

MANAGEMENT INFORMATION SYSTEMS SCHOOL OF BUSINESS & ECONOMICS MIS VISION 2015

Executive Summary

Enrollment for Management Information Systems (MIS) majors has been declining since shortly after the turn of the century. The purpose of this document is to identify the indisputable benefits of maintaining a strong MIS degree program in the School of Business & Economics at Michigan Tech. We begin by clarifying what is meant by MIS and defining the discipline, reviewing the history of MIS in the SBE (e.g. average nearly 20% female majors in this particular STEM field), summarizing an analysis of our degree program (i.e. SWOT analysis), and outlining a plan to improve the number of MIS majors within the next five years.

We begin with a review of factors commonly credited for the falling numbers and myths contributing to avoidance of technical fields by prospective students. Two examples are the misinformation that there are “no jobs” available in information systems/technology and that all positions are being outsourced to India or China. Understandably, students are reluctant to pursue majors if they believe they will not secure employment upon graduation. However, the message is exaggerated by the popular press, inadequately reporting actual data. The jobs that MIS majors are prepared to enter are not typically outsourced overseas –analysts and project managers. This positive message needs to be communicated clearly to high school students.

MIS establishes the nexus between business and technology. Our graduates are prepared to enter the workforce as project managers, business analysts, systems analysts, database analysts, and applications developers. These are exceptional positions with rich promotional opportunities residing in a variety of industries. Although a small sample size, our MIS graduates have excelled in their careers, including employment with Fortune 500 companies. The MIS curriculum is keeping pace with the needs of industry, and producing outstanding alumni who are proven assets to their employers. With a range of \$55,000 to 65,000, MIS graduates own some of the highest starting salaries of Michigan Tech alumni. In the larger context, diminishing numbers of technical graduates nationwide creates a gap in the job market and reduces the competitive strength of the United States. This, in turn, forces companies to outsource technical jobs to other countries, since corporations claim they are not able to find a sufficient number of domestic applicants with the necessary skill sets. The problem becomes self-fulfilling. This vicious cycle will continue until academic institutions begin to educate prospective students on the range of technology-based programs available.

Numerous recommendations have surfaced in published articles, both scholarly research and practitioner print, that describe specific actions that universities should attempt in order to reverse this trend. Baylor University, with a recent 293% increase in enrollment in their degree, provides a benchmark for other programs to emulate. Their “secret” was involving current MIS majors in the recruitment and retention process. This paper concludes with a detailed list of action items and outcome goals for the next five years. With adequate resources for recruitment and curriculum development, Management Information Systems will become a preeminent degree program at Michigan Tech.

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Background

Management Information Systems (MIS), also called simply Information Systems (IS), programs peaked nationwide shortly after the year 2000 (Goff, 2000). Some of the hyper growth of the field leading up to that time period was due to the Y2K frenzy and the explosive expansion of the Dot Com Bubble. Frankly speaking, students were attracted to the high salaries and career opportunities (Kuechler, McLeod, and Simkin, 2009). Information technology (IT) specialists were in high demand, primarily for their advanced technical and programming skills (e.g. COBOL). However, after the Dot Com Bust, many experienced IS/IT experts flooded the job market. Additionally, the popular press emphasized the negative impact on the IS/IT job market due to outsourcing and offshoring, primarily to India and China (e.g. Mildenberg, 2004). Although some of this information was accurate, the impact was dramatic and immediate (Granger, et al., 2007). Students were reluctant to select technical academic programs in light of the uncertainty of securing employment following graduation (Kuechler, et al., 2009). The unflattering perception of technical majors populated by nerds and geeks has also influenced some students in their avoidance of MIS (Scott, et al., 2009).

Radical and continuous innovation are the drivers of IS/IT demand. The technological landscape is constantly changing, and the pace of change is accelerating (Gates, 1999). In this environment, employees are required to participate in continuous learning. It is critical that they enter the workforce prepared to adapt to changing technical responsibilities. Technological foundations are at the very core of competitive advantage as corporations progress into the next decade.

Numbers of MIS/IS majors are beginning to rebound both nationally and internationally. Universities that cut their degree programs are finding that they are poorly positioned to respond to the influx of students seeking these programs. Although we are witnessing the early stages of recovery, this realization presents our organization with a profound opportunity. This is the time to revise the MIS curriculum to align our graduates with the functional needs of corporations who will be poised to hire them. A unified vision for MIS will secure the health of this discipline and place our graduates in professionally challenging, competitive roles.

