

The Topics, They Are A-Changing: The State of the Accounting Information Systems Curriculum and the Case for a Second Course

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Abstract

Previous studies indicate that teaching Accounting Information Systems (AIS) is a challenging aspect of offering an accounting curriculum. Developing an AIS course is made difficult due to a constantly changing array of topics and a lack of consensus in pedagogical methods. Thus, controversy exists regarding its place in accounting programs, its content coverage, and its delivery. Seeking a framework for an AIS curriculum, we analyze data gleaned from surveys of accounting faculty, inspection of AIS books, and content analysis of AIS course syllabi. We conclude with proposals for the structure and sequence of the AIS curriculum, and for the materials used therein. Specifically, we propose that ideally the AIS curriculum be taught over two courses, using a loose-leaf format textbook. This enables the coverage of course fundamentals as well as ever-changing current topics driven by evolving technology.

Introduction

Teaching Accounting Information Systems (AIS) is undoubtedly one of the most challenging aspects of offering a successful accounting curriculum (Davis and Leitch, 1988; Doost et al., 2003). Unlike other accounting subjects, such as financial accounting, managerial accounting, and taxation, which enjoy a relatively stable curriculum and a standardized environment for the delivery of their course material, AIS contends with a constantly changing array of topics and a lack of consensus in pedagogical methods (Bain et al., 2002). This is in part due to ongoing changes in the accounting landscape brought on by advances in technology and technological developments like the XBRL initiative and Enterprise Risk Management (ERM). It might also be due to the fact that it is a relatively new area in the discipline. The passage of new legislation, such as the Sarbanes-Oxley Act of 2002 (SOX), also has implications for AIS.

All of these factors contribute to fueling debates regarding AIS's placement in the accounting curriculum, the contents to be covered, and the delivery of the subject matter. The American Accounting Association and the American Institute of Certified Public Accountants have attempted over the years to influence AIS course development by placing emphasis on certain topics. The theme of recent conferences has been a call for the development of a framework for AIS course structure and its content.

The purpose of this paper is to contribute to the efforts of developing a framework for AIS courses. This study endeavors to identify core topics taught over time by evaluating the state of consensus of topics among AIS faculty. The first section of the paper provides background information by reviewing relevant earlier works in this area, and summarizing efforts by various accounting organizations to influence AIS curriculum development. The second section of the paper documents the nature and extent of AIS topic change and proliferation through various analyses based on surveys of accounting faculty, content analysis of AIS textbooks, and a review of AIS course syllabi. The third section of the paper identifies consistent “core” topics that have persisted in the AIS curriculum over time. Based on the findings, an approach is developed to meet the challenges presented in providing AIS courses.

Earlier Studies about the AIS Curriculum

Previous research has documented the proliferation and increased diversity of topics in AIS courses. These studies, conducted over the last two decades, have used various research methods to characterize the content, availability, and presentation of AIS courses.

Wu (1983) reviewed the history of AIS pedagogy, from the initial calls for implementation of such a course by the American Accounting Association in the 1950’s. Based on surveys of accounting faculty, Wu recommended an AIS curriculum integrating case studies, theory, and programming. Over the years changes in technology and the student body have generated significant curricular changes as evidenced by the different topical emphases recommended in later research.

Davis and Leitch (1988) expanded the scope of Wu’s sample, surveying both faculty and practicing accountants, to elicit their suggestions for reforming the existing AIS curriculum. They suggested that due to the rapid change in information technology and its prevalent effects on business practice, it might be more appropriate to consider offering several specialized AIS courses within the accounting major. This could be accomplished by offering both an undergraduate and graduate AIS course.

While the objective of Murthy and Groomer (1996) was much broader than determining the topics appropriate for inclusion within the AIS curriculum, their survey of accounting faculty touched on the subject. The study asserted that “advanced topics (such as) data bases and modeling received very little coverage (Murthy and Groomer, 1996, p. 16.)”

Bain, Blankley, and Smith (2002) surveyed faculty and practitioners, and inspected AIS textbooks and syllabi, to determine desired and actual topical coverage in the AIS course. According to their findings, a consensus had developed as to the core content of the AIS course. This core was comprised of an introduction to information systems, transaction processing, and internal controls, but there was little common ground beyond these three areas. Thus, Bain, et al. (2002) suggests that “the curriculum for the AIS courses will probably never be, nor should be, a settled issue.

