AN ANALYSIS OF TOP MBA IN INFORMATION SYSTEMS PROGRAMS

Chen-Huei Chou, College of Charleston, chouc@cofc.edu

ABSTRACT

Information Systems is an ever-changing field that requires constant updates. In order for university curricula to reflect changes in the field, it is of great importance to understand the key topics being covered by the Information Systems programs. Not only do the education providers need to know the current trends in the field but also the education receivers. In this paper, top 10 MBA in Information Systems programs are analyzed using grounded theory. In total, 169 courses were collected from the programs and classified into managerially oriented and technically oriented groups. In sum, 54 unique managerial courses were found and 42 unique technical courses were identified. Information Systems Strategy and Supply Chain Management are the most commonly covered managerial courses, while Data Mining is the most commonly offered technical course. Based on the coverage of courses, the University of Texas at Austin stands out among the 10 programs. The University of Pennsylvania has the strongest emphasis on managerially oriented IS courses, while Carnegie Mellon University has the strongest focus on Information Systems technology.

Keywords: Information Systems Curriculum, Grounded Theory, Managerially Oriented Course, Technically Oriented Course.

INTRODUCTION

New technologies related to information systems become available every year. The adoption of these technologies and their alignment with core business objectives are major tasks being undertaken by enterprises. Management with relevant knowledge can help businesses efficiently handle the changes that occur. Knowledge offered by an MBA in Information Systems (IS) should promote this objective. According to *U.S. News and World Reports*, "An M.B.A. in information systems helps students grasp the technical side of business administration. Coursework focuses on working with computers, networks, and IT systems." [20] In order to better emphasize the information systems aspect of an MBA program, many universities offer specialization, concentration, emphasis, and a special track in the field of information systems. However, different universities have different requirements for their concentration in Information Systems. Most of the top 10 MBA in IS programs [19] specify clear requirements (around three to six relevant elective courses), while there are still a few programs that do not have specific requirements. For example, the Massachusetts Institute of Technology, which has a top ranked MBA in IS program, offers classes in an IS-related field—Information Technology, and provides a personalized curriculum that allows students the flexibility to prepare their career with a mix of coursework in various fields. There is no required number of hours nor coursework for the completion of IS courses. Table 1 summarizes the program details of the top 10 MBA in IS programs along with their mission statements. The ranking is based on the latest 2013 results published by *U.S. News and World Reports* [19].

Table 1. Program Details of Top 10 MBA in IS Programs

University Name and Ranking	Field of Specialization	Concentration Requirements	Mission Statement*
01-Massachusetts Institute of Technology (Sloan)	144 units of electives (flexible)	N/A	N/A

02-Carnegie Mellon University (Tepper)	Technology Leadership track	18 units of technology or entrepreneurship-centric courses	Computing technologies have become pervasive and fundamental to the operation of modern businesses. They are at the core of today's knowledge-based economy, fueling the development of innovative products, services and business processes. Developing great software-intensive products and services, however, requires more than just technical excellence. Technology leaders also need a deep understanding of business fundamentals and of how to weave novel technologies, business processes and market forces together to create successful products and services. [2]
	Information Systems concentration	3-4 elective courses	The unprecedented speed in which technology transforms markets and economies has altered the way multi-national organizations successfully compete. As the university that is synonymous with technology, it has been a key player in leading this trend. Our students represent a new breed of leader, one who understands global issues and is able to take advantage of emerging trends and technologies. Broadly encompassing an array of technical and managerial coursework as well as applied project experience, the Information Technology concentration is aimed at preparing students for a career in a technology-related field. [1]
03-University of Minnesota (Carlson)	Information Systems	10 credits	An emphasis in information systems provides students with the ability to lead in the digital age. Students taking this emphasis will appreciate the profound and often disruptive impact information and communication technologies have on business and society. Students will garner the necessary skills to leverage IT to create efficient organizations characterized by standardized business processes and integrated data. Additionally, the emphasis will prepare students for an increasingly compliance and security intensive environments due to heavy integration of IT with key financial and accounting processes. Finally, they will learn how to innovate and create top-line growth and differentiation opportunities based on data-driven business intelligence, harnessing social media to develop customer intimacy and by optimally leveraging a global sourcing of IT and IT enabled business processes. [16]
04-University of Texas at Austin (McCombs)	Information Management	1 required (Information Technology Management) 3 elective courses	The Texas MBA Information Management (IM) concentration focuses on developing business leaders who understand (1) how to leverage IT to create value for customers using improved business processes and innovative information design; (2) the strategic, financial and economic implications of IT projects. The concentration provides a strong foundation so that students can articulate the strategic and business value of IT beyond an IT-centric view and develop the expertise required to manage global resources and