Defining MIS

The Management Information Systems (MIS) discipline combines the technical skills (i.e. programming) of computer science with the management skills introduced in core business curricula. Our majors develop a solid understanding of essential programming functions and the proven methods to implement successful systems solutions. Through their business core, these

students acquire the business acumen that broadens their perspective to include the “language of business” (i.e. business terminology). Specifically, they develop a deep appreciation of business goals and processes with a focus on the “big picture”. This strategic, systems thinking approach ensures that their problem solving activities integrate multiple objectives and perspectives, optimizing resources throughout the organization being served.

Another fundamental area of study is the importance of developing exceptional project management skills. These graduates will be required to direct and monitor systems projects to their final implementation, and to supervise other computer programmers on their project teams. The curriculum must prepare MIS majors to not only learn computing basics, but to also lead teams with confidence while simultaneously mitigating the negative effects of team conflict. Within systems development teams, business analysts gather system requirements from end users, create models representing the business processes, design innovative solutions to improve efficiency and effectiveness of systems, translate between the distinct worlds of business and technology, test and implement final solutions, and support & maintain systems currently in use.

In order to accomplish these roles, interpersonal communication skills are practiced and emphasized throughout the MIS curriculum. It is imperative that IS/IT professionals communicate with diverse audiences, from senior executives who control the financial resources to end users who must adopt new systems in the performance of their jobs. Therefore, teamwork, cooperation and collaboration are cornerstones of the MIS program.

MIS-Related Occupations

The following is provided as a representative list of the types of jobs MIS majors are prepared to enter upon graduation. The average salaries were extracted from the Occupational Outlook Handbook, U.S. Bureau of Labor Statistics, 2010-11 Edition (last accessed online 7/25/10). This list is not intended to be exhaustive or comprehensive, and is not intended to limit the scope of individual alumni.

- Business Analyst (\$82,090)
- Computer Systems Analyst (\$75,500)
- Computer Network, Systems, and Database Administrators (\$66,310)
- Computer Support Specialists (\$43,450)
- Computer and Information Systems Managers (\$112,210)
- Computer Software Engineers and Computer Programmers (\$85,430)

NOTE: Job outlook projections are expected to increase much faster than average across all of these occupations over the next decade.

Returning to the issue of offshoring, the IS/IT positions most vulnerable to this business practice are infrastructure services, help desk support, and data centers; while jobs that focus on strategic use of technology, architecture design, project management, and relationship management are significantly more secure (Timpany, 2010). The MIS curriculum in the School of Business & Economics at Michigan Tech clearly prepares graduates for the latter types of jobs, leading to permanent positions with professional growth opportunities. (See Appendix A.) Additionally, the 2010 IT Skills and Salary Report states that the average salary was \$82,115 for the over 19,500 IT professionals worldwide who responded, nearly flat from last year’s average, in spite of the economic recession (Timpany, 2010).

Demographics of MIS Majors

Since 2005, the number of students selecting MIS as their major has decreased from a peak of 18 in the capstone course (BA4210 Advanced Information Systems) to the current class of 6. This percentage decline (33%) is lower than the national average of 50%, but reflects the general trend identified by numerous researchers in technology fields. (See the Suggested Readings list at the end of this document.) A positive observation is our percentage of female MIS majors. With the exception of Spring 2006, our percentage of female majors exceeded the overall national average of 15%. (See Table 1.)

Semester	Total MIS Majors	Percentage Female
Spring 2004	16	25.00%
Spring 2005	18	22.22%
Spring 2006	12	0.00%
Spring 2007	9	22.22%
Spring 2008	8	25.00%
Fall 2009	11	18.18%
Fall 2010	6	16.67%

Table 1. Total MIS majors in the capstone course and percentage of female students.

Analysis of the MIS Degree

Strengths

The strength of the MIS program at Michigan Tech can be traced through the successful placements of our alumni. (See Table 2.) We have a very high percentage of graduates securing positions related to their field of study (roughly 85% within 6 months of graduation). Current job descriptions for most technology-related positions include business acumen and interpersonal communication skills as either required or desirable in qualified applicants. Plice and Reinig surveyed recent alumni working in industry (2009) regarding the value of IS curriculum at San Diego State University (81 usable survey responses):

An analysis of the responses indicates that communications and teamwork skills are perceived as highly important to the business community. Qualitative and statistical analyses show that the business community perceives value in curriculum content that emphasizes managerial and systems development topics and covers technical topics broadly rather than deeply, (Plice and Reinig, 2009, pg. 142).