Doost, McCombs, and Sharifi (2003) examined the gap existing in teaching introductory AIS courses, and raised several concerns and problems, such as the need for more rigorous, consistent, and updated coverage of AIS topics. It concluded that the AIS information domain had expanded to a point that would not allow most instructors to cover all the desired subjects in a single introductory course.

Badua (2008) compared different studies on AIS pedagogy, and reviewed syllabi of AIS courses offered between 2001 and 2007. The paper concluded that the diversity of AIS course topics had increased over the time period studied, and that topical emphases recommended by earlier studies, such as computer programming, had changed to newer topics, such as data modeling and AIS design.

On Institutional Efforts at Curricular Development

Efforts of oversight bodies also reflect the change in AIS topic emphasis over the years. Three such institutional attempts at influencing AIS curriculum are represented by the American Accounting Association Mock Committee Report [AAA, 1987], the AICPA Core Competencies Report [AICPA, 1999], and the AICPA Top Technologies Report [AICPA, 2010]. The various topics recommended by each report are summarized in Table 1, at the end of the paper.

The general lack of consensus across all three reports indicates that a considerable state of flux exists with respect to suggested topical coverage in AIS courses over the years. There are, however, several common topics including internal controls, system design and implementation, and appropriate use of system technology.

The recurrent theme in the earlier studies presented, and in the institutional attempts at influencing curriculum development in AIS, is that there appear to be some constants with respect to topics. However, much of AIS changes at such a rapid rate that topics in these areas needs to be constantly and quickly updated. Because of this rapid rate of change, AIS textbooks often become outdated not long after publication, though AIS faculty still prefer to use them in their courses. Additionally, the amount of material relevant to AIS appears to be growing (Badua, 2008).

Data and Analyses

To test the above observation, we conducted analyses on data gathered using three different research methods over the last decade. These include a survey of participants at the 2002 AIS Educator Conference, a content analysis of AIS course syllabi dating from 2001-2007, and a review of four textbooks published in 2010 to 2012. Therefore, by using multiple data gathering methods over several years, the validity of the findings is buttressed by triangulation.

Survey of AIS Faculty

A survey of 120 participants of the 2002 AIS Educator Conference was conducted. The participants in this study represented a major cross section of individuals who could influence the AIS educational domain.

Forty-eight educators, representing 40 percent of conference participants responded to the questionnaire. Of the respondents, 24% taught at four year undergraduate institutions, 6% at institutions that taught only juniors, seniors, and master's students, 58% at institutions offering four year undergraduate and master's degrees, 6% at institutions offering Ph.D.s, and 2% at institutions offering MBA programs. The non-response rate was 4%.

The survey concentrated on the respondents' preferences regarding the structure of the AIS course and the materials to be used for it. Thus, participants were asked if they used textbooks for their courses, if they followed the order in which topics were presented in the textbook, if they preferred one AIS course or two, whether they preferred a standardized structure for the AIS course, and if their institutions offered an AIS concentration. Results are presented in Table 2.

The data concludes that the use of a textbook is an essential educational tool for the overwhelming majority of AIS educators, though many of them did not follow the textbook's order of topic presentation. This implies that instructors might have expedited, postponed, or otherwise reordered material based on their divergent pedagogical goals and limited resources.

In response to the question as to whether the AIS courses should have a standardized structure, half of the respondents felt that the course content should not be standardized with only 29% preferring a standard structure. Also, over 50% of the respondents were in favor of having two AIS courses as a part of an accounting program.

From these results it might be inferred that there is considerable diversity in the manner AIS textbooks are used, an aversion to having a standardized structure imposed on AIS courses, and a preference for two AIS courses rather than one. It is possible that the number of relevant AIS topics has expanded at a rate that makes a consensus on

topical coverage in a single AIS course impossible to achieve. Furthermore, the same rapid rate of expansion may imply that textbook obsolescence is a critical issue, as evidenced by the different ways in which instructors use textbooks. Nevertheless, instructors still feel the need to use a text to guide the course, but not necessarily in the manner prescribed or intended by the authors.

It also may be concluded that the AIS information domain has expanded to a point that would not allow most instructors to cover all the desired subjects in a single introductory course. The issue may now be even more compelling since the survey was conducted before the enactment of SOX and the impact of SOX related issues on AIS was not considered by the respondents. Other important developments since the collection of this data include the introduction of the ERM Framework in the fall of 2004, and the emergent technology of XBRL-enabled financial statements filed with the Securities and Exchange Commission (SEC), both of which have implications for the content of AIS courses. In the next section the sources of materials used in AIS courses are presented and analyzed.

