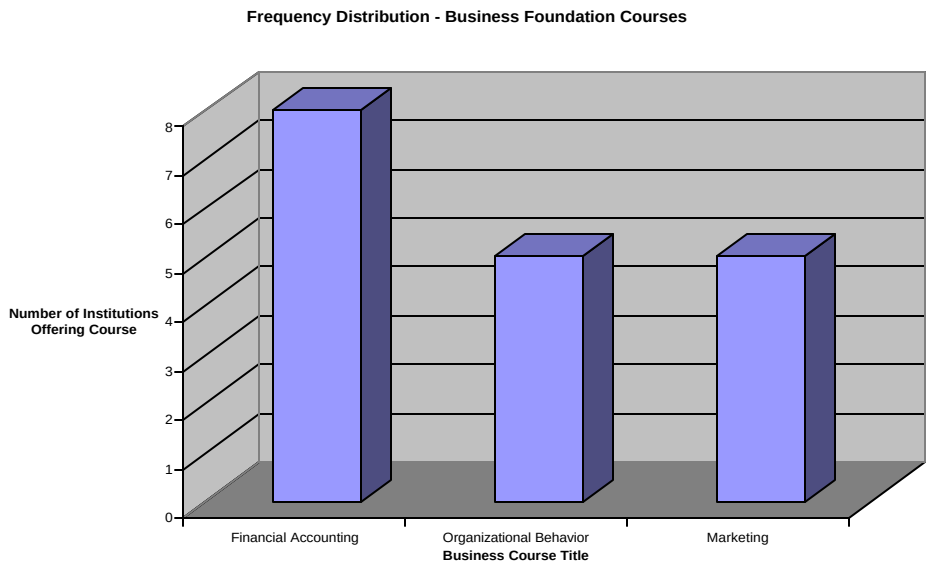

Figure 2

If these statistics do present a fair representation of the selected institutions, then there should be a definite increase in the number of business course options within their respective master's programs. The integration of business content into the MS in Information Systems is essential to provide the student the skills required to interact within the business community .All business professionals may not be familiar with Information Systems concepts, and the burden will fall upon the IS student to facilitate this interaction between business and IS professionals.

IS Core Courses

The IS Core section of the MSIS 2000 Model Curriculum is intended to provide a more in-depth learning experience. The student will receive the knowledge and skills dealing more directly with the Information Systems field. And although these are more IS specific courses, care must be taken to insure that a common ground is maintained between institutions. This ensures that employers will have a better understanding of what skills a student possesses, regardless of which institution the student attended. Figure 3 exhibits the frequency distribution of IS core courses throughout the twenty selected colleges and universities.

The frequency of institutions offering courses that adhere to MSIS 2000 recommendations is greater in the core courses than in that of the foundation courses, but it is still lacking in many aspects. Though many of the courses are now offered by a greater number of institutions, some courses are still poorly represented. Just like the foundation courses, all the institutions are offering no one individual course from the core courses. Also, the integration courses are not being adopted by a majority of the institutions. This concept of integration is highly emphasized by the MSIS 2000 report, and should be addressed more thoroughly for a successful master's program.

Three courses, MSIS2000.1 -Data Management, MSIS2000.2 Analysis, Modeling and Design, and MSIS2000.3 -Data Communication and Networking, were included in a majority of the chosen institution's MS programs. A lower frequency of institutions offered MSIS2000.4 -Project and Change Management and MSIS2000.5 -IS Policy and Strategy, but these course were still on par with or greater than the frequency of foundation courses. As stated earlier, the integration courses deemed essential by the