Year of Graduation	Firm	Position/Title
2001	Up & Running Technology Solutions, Inc.	Owner
2003	Revenue Management Solutions, LLC	Director, Data Services and Analytics
2004	Accenture	Manager
	BDO	Technical Resource
	Aprimo	Technical Lead
2005	Logic Trends, Inc.	Midwest Regional Delivery Manager
	Kimberly-Clark	Sr. Analyst – Enterprise Technology Development
	Gambro Renal Products	SAP Portal Administrator
	Icavia, LLC	Sr. Developer
	Dow Chemical Company	Implementation Specialist
2006	Wisconsin Hospital and Clinics	Senior Systems Analyst
	Ford Motor Company	IT Systems Engineer
	Integrus	Server Analyst
2008	Revenue Management Solutions	Database Analyst
	Dow Chemical Company	IT Staff Auditor
2009	Northwest Aerospace & Aviation Company	Analyst/Developer

Table 2. Sample of positions held by MIS alumni of the School of Business & Economics.

We are confident that our MIS curriculum provides graduates with a broad range of technical skills (i.e. programming, analysis and design) as well as the additional transferable skills (sometimes referred to as “soft” skills) necessary to propel them to the top of applicant pools. One MIS graduate, Scott Isaacson, provided a clear description of the benefits of his experience at Michigan Tech and how the skills developed have contributed to his successful career progression. (See Appendix B.)

Officially changing the SBE disciplines from concentrations to majors will improve our visibility to potential employers. We view this strategic change as a strength, helping to put our majors in front of recruiters at Career Fairs. Over the past two years, one of the MIS faculty members has proactively engaged recruiters at events, discussing the merits of the MIS program. In particular, she has targeted recruiters seeking computer science majors, but not listing MIS majors in their profile searches. Several corporate representatives admitted their ignorance of our MIS program, and expressed interest in contacting our MIS majors in the future.

After conducting a quick search of our MIS alumni, the list of corporate placements is quite respectable: IBM, Kimberly-Clark, DOW Chemical, Ford Motor Company, Epic Systems, Sentry Insurance, Compuware, Northwest Aerospace & Aviation Company, Univ. of Wisconsin Hospitals & Clinics, Revenue Management Solutions, Upper Peninsula Health Plan, Icavia LLC, Aprimo, Accenture, BDO, Verizon, Integrys, Logic Trends, to name a few. What is less obvious from this list is their rapid career projections. Some of our recent graduates are already entering management roles, supervising systems development teams, and even moving into executive ranks. For a relatively young discipline, our alumni are innovating their way to the top of the corporate ladder.

Weaknesses

Although not insurmountable, the following challenges artificially constrain the growth of the MIS program. First, external visibility continues to be a weakness for the MIS program (Granger, et al., 2007). Recruiters are either not aware of our degree, or they are ill-informed about our curriculum. Computer science is familiar and recognizable. This challenge is not unique to Michigan Tech; the MIS/IS discipline continues to strive to communicate our specific area of expertise.

Second, students entering the MIS degree tend to demonstrate unsatisfactory quantitative skills required for business analytics. We need to work with students, overcoming these negative biases and build up their confidence in applying various applications (e.g. statistical packages) to solve business problems.

Third, prerequisites prohibit MIS majors from upper level computer science courses, thereby limiting technical programming coursework available to them. This issue will be addressed through open dialogue with the Computer Science and School of Technology departments. Our respective specialties offer unique benefits to Michigan Tech students, and synergies through interdisciplinary work should be identified.

Fourth, although adequate for the present load, physical resources are not adequate to develop an internationally renowned MIS program. As a minimum, we require two additional faculty members to offer MIS electives in Business Intelligence and IT Security. Very few universities are offering undergraduate electives in these areas; these courses would distinguish Michigan Tech's MIS degree from other competing programs. The 2010 IT Skills & Salary Report identified the following skill sets as most important for the future: "*project management*, expertise in cloud computing and virtualization, *data security*, network administration, *business analysis*, and process improvement," (Timpany, 2010, pg. 10, emphasis added).

Finally, as explained above, there is no clear definition of the MIS major. The message must be crystallized and distributed to a wide-ranging audience. It helps to focus on our expertise and roles within corporations. It can also be beneficial to limit the scope, describing what we "are not" (i.e. strictly programmers). This is an ongoing discussion, not likely to be resolved in the short term.

Opportunities

The most urgent need is to brand our program. In other words, we need to communicate the value of our graduates to corporate recruiters and develop a distinctive curriculum that draws attention from outside our academic community. Although job descriptions proclaim that these are the skills recruiters seek (i.e. combination of technical and business skills), corporate representatives continue to advertise for disciplines outside of business schools. Arguing the irrationality of that process simply wastes energy and resources. The effective response seems to

be a continuing, open exchange with technology professionals already residing within corporations. These “front-line” employees understand the value of the technology/management hybrid, and they are interested in the curriculum we are proposing. For example, we received positive feedback from technology executives from Ford Motor Company when we presented our curriculum plan last spring (2010). They agreed that business intelligence and analytics along with information security are the fundamental areas of emphasis for the future. Michigan Tech MIS graduates will add value by assisting their employers with data mining, searching for trends and patterns in the vast stores of data contained in data warehouses. They will transform data into actionable information to improve decision making at all levels of the organization.