			projects enabled through IT. Finally, the concentration strives to provide an environment for students to develop entrepreneurial thinking and leadership skills through activities such as extracurricular case competition and projects for local organizations. [18]
05-University of Arizona (Eller)	Management Information Systems	4 elective courses	Management information systems (MIS) is the design and management of information technology (IT) for an organization. It focuses on the best way to enable the organization to meet its goals and business challenges. MIS professionals are the "communication bridges" between IT and the business community. They analyze, design, implement, and manage IT strategy to help solve business problems. [14]
06-University of Maryland (Smith)	Information Systems		Information systems and technologies are fueling the transformation of corporations to meet the challenges of the knowledge-based economy. Smith offers a rich selection of courses in this area to prepare students for careers in the management, design, and implementation of information systems. [15]
07- University of Pennsylvania (Wharton)	Information Systems track	5 elective courses	This major is relevant for those involved in the supply chain of a business, whether it be with a physical supply chain or an information-based system at the retail or manufacturing end. The automotive and transportation industries are good examples of increasingly complex business areas that benefit from the skills developed in this major. Individuals studying Operations and Information Management may also find attractive opportunities in management consulting and private equity firms. [17]
08-Stanford University	Up to 18 electives	N/A	N/A
09-Georgia State University (Robinson)	Information Systems	12 hours for concentration or 18 hours for major	This concentration is intended to prepare students for executive careers in management of information systems functions, management of organizations that involve intensive use of information technology, or a career in consulting that builds on expertise in the information systems area. [3]
10-New York University (Stern)	Management of Information Technology and Operations	9 credit hours	A specialization in Management of Information Technology and Operations provides students with an overview of management and its strategic alignment with business models that are essential to achieving business success. Operational excellence is the key driver to performance in a world that is increasingly driven by information. A specialization in Management of Technology and Operations enables you to think about technology-enabled business models and the alignment of IT and Operations with corporate strategy. [9]

* The mission statements are directly gathered from the programs' websites.

Based on the requirements of the top ranked MBA in IS programs, students pursuing the degree need only three to six elective courses in order to be professionals in the field. A careful selection of courses/program is crucial.

According to the guidelines for graduate degree programs in Information Systems (i.e., master's of science in IS) suggested by Gorgone et. al [5], it is recommended to model the IS graduate degree programs with IS technology courses and IS management courses. The IS technology courses focus on four fields: 1) IT Infrastructure; 2) Analysis, Modeling, and Design; 3) Enterprise Models; and 4) Emerging Technologies and Issues. In addition, the IS management courses emphasize: 1) Project and Change Management, 2) Policy and Strategy, and 3) Integrated Capstone. All courses except the integrated capstone course are applicable to MBA in IS programs.

In the design of an IS curriculum, Topi et al. [12] suggest program guidelines for undergraduate degree programs in IS. Seven core courses are identified: 1) Foundations of Information Systems, 2) Data and Information Management, 3) Enterprise Architecture, 4) IT Infrastructure, 5) IS Project Management, 6) Systems Analysis and Design, and 7) IS Strategy, Management, and Acquisition. For IS master's level programs, Topi et al. [13] suggest that "IS as a field and master's programs in IS should consider reaching beyond the traditional business disciplines and beyond business as the domain context of the degree." They also discuss a successful program offered by the University of San Francisco that integrates biotechnology and information security.

In a related field—software management, a managerial direction of Information Technology, Shoemaker et al. [11] suggest including the following core courses: 1) Project Management, 2) Object Oriented Programming, 3) Software Requirements Specification, 4) Software Quality Assurance and Testing, and 5) Strategic Software Process Management. Managerial and technical courses are equally important in this curriculum design. In the curriculum design of IT-related engineering-oriented programs such as a master's of software assurance [8] and graduate software engineering [10], which are normally not offered by schools of business/management, courses with managerial aspects are not the major concern. Other than the design of curriculum of IS programs, Harder and Harper [6] propose a framework to assess MIS undergraduate programs and MIS student outcomes. The framework assesses four competency areas: technical, analytical, communicative, and managerial clusters.