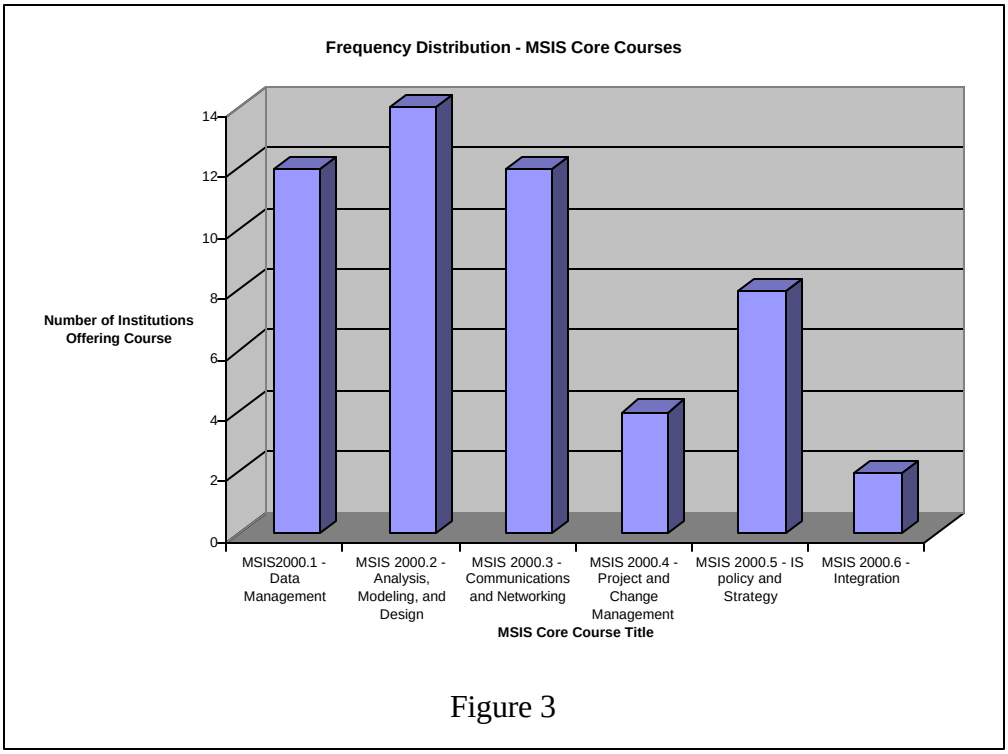

Figure 3

MSIS 2000 study are strangely low in frequency, with only two of the institutions involved having integration courses listed in their programs.

As in the previous discussions, there is a definite possibility of data corruption involved in this study. Although it is not certain, many of the courses offered by these individual institutions may be in direct correlation with the MSIS 2000 Model Curriculum. It becomes a difficult task to ensure that all courses are represented when placed in the context of the MSIS course descriptions. Also, the individual catalog descriptions provided by each institution may be either misleading or non-inclusive, providing the opportunity for a misrepresentation of the data.

Assuming the data is statistically correct, and then the following recommendations must be put forth. While the different colleges and universities are moving towards a more unified core group of courses, more work is needed. Realizing once again that the individual needs of the institutions playa major role in the selection of program content, the integrity of the students schooling must be maintained in the eyes of potential employers. It would be impractical for employers to evaluate every school's program individually. Employers must be able to be confident that a common set of skills will be instilled in students graduating from an MS in Information Systems programs.

Integration

The integration component of the MSIS 2000 Model Curriculum is perhaps the most important part of the MS program, and it is also the component being utilized the least. Many of the individual programs included "Capstone" courses, but these courses didn't necessarily deal with specific integration issues. The statistics of the integration courses were touched upon in the previous section (See Figure 3), in part because the individual programs that did include an integration related course were often included in the IS core courses. That being stated, it is not necessarily essential that the integration courses be offered as stand-alone courses. Many of the individual core courses should be able to incorporate the integration concept into the course content. However, individual integration courses would also be very beneficial, being able to contain several different course concepts and apply them as they interact with each other. Also, the integration courses may themselves be concentrated upon several aspects of integration, as outlined in the MSIS 2000 report. However applied to the master's programs, the integration component

must be focused upon more in the future. As business develops with emerging technology, IS professional will find these integration skills increasing more useful, if not a necessity?