An additional opportunity exists at Michigan Tech to create an interdisciplinary learning experience for students. A variety of technology-based courses are offered in departments across the campus, such as the School of Business & Economics (MIS major), School of Technology (CNSA major), Computer Science, and engineering disciplines. Colgoni and Eyles (2010) advise an inquiry-based approach that will benefit graduates in their future careers. These alumni will be poised to adapt to the rapid pace of change and to focus on innovation, regardless of any specific industry or market. Working together to build a strong technical program of study, while preserving the uniqueness of the individual facets, is an ambitious goal. Mutual respect between complementary disciplines will solidify these aims.

Threats

The tuition for the MIS degree at Michigan Tech is expensive compared to some other universities. We also have substantial competition for acquiring majors to our area within the Michigan Tech campus. For example, in addition to MIS, students interested in technology-related fields can choose computer science, computer engineering, computer network and systems administration, and scientific and technical communications. The programs are distinct and take a profoundly different view of technology, but students are not always well-informed about their options. This is unfortunate, since students sometimes find themselves in programs that do not fulfill their expectations. More detailed information about alternatives should be shared with potential first year students through recruiting and outreach efforts.

The economic crisis continues to have a negative effect on job prospects, impacting students' choices of majors. Realistic, fact-based information needs to reach students, not emotionally-biased and baseless counsel. There are jobs in the IS/IT field; graduates must be willing to conduct a persistent job search in order to secure permanent employment.

Recommendations

There are a number of actions that we can take to improve the number of majors in MIS. Akbulut and Looney (2007) summarize their recommendations for attracting students to computing majors in three areas; self-efficacy, outcome expectations, and interest. Immediate and frequent successes lead to intrinsic motivation. They must believe that their efforts will be rewarded following graduation (i.e. good salaries and job security). And, courses need to be challenging and aligned with student interests.

Learn from Published Research

Borrowing from published studies, we can formulate an action plan for the future. (See the Suggested Readings list at the end of this document.) First, we must explain clearly the value of an MIS degree to diverse audiences, describing the career opportunities open to MIS graduates. Second, we need to reach out to high school counselors and teachers to introduce them to our discipline. Parents, teachers, and guidance counselors hold considerable influence in the selection of college majors. Unfortunately, there is a profound lack of understanding among these groups regarding MIS. Correcting this communication gap will take focused efforts. Third, we could host an information session prior to the Career Fair, inviting firms listing computer science openings (and, in particular, those firms failing to list MIS on their search parameters). Fourth, students need to be made aware of job growth projections through the Occupational Outlook Handbook. Too many students select their majors with minimal information about what they are choosing. Perhaps First Year Orientation is the venue for introducing incoming students to this valuable resource. Informed consumers should critically process all available information before arriving at a conclusion.

Learn from Model University Programs

Baylor University has obviously found the recipe for growing the enrollment for their IS program. Current MIS students are at the very center of their recruitment, retention, and placement efforts (Koch and Kayworth, 2009). “Students recruiting students” was the foundation for their 293% increase in enrollment over a 2.5 year period (2007-2009). Their roadmap to success is worth reviewing, and perhaps imitating, to rebuild the MIS program at Michigan Tech.

Continuing Dialogue with Industry

The Business Technology Advisory Group (BTAG) should be reconstituted with the goal of gaining relevant industry perspective on potential directions for the MIS program. This type of bidirectional interaction with IS/IT professionals in industry could also lead to internship and permanent job opportunities. At the very least, it will establish strong ties to successful businesspeople with an interest in promoting Michigan Tech’s programs. Open dialogue with industry ensures that curriculum remains relevant as our graduates enter the job market (Plice and Reinig, 2009).

Future Growth

Although the “belt tightening” isn’t over yet, many IT shops are beginning to work on new projects designed to boost efficiency, improve customer relationships, and reduce costs (Murphy, 2010). Surveys of Chief Information Officers in diverse industries indicate that, in general, they perceive that the worst has passed for IT employment, and a new growth stage could very well be developing. As one example, the U.S. government will have to fill over 11,000 vacancies in critical positions due to the anticipated retirement of Baby Boomers (Thibodeau, 2009). However, the skill sets in demand may be shifting. In June, Hewlett-Packard Co. (May, 2010; Thibodeau, 2010) signaled a shift from “hard” technical skills to hiring personnel with business-related expertise. This change will prove favorable for graduates of MIS programs; that is the skill combination inherent in our curricula. Corporations are looking for a combination of technically-savvy and business-oriented employees (King, 2010).