Content Analysis of Textbooks

In order to determine if the proliferation in the number and diversity of AIS topics was not merely a perception of faculty, content analysis of AIS textbooks was also performed. The analysis based on this data would determine if the expansion in the domain of AIS topics was reflected in the course material, and not just a function of instructors' attitudes.

The textbooks in the sample are: Bagranoff, Gelinas, Heagy, and Romney. A total of 15 AIS topic categories were identified, as well as constituent topic sub-categories belonging to each of them (see Appendix I Table 3). Then, the number of pages in each book devoted to each of these sub-categories was determined. Based on these counts, nonparametric statistical analyses (Kruskal- Wallis and Median tests) were deployed in order to determine if the mean number of pages devoted to these topics differed significantly between textbooks. The findings are summarized in Table 3.

Results indicate that the number of pages devoted to a particular topic differs significantly across textbooks in 6 out of 15 topics. These include: computer fraud and security, documentation, e-commerce, systems planning and analysis, introduction to data processing, and AIS technology.

The difference in topic coverage implies that textbooks place varying emphasis on topics. One textbook may be lighter in its coverage of a particular topic than others. Hence, it may be argued that some textbooks may be weaker or stronger than others in the depth and rigor with which they cover certain areas.

One could argue that the rapid pace of innovation contributes to the number and diversity of AIS topics, and that there is disagreement among authors as to which topics are more/most important relative to one another in the AIS curriculum. Consequently, the significant differences in textbook topic coverage suggest that there may be lack of consensus among AIS faculty, which manifests in the textbooks that they write.

Content Analysis of Course Syllabi

The final analysis performed in this paper was based on content analysis of syllabi from 65 AIS courses offered between 1997 and 2007, collected by Badua (2008) using a Google web search. The focus of this analysis was to complement the faculty survey and course textbook data used in earlier analyses. The survey documented faculty perceptions and aspirations, the textbooks reflect the resources that might potentially inform or influence what is taught, but course syllabi, which are viewed as contracts between the instructor and student (Parkes and Harris, 2002), are arguably the closest proxy to what is actually taught in a course. Furthermore, Badua's use of Google to detect and identify course syllabi yields documents that would likely be the most influential to faculty seeking a blueprint for their own AIS courses as these are the documents that would surface from such a search.

Syllabi were then subjected to content analysis, from which 75 distinct topics were identified. The number of times each topic was offered in each of these syllabi was then determined. Based on these frequencies, the average number of topics per course, and the diversity of AIS topics, measured by the Gini metric, was calculated. The Gini metric generates a score on a 100 point scale that is lower (higher) for distributions that are more (less) equal and diverse. (Stigler 1994). It is conventionally computed as 100 times the sum square of a distribution of proportions, which together make up one whole, or:

$$100 * \text{SUMSQ}(x_1/N \dots x_n/N)$$

Where $\sum x_1 \dots x_n = N$

Results of this analysis are summarized in Table 4. While the number of topics per course has held steady at about 6, the Gini metric has decreased over the years. This indicates that while the population of topics has increased and is more varied, faculty is not increasing the number of topics covered in their courses. This may imply that instructors are sacrificing relevant topics because of time constraints inherent in a one-semester AIS course.

Conclusions, Suggestions, and Summary

Special Considerations When Designing AIS Curriculum

Overall, our literature review and review of institutional attempts to influence AIS courses, faculty opinion, and course material in the form of textbooks and course syllabi, suggests that the rapid proliferation of AIS topics demonstrate a need for special considerations when designing the AIS curriculum. Such considerations would need to balance the accommodation of more stable topics with the ability to address new topics as they become relevant.

In an effort to gain additional insights, research in other disciplines was reviewed. This research included studies in both education (Fogarty, 1991), and computer information systems (Howatt and Jensen, 2006; McAleer and Szakas, 2008; Russell, Russell, and Pollacia, 2009).

Fogarty (1991) recommends different models by which to structure programs of study and individual courses in disciplines where there is a proliferation of different topics. At one extreme is the fragmented model, where a small number of very closely related topics are taught in several separate, narrowly focused courses. At the other extreme is the connected model, where a diverse topic spectrum is taught in one course. According to the paper, neither extreme is usually feasible, because of the loss of a macro- perspective in the fragmented model, and onerous demands on faculty in the connected model. Instead, other models that lie between the two extremes are proposed. These include the nested, shared, and sequenced models of instruction.