Summarizing from prior studies, it is crucial to emphasize the managerial and technical aspects of IS education. Previous research focused on the undergraduate and graduate level (master's of science) of IS and related fields. However, there are no guidelines or suggestions for MBA in IS programs. Little is known about the orientation of the programs as well as the key courses being offered in this ever-changing field. Thus, this study strives to answer the following research questions:

- Which top ranked MBA in IS programs are managerially oriented?
- Which top ranked MBA in IS programs are technically oriented?
- What is the most commonly offered managerial course in the top ranked MBA in IS programs?
- What is the most commonly offered technical course in the top ranked MBA in IS programs?
- What is the top ranked MBA in IS program with the best coverage of IS courses?
- What is the top ranked MBA in IS program with the best coverage of managerial courses?
- What is the top ranked MBA in IS program with the best coverage of technical courses?

The rest of the paper is organized as follows. First, we discuss the methodology of the study, covering the processes of data collection and data analysis approach. Next, the results of the analysis are presented and discussed. Finally, the conclusions and future directions of the study are provided.
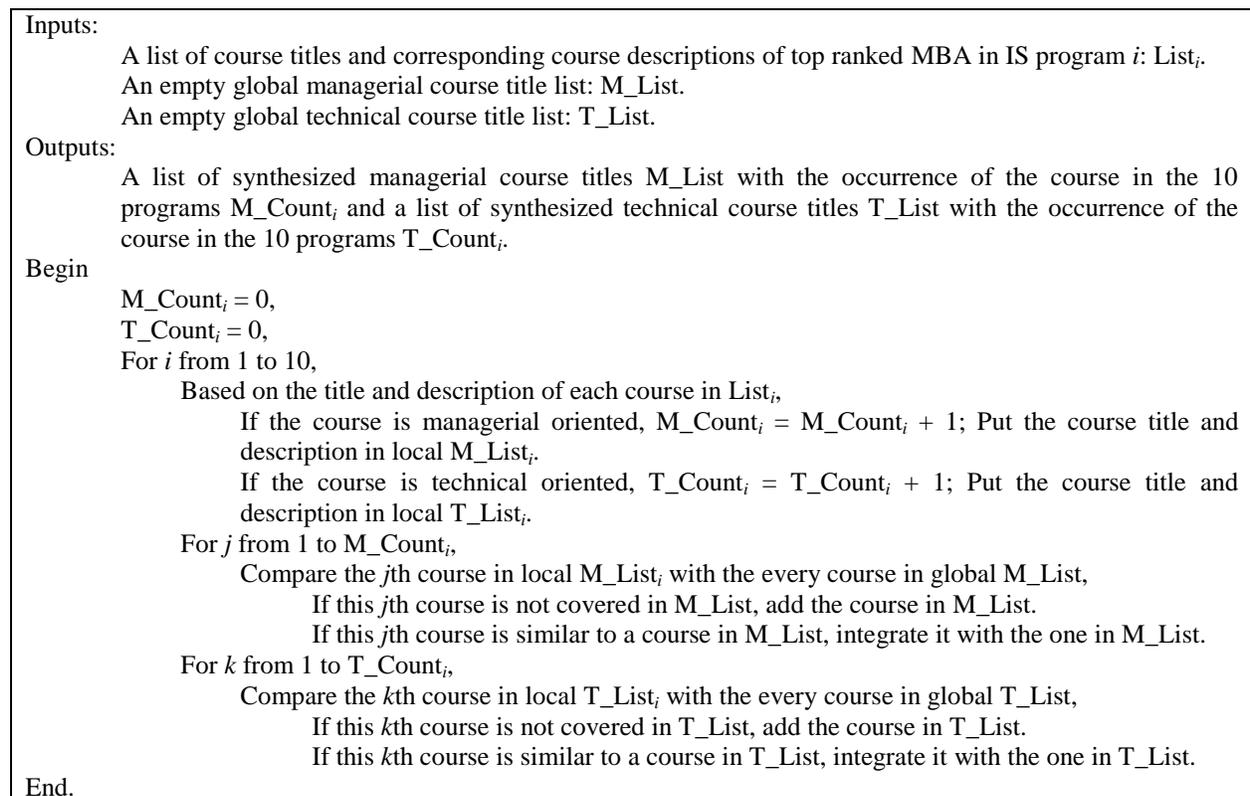
RESEARCH METHODOLOGY

In order to answer the above-mentioned research questions, this study focuses on a course analysis of the top 10 MBA in IS programs. In this section, the processes of data collection and methods of data analysis are discussed.