Students in technology-related fields need to be cautioned about defining their career projections too narrowly (e.g. C++ programmer). This leads to rapid obsolescence of key skills

and reduces job security. Many programming positions are prime targets for outsourcing and offshoring initiatives. Project managers and problem solvers tend to enjoy greater job security (Timpany, 2010). The 21st Century IT professional must be able to integrate information from multiple sources to solve increasingly “complex multidimensional problems and to effectively communicate with a range of audiences” (Colgoni and Eyles, 2010, pg. 11). That accurately describes an MIS graduate, and companies are beginning to appreciate those skills.

Performance Goals and Actions

The following list highlights the areas of immediate importance and sets measurable objectives for the next five years.

Activity	Targeted Outcome
Hire two full-time MIS instructors at either the Assistant or Associate level. One should have expertise in areas focusing on programming and telecommunications.	Provide the necessary teaching resources for the MIS curriculum to include valuable electives (i.e. proposed new courses).
Create a clear definition of the MIS program and communicate this message through promotional materials to target audiences (e.g. undergraduate advisors, local high school faculty, guidance counselors, and students). Participate in Preview Day at Michigan Tech to personally introduce MIS to visitors.	Increase the number of MIS majors to 45 (approximately 10% of the total SBE undergraduate enrollment). We currently have 27 declared MIS majors, although some students remain undecided until their third- or fourth-year.
Develop an informative and engaging presentation to be shared through SBE recruitment channels. Offer to accompany the Outreach Coordinator on some local recruitment visits.	Increase the number of MIS majors to 45.
Reconstitute the Business-Technology Advisory Group (BTAG). Meet with IS/IT professionals in industry and MIS alumni either face-to-face or virtually (conference calls). Discuss the direction of our MIS curriculum and collect feedback/insights. Conduct a minimum of one meeting per semester.	Maintain a relevant curriculum, satisfying the constantly changing needs of industry.
Develop the business intelligence (business analytics) elective and offer a BI topics course.	Create awareness among MIS majors of the changing skills and growing emphasis on quantitative focus.
Work with other technology-related faculty to develop synergies on campus. Meet on a regular basis to discuss trends and opportunities (e.g. at least once per semester).	Develop collaborative initiatives benefitting students interested in technical careers.
Discuss the recruitment plan with Baylor University's MIS faculty. Include our current MIS majors in the process of recruitment.	Increase the number of MIS majors to 45.
Inform all MIS students of the IT Oxygen Enterprise and encourage their participation.	Build mutual respect between MIS and other technology-based majors through development of team projects.
Encourage all MIS majors to join the AITP (Association of IT Professionals) student organization at Michigan Tech.	Increase awareness of career opportunities and develop professional networks with IT professionals.

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Suggested Readings:

- Becker, J., Hassan, N., and Naumann, J.D. (2006). "Combating the Enrollment Downturn in IS/IT Programs," *Proceedings of the Twelfth Americas Conference on Information Systems, Acapulco, Mexico*, pp. 2289-2298.
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APPENDIX A
MIS CURRICULUM (APPROVED SPRING 2010)

Proposed Management Information Systems Curriculum Changes 2010

After carefully reviewing the MIS curriculum, the MIS faculty is proposing to add five new courses to the curriculum. Minor changes have been made to the remaining courses as follows.

Current Course	New Course
BA2 200 Business Programming Concepts	MIS 2100 Introduction to Business Programming
BA 2210 Web Application Development	MIS 2200 Web Programming
BA 3200 IS/IT Management	MIS 2000 IS/IT Management
BA 3210 Business Database Management	MIS 3100 Business Database Management
BA 3220 Systems Analysis and Design	MIS 3200 Systems Analysis and Design
	MIS 3000 Business Process Analysis
BA 3250 Telecommunications	MIS 3300 Telecommunications
	MIS 3500 User-centered Design
	MIS 3600 Information Regulatory Compliance
	MIS 3400 Business Intelligence
BA 3290 IS/IT Topics	MIS 4900 IS/IT Topics
BA 4210 Advanced Information Systems	MIS 4000 Advanced Information Systems
BA 4250 Information Systems Projects	MIS 4100 Information System Projects

Course Descriptions:

The curriculum is designed to emphasize analytical, design, and implementation skills in order to prepare graduates for business analyst, systems analyst, business application developer, database management, and information systems project management careers.