The nested model of instruction assumes there is a mother discipline with a broad perspective, and child disciplines of increasing specificity. Topics are taught according to their relationship to these disciplines, so that in a History department, provincial or state histories are taught within the context of national histories, which are in turn taught within the context of world history. The shared model, on the other hand, uses cross- disciplinary team- teaching to construct and deliver topics that are relevant to multiple subjects, as a calculus instructor and a statistics instructor might collaborate to teach students about the Cartesian equation, regression analysis, and linear and polynomial functions, all in the same course. Finally, the sequenced model of instruction uses separate courses, arranged in a particular order, so that student learning in the current course builds upon information learned in previous courses.

As can be seen from the analyses of the AIS curriculum, the sequenced model, which would be consistent with the proposed second AIS course, would be the most feasible solution. While it may be possible to contextualize information systems within accounting, or vice- versa, or to situate both in a third discipline such as economics or management, there would be political resistance in placing disciplines in an implied order of importance. The shared model would obviate such wrangling, but the level of coordination and the logistical complications of team- teaching would not be avoidable. Furthermore, the isolation of specific topics susceptible to shared instruction would be difficult in itself, let alone in a field as mutable as AIS. Indeed, while Russell (2009) extols the virtues of such multi- disciplinary and collaborative efforts, the authors also document the apparent institutional hesitance to

implementation. Thus, the sequenced model, as embodied by a second AIS course, appears most appropriate because it requires less administrative effort, and more importantly, because AIS topics could build on one another, as explained in the next section.

A Second AIS Course

Based on the survey of AIS faculty in this study, a majority of respondents (58%) indicated the need for a second AIS course to cover current knowledge at a depth desired by the instructors. Furthermore, the findings of the longitudinal content analysis of AIS course syllabi indicate that the diversity of AIS topics is increasing, such that instructors are required to cover an ever greater variety of topics in a single semester course. Thus, the empirical evidence in this paper suggests that a single AIS course may not be sufficient to cover information about current technological innovation, as well as recent regulatory changes, such as the introduction of SOX, and the new XBRL corporate reporting developments. This may imply that instructors are forced to sacrifice topics in order to fit the single semester format, leading to an inadequacy of exposure to necessary knowledge, and/ or an inconsistency of coverage of the desired material across AIS programs (AICPA, 1999) and (Badua, 2008). There simply may not be enough time in a typical AIS course to cover current topics while retaining classic and fundamental topics as well.

In dividing necessary topics between a first and second AIS course, there ought to be a distinction drawn between (1) those which are of continuing relevance, and (2) those that are likely to change with technological innovation. Because group one is likely to consist of concepts and theory that are fundamental to an appreciation of the second group of topics, these would probably be more appropriate to the first course. Furthermore, because the second AIS course would necessarily be closer to the students' graduation date, whereupon they would be required to possess a proficiency with the most current technology, this second course would most appropriately consist of group two topics.

In the information systems context, certain skills have been identified as possessing a relevance resistant to changes in the workplace, and thus includable in the first AIS course. For example, those skills that are more "creative and innovative" as opposed to "routine," such as systems analysis and design, would fall under this category (McAleer and Szakas, 2008, p. 5). The same study also states that skills representing more routine functions, such as data-input and programming, should be de-emphasized particularly because these are functions that are vulnerable to outsourcing (McAleer and Szakas, 2008). This concern has been more serious in other technology-oriented disciplines than in AIS, in spite of the rise of networking technology, because the uniqueness of US GAAP has buttressed domestic accountants against overseas competition. However, the advent of IFRS has made this concern more poignant for accounting and AIS. The paper also recommends soft skills such as teamwork, communications, and global awareness should be emphasized. Howatt (2006) provides additional guidance by recommending that information systems programs start with non-technical foundation topics, and systems analysis and design, before proceeding to topics dealing with the implementation and management of currently existing information systems. Hence, the first AIS course would deal with theoretical foundations rather than technical functions, and analyzing and designing new systems rather than learning how to use existing ones.

Thus, group one topics would be comprised of knowledge areas that the aforementioned literature suggests is likely to remain relevant in the long term. These would include, but not be limited to, internal controls and business process analysis and their relationship to systems design, data modeling and architecture, and systems strategy in a globalized economic environment. Ideally the course covering these topics would be offered at the second semester of the junior year, just prior to the required audit course.