Career Electives

While the need for a common set of skills and knowledge is strongly stated in the MSIS 2000 report, it recognized the fact that not all students are the same. Many students have different interests and career goals. The Career Electives component of the MSIS 2000 Model Curriculum accounts for these individualities, and suggests several courses be geared towards the students' specific needs. As to be expected, this is also the most varied component between MS programs. Each institution offered several different elective options, encompassing many different career tracks. The MSIS 2000 report gave a detailed list of some of the suggested career tracks and course content (See Appendix B). This list is by no means exclusive, and will continue to change as the Information Systems field changes. The needs of the various colleges and universities will dictate which courses are presented to the students as elective options. These needs can depend on many different factors, including institutional resources, faculty, geographical differences and perceived changes in business and technology.

The MSIS 2000 Model Curriculum suggests that at least four elective courses be required to satisfy the career elective component of the model. Most of the institutions are in coherence with the MSIS 2000 model in the fact that they are including the elective component, but differ on the number of elective courses required. While all of the institutions required elective course work, some institutions required as few as one elective. Also, many of these programs didn't offer direct elective courses, but offered different areas of concentration, which determined how the master's program would be undertaken. Although it seems that most colleges and universities are providing definite if not direct career choice in their respective master's programs, it must be certain that enough time is spent upon these concentrations. The common field of study is important, but the individual needs of the student cannot be ignored or taken too lightly. These individual options are surely what will continue to draw students towards the master's programs of certain institutions, and the lack of them will just as surely lead to students seeking other means of fulfilling their individual needs, be it other programs, or other institutions altogether.

Exit Objectives

Previous studies of a model curriculum in Information Systems (Ashenhurst 1972, Nunamaker 1982, Gorgone 2000) have also mentioned the need to present what the exit objectives for graduates of a master's program should be. The rapidly changing world of technology facilitates the need for students to have hands-on knowledge of current and emerging technologies. Good technical skills are desired by many of the employers in the business world. The MSIS 2000 report outlines several criteria that graduating students will have to have in order to meet the needs of the business world.

- Broad business perspective, and business experience/skills
- Systems/IS skills, including hardware and software programming skills
- Communication/interpersona1/team skills
- Analytical and thinking skills
- Real world experience/internship
- Cutting-edge technology knowledge and tools

In addition to these criteria, it is extremely important that the exiting student have the skills required to not only interact with other business professionals, but also to be able to analyze, evaluate, and create solutions for their respective businesses. This will involve designing, implementing, and evaluating information systems that are beneficial to the needs of the organization. The MS graduate must be able to

recognize and utilize all available resources in an efficient manner, and to recognize opportunities to implement new systems, as well as modify existing systems, that will increase the productivity of its users.

Conclusion

There has been great demand for the MSIS program in the industry for the last two decades, which can be supported by the numbers of degrees awarded by the U. S universities as stated by Tobias.

Between 1984 and 2000, according to the National center for Education Statistics, the number of professional master's degrees awarded by U. S universities climbed from 271,000 to 360,000 – 86 percent of these in professional fields and 13.6 percent in the arts and sciences (Tobias, 2002).

The model curriculum proposed by the MSIS 2000 report will be very useful reference for institutions that wish to either start a MSIS program, or modify an existing program. Many of the suggestions put forth by the report are still extremely relevant, but the model curriculum must be continually updated to accurately represent the changing field of Information Systems, and the needs of the MSIS students. The survey conducted for this paper demonstrates that although many of the selected colleges and universities are adhering to the MSIS 2000 Model Curriculum guidelines, none of the institutions are following the model curriculum implicitly. This is due to many different factors, unique to the individual needs of each institution.

While some specialization is definitely needed in the master's program, care must be taken to insure that graduating students have the critical knowledge areas included in their MSIS program curriculum, regardless of the institution attended by the student. The four critical knowledge areas for information systems managers as suggested by Dietrich are: functional areas of business, modeling and decision-making processes, hands-on computer skills, and information systems concepts and processes (Dietrich, 1989). This will better serve both the students and their prospective employers by increasing the integrity of the MSIS degree, and developing a sense of trust between the two parties. An employer needs to be confident in the skills of new employees, while students should be confident that while they may have a specific area of concentration in Information Systems, their core skills will enable them to function efficiently in whatever environment they are placed, irregardless of how it relates to the individual students specialization.