Current Courses

MIS 2000 - IS/IT Management (Changed number)

Focuses on the theory and application of the information-systems discipline within an organizational context, and identifies the roles of management, users, and information systems professionals. Covers the use of information systems and implications for decision support to improve business processes, and addresses the ethical, legal, and social issues of IT.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Fall, Spring, Summer

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): BUS1100, CS 1121 or CS 1131 or ENG 1101 or (ENG 1001 and ENG 1100) or SAT 1200

MIS 2100 – Introduction to Business Programming

Develops business problem solving skills through the application of a commonly used high-level business programming language. Topics include the nature of the business programming

environment, fundamentals of the language (e.g., programming constructs, data management, manipulation of simple data structures), structured programming concepts, desirable programming practices and design, debugging and testing techniques.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Spring

Pre-Requisite(s): BUS1100

MIS 2200 - Web Programming

Covers technologies, tools, and environments related to the development of web-enabled business solutions. Topics include the development environment for web-based solutions, key development technologies, desirable development practices, and design, programming, debugging and testing methods.

Credits: 3.0

Lec-Rec-Lab: (3-0-0)

Semesters Offered: Fall

Restrictions: May not be enrolled in one of the following Class(es): Freshman

Pre-Requisite(s): MIS2200 or CS 1121 or CS 1131 (or equivalent programming class)

MIS 3100 - Business Database Management

Emphasizes database principles that are constant across different database software products through concrete examples using a relational database management system. Provides a well-rounded business perspective about developing and utilizing organizational databases.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Fall

Pre-Requisite(s): MIS2300(C)

MIS 3200 - Systems Analysis and Design

Provides an understanding of the IS development and modification process and the evaluation choices of a system development methodology. Emphasizes effective communication with users and team members and others associated with the development and maintenance of the information system. Stresses analysis and logical design of departmental-level information system.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring

Pre-Requisite(s): MIS2300(C)

MIS 3300 – Telecommunications (or SAT 2343 Network Administration I)

Introduces students to telecommunications concepts, architectures and protocols, commercial offerings, hardware, software, network design, and telecommunications management, regulations, and business applications (e-commerce).

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 AY

Pre-Requisite(s): MIS2300(C)

MIS 4000 - Advanced Information Systems

Focuses on understanding IT for competitive advantage and as an agent of transformation. Topics include managing IT infrastructure and architecture, facilitating information distribution throughout the enterprise, conducting case analyses to develop a framework for innovative Enterprise Systems to be used for sustainable competitive advantage.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Spring - Offered alternate years beginning with the 2010-2011 academic year

Restrictions: Must be enrolled in one of the following Class(es): Senior

Pre-Requisite(s): MIS3210 and MIS3220

MIS 4100 - Information Systems Projects

MIS capstone course. Previous completion of required MIS coursework expected. Applies IS practices and artifacts as solutions to business problems using project teams and faculty project manager supervision. Emphasizes the latter portion of the systems development life cycle project management within an IS context.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Fall, Spring

Restrictions: Must be enrolled in one of the following Class(es): Senior

Pre-Requisite(s): (MIS2200 or CS 1121 or CS 1131 or ENG 1101 or ENG 1100 or SAT 1200) and MIS3210 and (MIS3220 or MIS3230).

MIS 4900 - IS/IT Topics

Examines current IS/IT topics and issues in greater depth from a managerial perspective. A single offering of this course will concentrate on one or two topics, which will vary.

Credits: 3.0; Repeatable to a Max of 6

Lec-Rec-Lab: (0-3-0)

Semesters Offered: On Demand

Pre-Requisite(s): MIS2300

New Courses

MIS 3000 Business Process Analysis

Studies business decision management discipline using business rules, process models (e.g., flowcharts, unified modeling language, swim lanes), and information systems to improve efficiency and effectiveness. Emphasis on industry standards and business process management used to increase productivity.

Credits: 3.0

Lec-Rec-Lab (0-3-0)

Semesters Offered: Fall – Offered alternate years beginning with the 2011-2012 academic year

Pre-Requisite(s): MIS2300

MIS 3400 Business Intelligence

Focuses on generation and interpretation of business analytics relative to organizational decision making. Includes core skills necessary for constructing data retrieval queries in a relational database environment.

Credits: 3.0

Lec-Rec-Lab (0-3-0)

Semesters Offered: Spring – Offered alternate years beginning with the 2011-2012 academic year

Pre-Requisite(s): MIS2300

MIS 3500 User-centered Design

Studies user-centered design in development of effective interface solutions for business needs. Content **may** include input/output devices, user modeling, help and documentation, social issues, and usability evaluation. Emphasis on how interface design addresses human capabilities and capacities.