The coverage of controls and risks associated with business processes and business technology, as discussed in the AIS course, would allow the student to better understand the impact of those controls on firm operations and on the selection of the appropriate audit procedures, as they are discussed in the traditional auditing course.

The topics covered in the second course, would consist of those knowledge areas and skills that are continuously changing due to technological and other types of advancements. Examples are hardware topics, of which the cutting

edge is comprised currently of tablets, handhelds, Wi-Fi and Bluetooth, and software topics, such as XBRL, application and systems packages, enterprise systems (such as Oracle and SAP), and productivity software, such as the latest versions of Microsoft Office and Microsoft Project. Recent technological paradigms involving both hardware and software developments, such as cloud computing, and its internal control and security implications would also merit discussion in this course. Finally, familiarity and mastery of current software and hardware relevant to the above concerns would also be appropriate.

Other topics appropriate for the second course would include the information systems impacts of recent regulatory foci and policy initiatives. Such questions as the implementation of computerized controls and their interaction with traditional, non- digital controls to further the assurance objectives of SOX 2003, and the capital sufficiency concerns of Dodd- Frank 2010, would be examples. Similarly, the development and implementation of metrics of firm eco-sustainability, particularly in an ERP environment could be discussed in this course.

We emphasize that it is not our intention to use either of the courses for in depth coverage of some of the specialized topics such as IT audits. We feel separate courses should be developed for such topics.

One way to maintain currency in the second AIS course would be for the IS section of American Accounting Association (AAA) or the AIS Educator Association to create an online forum to continuously accommodate new learning objectives and suggested topics from AIS stakeholders. This approach may allay concerns of survey respondents in this study who indicated they preferred no standardized structure for the AIS course. To the extent that these instructors are able to participate in the creation of a model curriculum, concerns about standardization as a hindrance to academic freedom, or controversy or diffidence about what topics ought to be taught and to what depth they should be discussed, would be mollified.

Finally, it should be recognized that it may be difficult to add a second AIS course in schools that primarily offer bachelor's degrees with no graduate program. Staffing of the second AIS course given the existing shortage of qualified accounting faculty, could be another potential problem.

Format of AIS Materials

Ninety percent of the respondents to the survey of accounting educators indicated using a textbook in teaching AIS, although 54 percent indicated that they do not follow the book's ordering of the topics, while 31 percent indicated they did. Furthermore, the content analysis of textbooks revealed that different books cover topics at significantly different levels of depth and rigor. Collectively, this implies that although the AIS faculty feels the need to use a textbook, there is considerable difference in the sequencing and emphasis of material presented in these books. This may be due to necessary but costly choices between topics that are of equal relevance, but which cannot both be covered within the current single semester format, or to the rapid change of topics inherent in a technology driven subject like AIS. In either case, a loose- leaf format book, which 46% of survey respondents preferred (31% preferred bound books, 23% preferred neither), would probably be a feasible alternative.

The loose-leaf format has been successfully adopted for tax books. In addition to allowing for rapid changes in topics resulting from technological innovation, an additional advantage to this method of publishing is the promotion of best practices by including the most appropriate chapters or sections from different books or by different authors. Any single textbook may be weak in certain areas and strong in others. A loose- leaf book could be a composite of what are generally accepted to be the best chapters written by the most authoritative authors, combining the strengths and complementing the weaknesses of different sources.

Limitations

The data sources used in this paper was drawn from faculty surveys, textbook content, and course syllabi. Thus, the findings are intended to represent what faculty teach or desire to teach in the AIS curriculum.

However, another important stakeholder sector is comprised of practitioners and regulators. While, it may be argued that their preferences and recommendations are often expressed and implemented by faculty because of the influence of licensure examination requirements on what faculty teach, this is not formally tested in this paper. Hence, because of this limitation, the desires and needs of the accounting industry are not fully expressed in the findings. Extending the methodology to include data collected from practicing accountants would be a possible avenue for future research.

Summary

The appropriate structure and materials used in an introductory AIS curriculum has been the subject of many discussions. Concerns arise from a mismatch between the time allotted to teaching the course, and the constant and rapid expansion of the domain of AIS topics.