Data Collection

The top 10 programs were identified based on the latest 2013 ranking of MBA in IS programs [19]. The courses designed as electives for concentration in IS were used. The course titles and course descriptions were collected individually from the 10 programs' official websites or graduate catalogs. We collected 169 courses from the 10 programs and further categorized them into managerially oriented and technically oriented groups as suggested by Gorgone et. al [5].

Data Analysis Approach

Since the courses covering similar topics may have different names, grounded theory [4] is applied to consistently compare and contrast the course titles and descriptions from different institutions. Grounded theory is "the discovery of theory from data" [4, p.1]. It involves an iterative process between data collection and analysis through comparing and contrasting findings at each stage with those of the next. The following proposed algorithm (Figure 1) describes the details of grounded theory applied in this study:

Inputs:
- A list of course titles and corresponding course descriptions of top ranked MBA in IS program i: $List_i$.
- An empty global managerial course title list: M_List.
- An empty global technical course title list: T_List.

Outputs:
- A list of synthesized managerial course titles M_List with the occurrence of the course in the 10 programs M_Count_i and a list of synthesized technical course titles T_List with the occurrence of the course in the 10 programs T_Count_i.

Begin
- $M\_Count_i = 0$,
- $T\_Count_i = 0$,
- For i from 1 to 10,
  - Based on the title and description of each course in $List_i$,
    - If the course is managerial oriented, $M\_Count_i = M\_Count_i + 1$; Put the course title and description in local M_List_i.
    - If the course is technical oriented, $T\_Count_i = T\_Count_i + 1$; Put the course title and description in local T_List_i.
  - For j from 1 to M_Count_i,
    - Compare the jth course in local M_List_i with the every course in global M_List,
      - If this jth course is not covered in M_List, add the course in M_List.
      - If this jth course is similar to a course in M_List, integrate it with the one in M_List.
  - For k from 1 to T_Count_i,
    - Compare the kth course in local T_List_i with the every course in global T_List,
      - If this kth course is not covered in T_List, add the course in T_List.
      - If this kth course is similar to a course in T_List, integrate it with the one in T_List.
End.

Figure 1. Algorithm for Processing Courses Using Grounded Theory

When integrating a course from each program with the one in the global course list M_List or T_List, a general title is used to represent the course after the synthesis and integration. For example, an Information Systems Strategy course is synthesized from the following courses offered by six universities: Technology Strategy, Information Systems Strategy, Information Technology Strategy and Services, IT Strategy, Information Technology and Corporate Strategy, and Business Strategy and the Role of IT.

RESULTS

Following the grounded theory approach by which we synthesized the collected courses from the two areas of focus, 54 unique managerially oriented courses were identified and 42 unique technically oriented courses were found. A program is managerially oriented if the number of managerial courses is higher than the number of technical courses and vice versa. Table 2 shows the number of courses processed and the percentage of courses in the two major areas of focus. As a result, the Massachusetts Institute of Technology, the University of Minnesota, the University of Texas at Austin, the University of Maryland, the University of Pennsylvania, Stanford University, and New York University are managerially oriented. The rest of the three universities, Carnegie Mellon University, the University of Arizona, and Georgia State University, offer technically oriented MBA in IS programs. In general, the University of Texas at Austin has the best coverage in IS programs since it has a total 38 courses. The University of Pennsylvania has the strongest emphasis on the managerial part of IS (83.33%), while Carnegie Mellon University has the strongest focus on IS technology (66.67%).

Table 2. Statistics of Courses Offered by Top 10 MBA in IS Programs

University Name and Rank	Managerially Oriented		Technically Oriented		Total
	Number	Percentage	Number	Percentage	
01-Massachusetts Institute of Technology (Sloan)	12	75.00%	4	25.00%	16
02-Carnegie Mellon University (Tepper)	5	33.33%	10	66.67%	15
03-University of Minnesota (Carlson)	6	54.55%	5	45.45%	11
04-University of Texas at Austin (McCombs)	24	63.16%	14	36.84%	38
05-University of Arizona (Eller)	11	47.83%	12	52.17%	23
06-University of Maryland (Smith)	5	55.56%	4	44.44%	9
07-University of Pennsylvania (Wharton)	10	83.33%	2	16.67%	12
08-Stanford University	7	53.85%	6	46.15%	13
09-Georgia State University (Robinson)	10	41.67%	14	58.33%	24
10-New York University (Stern)	6	75.00%	2	25.00%	8
Total Courses	96	56.80%	73	43.20%	169
Total Unique Courses	54	56.25%	42	43.75%	96