Credits: 3.0

Lec-Rec-Lab (0-3-0)

Semesters Offered: Fall – Offered alternate years beginning with the 2012-2013 academic year

Pre-Requisite(s): MIS2300

MIS 3600 Information Regulatory Compliance

Focuses on understanding government regulations directly relevant to information systems practitioners and end users for the secure management of IT assets and capabilities. Coverage **may** include: global, national, and local regulations; security concerns; and individual, team, and organizational responsibilities (e.g., social engineering issues).

Credits: 3.0

Lec-Rec-Lab (0-3-0)

Semesters Offered: Spring – Offered alternate years beginning with the 2012-2013 academic year

Pre-Requisite(s): MIS2300

MIS Major Requirements: Total of 30 credits from the Major Requirements, MIS Electives, and Business and Economics Electives.

Concentration Requirements

Course Number Credits

MIS Major Requirements (15 credits)

MIS 2100 (or equivalent programming course)	3	Introduction to Business Programming
MIS 3100	3	Business Database Management
MIS 3200	3	Systems Analysis and Design
OSM 3120	3	Project Management
Capstone Experience:		
MIS 4100 OR	3	Information Systems Projects
One of the following with IS faculty signature: (BA 4950 CenTILE Project), (BA 3900 Business Internship), or ENT 4900 (Enterprise Experience)		

Management Information Systems Electives (9 credits)

MIS 2200	3	Web Programming
MIS 3000	3	Business Process Analysis
MIS 3300	3	Telecommunications (or SAT 2343 Network Admin I)
MIS 3400	3	Business Intelligence
MIS 3500	3	User-Centered Design
MIS 3600	3	Information Regulatory Compliance
MIS 4000	3	Advanced Information Systems
MIS 4900	3	IS/IT Topics
HU 3120	3	Scientific and Technical Communications

Business and Economics Electives (6 credits)

ACC 3500	3	Managerial Cost Accounting I
ACC 4800	3	Accounting Systems
EC 4200	3	Econometrics
MGT 3650	3	Intellectual Property Management
MGT 3780	3	Entrepreneurship
MGT 4710	3	International Management
MGT 4750	3	Managing Change
MGT 4600	3	Management of Technology and Innovation
MKT 3600	3	Marketing Research
MKT 3200	3	Consumer Behavior
MKT 4510	3	Introduction to Digital Marketing
MKT 4570	3	Business to Business Marketing
OSM 4300	3	Project Planning and Innovation
OSM 4110	3	Supply Chain Management
OSM 4750	3	Managing Systems Risk
FIN 4000	3	Investment Analysis

Free Electives: 11-15 credits

APPENDIX B

Scott D. Isaacson

Sr. Systems Analyst – University of Wisconsin Hospital and Clinics

Senior business/systems analyst and project lead; experience with health care and business information systems, including analysis, documentation, system build, testing, and support.

Specialties

- * Certified in EpicCare Ambulatory and MyChart (Summer, 2009)
- * Relational databases, Chronicles ad-hoc reporting
- * Technical project management
- * Technical training and education

What follows is a summary of my experiences in the professional world, and how they relate to my MIS degree from Michigan Tech. This is pretty long, but I feel it's important:

The unique combination of business acumen, technical skills, project management, and interpersonal skills have been vital in building my career. They were first used during my internship at StoraEnso North America (now NewPage Corp.) During my co-op there, I did both technical work (relational database reporting), and coordination and interaction with end users as I developed intranet pages for the company. Project management played an important part as critical path thinking was necessary to ensure all deadlines were met before I departed the company.

While on co-op, I interviewed and was offered a position as a technical services engineer at Epic Systems Corporation, one of the leaders in Electronic Medical Records. The position was often called "problem solver" internally. In this position I coordinated software upgrades (worked closely with other teams, customer contacts, etc.), and followed an SDLC (Software Development Life Cycle) for development, testing, documentation, and release of new functionality. I also provided high-level support for both customers installing Epic, as well as those with an established platform. Understanding business needs helped prioritize internal projects (e.g. development, new features, bug fixes) as well as customers' issues lists. It was important for me not to become specialized (Epic uses a non-industry standard language, Cache, which is an M/MUMPS variant), so I began to look for another opportunity. My experience with both Epic-specific technology (their internal DBMS – Database Management System) and industry standard (relational databases) led me down the path of applying for a technical training position at Epic, where I would teach internal and external classes related to database reporting. I would have taught the classes around reporting at Epic - the ETL (Extract, Transform and Load) process used to flatten out Epic's data structures; the application specific data structures and their meaning (knowledge vs. information), as well as the reporting tools themselves (Crystal Reports.) However, this position was offered to me at a steep pay decrease, so I began work at Sentry Insurance.