This paper finds evidence from previous literature, institutional initiatives, and data gathered over several years using multiple research methods, that should help guide the design of AIS courses. Based on the evidence, we suggest the offering of a second AIS course and the use of a loose- leaf book, to accommodate the number, variety, and ever- changing nature of AIS topics. It is hoped that materials provided herein will be of assistance to those endeavoring to expand AIS coverage in their curriculum, as well as serving as a stimulus to the AIS community at large to more systematically address the issue.

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Appendix 1- Tables

Table 1: Institutional Efforts at Curriculum Reform

Mock Committee (1987)	AICPA Core Competencies (1999)	AICPA Top Technologies (2010)
Auditing of AIS	Systems analysis	Information security management
Management use of information systems	Systems design	Privacy management
Managing information systems	Output design	Secure data storage
Use of systems technology	Systems implementation	Transmission and exchange of data
AIS applications	Project management	Business process improvement
Systems analysis and design	Systems strategy and decision making	Work flow and process exception alerts
Technology of information systems	Technology implications of security, risk, and controls	Mobile and remote computing
Data base concepts	Data modeling	Technology training and competency
Internal control		Identity and access management
		Improved application and data integration
		Knowledge management and electronic data retention strategy

Table 2: Analysis of Survey Responses

	Yes	No	No response
Used a textbook	90%	6%	4%
Followed book's topic order	31%	56%	13%
Prefer a loose- leaf book	46%	31%	23%
Prefer structure	29%	50%	21%
Have AIS concentration at school	30%	70%	0%
Prefer one AIS course	34%		
Prefer two AIS courses	58%		
No preference/ no response	8%		

Table 3: Analysis of Textbook Topics

	Kruskal-Wallis Test		Median Test	
AIS and Accountants	0.540		0.740	
Auditing Computerized AIS	0.107		0.234	
Computer Fraud and Security	0.005	*	0.013	*
Control and Security	0.503		0.644	
Control for Computerized AIS	0.945		0.917	
Databases and Data Modeling	0.135		0.304	
Documentation	0.053	*	0.013	*
E-Commerce	0.000	*	0.000	*
Systems Study: Planning and Analysis	0.077	*	0.046	*
Elements and Procedures of GL Systems	0.240		0.212	
Introduction to Data Processing	0.036	*	0.022	*
Systems Implementation and Maintenance	0.198		0.112	
Systems Study: Systems Design	0.105		0.155	
AIS Technology	0.003	*	0.002	*
Transaction Processing	0.673		0.375	
* indicates difference is statistically significant				

Table 4: Analysis of Course Syllabi

	2001	2002	2003	2004	2005	2006	2007
Ave. no. of topics/course	6	5.5	5.2	6.25	5.86	6	6.79
Gini metric	14	10	5.9	12.5	6.79	5.46	4.8

Appendix 2 – Range of Topical Coverage and Frequency in Accounting Information Systems Textbooks

Topic	Range of Pages of Coverage	Number of Books Including (out of 4)
AIS and Accountants		
Definition of systems	0 to 4	1
AIS and role in organization	1 to 4	0
Relationship of AIS and other	0 to 1	2
Auditing (Risk Assessment)	0 to 8	2
Career in AIS	0 to 2	2
Strategy and Value Chain	0 to 5	2
Information and Decision Making	0 to 5	3
MIS & AIS	0 to 7	2
Organizational Structure / Processes	0 to 5	2
New areas in AIS	0 to 5	3
Elements & Procedures of GL Based Accounting Systems		
Business Activities and Information Needs	0 to 4	2
Transaction processing: Documents and Procedures	0 to 3	2
Providing information for decision-making	0 to 2	3
Financial Statements	0 to 1	3
Managerial Reports	0 to 4	3
ERP Systems	0 to 2	3
Technology of AIS		
Input, Process, Output	0 to 14	2
Data Communications	1 to 3	3
LAN, WAN, Client/Server, Voice	0 to 5	1