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Biographies

Sudesh M. Duggal is Professor of Information Systems at Northern Kentucky University, where he has been since 1979. His teaching interests are Database Management Systems, Management Information Systems, Visual Basic. NET, and ASP.NET. His research interests are in the field of Database Management Systems, Expert Systems, Distance Learning, Curriculum Issues, and E-Commerce.

Charles M. Mastruserio attended Northern Kentucky University and received his B.S. in Marketing and Psychology in 1995. He returned to Northern Kentucky University and received his Masters in Information Systems in 2002. He is always interested in the different applications of IT, and is currently working for the law firm of Jolly, Blau, Kriege & Turner in their Real Estate division.

Appendix A

Summary of Curriculum Requirements

FOUNDATION
IS Foundations
Fundamentals of Information Systems
Information Technology Hardware and Software
Programming, Data and Object Structures
Business Foundations
Financial Accounting
Organizational Behavior
Marketing

IS CORE
Data Management
Analysis, modeling and Design
Data Communications and Networking
Project and Change Management
IS Policy and Strategy

INTEGRATION
Integrating the Enterprise
Integrating the IS Function
Integrating IS Technologies
Integrating the Enterprise, IS Function, and IS Technologies

CAREER ELECTIVES
Four career-oriented courses - may include a practicum.

Appendix B

MSIS 2000

Academia (path to Doctorate) • Principles of IS Research • Teaching Skills • Statistical Research Methods • Advanced Elective in Teaching	Knowledge Management • Knowledge Management and the Learning Organization • Document Management • Data Warehousing • Data Mining and Knowledge Acquisition
Consulting • Consulting in Business • Consulting in IS • Advanced Project Management or Advanced Change Management • Elective in Consulting Area (e.g., knowledge management, ERP , telecom)	Managing the IS Function (Internal to IS) • Role of the CIO • Management of Computer Personnel Operations • Management of Telecommunications Resources , • IS Security
Data Management and Data Warehousing • Data Warehousing • Knowledge Management • Database Administration • Database Systems Planning	Management of the IS Function (external to IS) • Role of CIO • Telecommuting and Virtual Organizations Outsourcing • End-User Computing
Decision Making • Decision Support and Executive Information Systems • Data Warehousing • Simulation and Modeling • Human-Computer Interaction	New Ways of Working • Telecommuting and Virtual Organizations • Workflow and Collaborative Work Multimedia • Internet, Intranets, and Extranets
Electronic Commerce • Internet, Intranets, and Extranets • Electronic Commerce • WWW and the Value Chain • Consumer Relationship Marketing	Project Management • Advanced Project Management • Advanced Change Management • Outsourcing • Virtual Organization or Telecommuting
Enterprise Resources Planning • ERP Systems • Business Processes • Internet, Intranets, and Extranets • Systems Integration	Systems Analysis & Design • Advanced Design Methodologies (e.g., Object-Oriented Analysis and Design, RAD, prototyping) • Advanced Project Management • System Integration • IS Consulting
Global IT Management • Trans border EDI and Data Flows • Virtual Organizations • Knowledge Management • Global Cultural Implications for IS	Technology Management • Emerging Technologies and Technology Forecasting • Globalization • Advanced Project Management • Organizational Aspects of Technology Management
Human Factors • Ergonomics of Computing • Interface Design • Usability Analysis and Testing • Multimedia Design and Production	Telecommunications • Telecommunications Technology • Managing the Telecommunications Resource • Internet, Intranets, and Extranets • Electronic Commerce

Appendix C

Course Descriptions

The course descriptions are based on IS'97, modified to the format of MSIS2000, are available on request.

Appendix D

Program and course descriptions from the following list of colleges and universities were gathered from their respective World Wide Web sites:

Baylor University
Bentley College
Central Michigan University
Colorado State University
Dakota State University
DePaul University
DeSales University
Eastern Michigan University
Hawaii Pacific University
Kennesaw State University
Mississippi State University
Northern Kentucky University
Penn State -Harrisburg
Roosevelt University
Strayer University
University at Albany, SUNY
University of Illinois at Chicago
University of Missouri -St. Louis
University of South Florida
University of Wisconsin -Oshkosh