At Sentry I worked as a project manager and business analyst. I gathered and documented business and system requirements from the business area, and was ultimately responsible for the

on-time delivery of stable systems projects. After a project was added to the portfolio, I worked on a project plan, kick-off meetings, scope definition, and overall project management/coordination. After business requirements were final, I worked with the programming and later QA (Quality Assurance) for programming and testing of system changes. I worked with both internal customers (product managers, forms analysts, quality assurance, programmers, processing, etc.) and external customers (third party software companies which interfaced with our system). I was responsible for maintaining project scope, as well as following the change management process when additional changes were needed.

Communication, team work, "big picture"/high level systems thinking, and project management were crucial skills. I was also very successful in this position given my understanding of the technical components - an understanding of relational databases and object oriented programming made communication with programmers much easier. Also, my ability to speak with our product managers was important; they were driving systems projects based on business needs. It was important for me to create a bridge between technical developers and business users.

I was later recruited to my current position at UW Hospital and Clinics, as a senior systems analyst. I worked to implement Epic's EMR into multiple clinics, under strict deadlines. I had no previous experience with this module of Epic, but was quickly able to adapt given my previous experience and education. I needed to be able to interact with people all over our organization; fiscal, nurses, doctors, medical assistants, lab, radiology. We documented workflows, re-engineered them to work with an EMR, received operational sign-off, and "built" the system to fit these workflows. Once built, we tested at both the unit and integrated system level. After a clinic "went live," we provided elbow support to the users in our clinic, while coordinating support with other analysts.

After our installation, we've reorganized into a more typical Project Management Office. Of the four senior level analysts on my team, three were asked to be project leads. All three of these analysts have undergraduate MIS degrees. The fourth senior analyst (who is on my project team) has an undergraduate in nursing and a masters degree in healthcare administration.

I recently interviewed for a supervisory position, in which I would be managing our team of support analysts; those six analysts who are based in the physical clinic site, as well as one in our IT building. Here is an excerpt from the position posting:

At this level, the ITS Supervisor has proven the ability to consistently perform at an exceptional level with extensive experience. The incumbent must independently work with users to determine system requirements, process re-engineering issues, and application design and implementation strategies. In addition, work at this level involves justifying system design and concepts to users. The incumbent is expected to possess organizational skills that will lead to the effective management of projects, applications and employees. These skills include: analysis, problem definition and solution, conflict resolution, team/project management, planning and consulting. Excellent communication skills are crucial to successful performance in this position. This position requires the ability to independently evaluate and analyze subject matter and develop specifications to create or enhance information processing functions. This position is responsible for providing training and support for users on existing and new applications.

Problems encountered are of a high degree of complexity and difficulty and require exceptional analytical skills, innovation and creativity necessary to formulate and implement the mechanisms to identify and solve problems. Plans for new system applications are often developed using only broad guidelines for development and require a high degree of independence and decision-making.

Qualifications

1. Bachelor or Technical degree in Information Systems, related field, or equivalent combination of education or experience required.
 2. Five to seven years progressively responsible work experience functioning as a Systems Analyst including significant project management experience and/or similar experience in related field and/or accelerated exceptional performance required.
 3. Experience deploying HL7 interfaces and data migration, ASP and web-based applications, database applications, LAN-based systems and wireless solutions preferred.
 4. Experience supervising staff strongly preferred.
 5. Experience supporting clinical and ancillary systems in a 24x7 hospital setting is preferred.
 6. Experience with clinical laboratory systems is highly desired.
 7. Excellent communication, problem-solving and organizational abilities.
 8. Ability to work independently and be result oriented.
 9. Strong analytical skills.
 10. Excellent communication skills in both written and verbal presentation.
 11. Capable of interacting with all levels of staff.
 12. Ability to provide leadership and promote teamwork.
 13. Effective interpersonal skills.
 14. Consultative approach to working with users in assessing needs and requirements.
 15. Ability to manage multiple tasks with ease and efficiency.
 16. Physical requirements are: Sedentary: able to lift up to 10#
- Occasional pressure due to deadline requirements.
 - Occasional pressure due to multiple calls and inquiries.
 - Occasionally subjected to irregular hours.
 - Requires availability by phone or pager at all times.
 - Subject to regularly changing priorities and work assignments

I think you'll quickly notice the qualifications and requirements align very heavily with the MIS curriculum. The skills developed in the MIS degree prepare Michigan Tech graduates for a variety of technology-related positions. It provides an excellent combination of business and technical expertise, highly marketable in industry.