Moreover, Table 3 lists the most commonly covered managerial courses and technical courses offered by the top 10 MBA programs. Only the courses offered by at least two programs are included. Based on the results, we find that Information Systems Strategy and Supply Chain Management are the most popular managerial courses, offered by six programs. Similarly, Data Mining is the most commonly offered technical course, provided by six programs.

Table 3. Most Common Courses Offered by Top 10 MBA in IS Programs

Managerially Oriented Courses		Technically Oriented Courses	
Course Title	Number of Programs Offering the Course	Course Title	Number of Programs Offering the Course
Information Systems Strategy	6	Data Mining	6
Supply Chain Management	6	Business Telecommunications and Networks	5
Business Process Innovation	5	Database Management Systems	5
Information Technology Project Management	4	Decision Support Systems	4
Management of Information Systems	4	Knowledge Management	4
Security and Privacy of Information and Information Systems	4	Web Application Development	4
Enterprise Resource Planning Systems	3	Information Systems Design and Implementation	3
Global Systems Sourcing	3	Digital Evolution: Managing Web 3.0	2

Management of Information Technology	3	Enterprise Architecture	2
Technology Transfer: Theory and Practice	3	Financial Information Systems and Technology	2
Business Foundations for IT	2	Information Technology Essentials	2
Global Information Systems: Strategic, Technical, and Organizational Perspectives	2	Systems Development	2
Innovation, Problem Solving and Design	2	Systems Integration	2
Introduction to Electronic Commerce	2	Wireless Networks	2
Leadership Lab: Leading Sustainable Systems	2	Digital Evolution: Managing Web 3.0	2
Management of Technology	2	Enterprise Architecture	2
Managerial Decision Making	2	Financial Information Systems and Technology	2
Managing Disruptive Innovations	2	-	-
Managing for Quality Improvement	2	-	-

CONCLUSIONS AND FUTURE DIRECTIONS

Following grounded theory, we analyzed the top 10 MBA in IS programs. In total, 169 courses were collected from the programs and classified into managerially oriented and technically oriented groups. In sum, 54 unique managerial courses were found and 42 unique technical courses were identified. Information Systems Strategy and Supply Chain Management are the most commonly covered managerial courses, while Data Mining is the most commonly offered technical course. Based on the coverage of courses, the University of Texas at Austin stands out among the 10 programs, providing 38 IS courses.

Seven out of the top 10 MBA in IS programs are managerially oriented, while only three programs pay more attention to the technical side of information systems. The University of Pennsylvania has the strongest emphasis on the managerial part of IS, providing 10 managerial IS courses (83.33% of 12 courses). Carnegie Mellon University is the school with the strongest focus on IS technology (66.67% of 15 courses).

In addition, a school's MBA in IS program should strengthen the technical side of business administration. It is no surprise that the top two programs ranked by *U.S. News and World Report* [19] are well-known institutions with brand names highly associated with technology. However, it is interesting to see that the Massachusetts Institute of Technology (top ranked) emphasizes more the managerial part of information systems (75% of available 16 courses). Although Carnegie Mellon University claims to offer cross-campus technical academic experience through its MBA program from the Computer Science and Information Networking disciplines [1], its MBA program still has the strongest focus on technology by offering 66.67% of technically oriented courses out of 15 available electives. As suggested by Topi et al. [13] for graduate programs in IS, we find that Stanford University and Carnegie Mellon University have included biotechnology into their MBA in IS programs.

This study reports the available courses found on a university's program website or its graduate catalog. A website or catalog can show only the potential of taking the courses. Thus, this uncertainty of course offerings might limit their use for analysis. The current study opens up a variety of future directions. The current study can be further extended to rank the top programs based on the details of courses and other aspects of the programs. The results can be compared with the well known *U.S. News and World Report* graduate school ranking. Also, most top MBA programs are ACCSB (http://www.accsb.edu) accredited. The analysis can be extended to include a comparison with IS/computer programs accredited by ABET (http://www.abet.org). Another future study can focus on the ontology design of IS development [7] that includes the semantic structure of the IS problems.

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