Computer Software	0 to 3	3
Decision Support Systems & Spreadsheet	0 to 1	3
Artificial Intelligence	0 to 1	3
Expert Systems	0 to 2	3
Neural Networks	0 to 1	3
Intelligent Agent & Knowledge Management	0 to 2	3
Cloud computing	0 to 1	3
Documentation		
Document/ Systems Flowcharts	0 to 11	1
Data Flow Diagram	0 to 12	1
Process Maps	0 to 1	3
Program Flowchart	0 to 1	3
Decision Table	0 to 1	3
End User Computing	0 to 1	3
Entity Relationship Diagram	0 to 6	2
Sox documentation	0 to 2	3
Introduction to Data Processing		
Fundamental of Data Storage (field, records, file...)	0 to 1	3
Types of file (Transaction, master,...)	0 to 1	3
Batch Processing	0 to 1	2
Online - Real time Transaction Processing	0 to 4	2
Transaction Processing		
Business Process and Modeling	0 to 1	3
Transaction Cycle	0 to 9	3
Basics: Journal, Ledger, Trial Balance, etc.	0 to 3	3
Coding Systems	0 to 2	1
Revenue Cycle	4 to 46	0
Purchase Cycle & Expenditure	6 to 43	0
Resource Management Cycle (HR & Payroll)	0 to 38	1
Fixed Assets Cycle	0 to 2	3
Production Cycle	0 to 18	2
Financing Cycle	0 to 33	2
Specialized Industries	0 to 4	3
Functional Systems	0 to 1	3
Enterprise software	0 to 28	1
Business Process Reengineering & TQM	0 to 1	2
Order Entry / Sales	0 to 45	2
Billing, A/R, Cash Receipt	0 to 47	2
Extensible Business Reporting Language	0 to 2	2

Data warehousing	0 to 1	3
General Ledger/Reporting System	0 to 18	3
Data Bases and Data Modeling		
Database Concepts	1 to 15	0
Data Modeling and Normalization	5 to 15	0
Relational Data Bases	1 to 10	0
Data Base Structure	0 to 1	3
Object Oriented	0 to 1	2
Query Language	0 to 7	2
Data Base Systems and Future of AIS- REA	0 to 9	1
Implementing data models	0 to 12	2
Implementing data models - Special topics	0 to 16	2
Data Warehousing	0 to 1	3
Control & Security In AIS		
Introduction to Internal Control	1 to 2	0
Control Procedures	0 to 11	3
Elements o Internal Control Systems and Risk Assessment	0 to 1	3
COSO - Control Frameworks	0 to 16	2
Control for Computerized AIS		
Information Security Concepts	0 to 2	3
General Controls	0 to 16	2
Application Controls	8 to 42	0
Database Controls	0 to 6	3
Control for Computer Networks and Internet	0 to 2	3
Other Computer Controls	0 to 6	3
COBIT - Framework	0 to 3	2
Preventive, Detective and Corrective controls	0 to 16	2
Computer Fraud and Security		
Computer Crime, Security	0 to 6	1
Examples (Equity Funding, TRW, Hacking)	0 to 4	2
Virus and Techniques	0 to 18	2
Thwarting Computer Abuse	0 to 6	2
Computer and Ethical Behavior	0 to 7	2
Confidentiality and Privacy	0 to 6	2
Encryption	0 to 7	3
Auditing Computerized AIS		
Various Types of Audit	0 to 4	2
Internal and External	0 to 1	3
IS Audit	0 to 9	2
Evaluating Effectiveness of IS Control	0 to 2	3
Auditing Computerized AIS	0 to 6	2

Continuous Auditing	0 to 1	3
Auditing with computer, Generalized Audit software, Automated workpaper software	0 to 3	2
Auditing in the Information age	0 to 4	3
Systems Study: Planning & Analysis		
Systems Development Life Cycle	0 to 2	3
Analysis	0 to 4	1
Systems Study: Systems Design		
Introduction to Design	0 to 14	1
Feasibility evaluation	0 to 3	2
Prototyping	0 to 2	2
CASE / Systems Techniques	0 to 2	1
Selecting A Final System	0 to 1	2
Development Strategies	0 to 9	2
Purchase	0 to 4	2
Structured Systems Analysis	0 to 1	3
Systems Implementation and Maintenance		
Systems Implementation	0 to 12	1
PERT, Gantt	0 to 1	2
Implementation Activities	0 to 1	3
Outsourcing	0 to 3	2
Information and Knowledge Processing Systems		
Strategic, Management and Operational Decisions	0	0
Electronic Commerce and the Internet		
Internet and World Wide Web	0 to 3	3
Electronic Commerce	0 to 16	2
Electronic Data Interchange	0 to 7	2
Financial Electronic Data Interchange	0 to 1	3
Privacy and Security on the Internet	0 to 4	2
Fire Walls and Proxy servers	0 to 2	2
Data Encryption	0 to 1	2
Digital Signature	0 to 2	2
Auditing and Third Party Assurance	0 to 1	3
XBRL Financial Reporting	0 to 2	3

Appendix 3 – Topics Identified in Syllabi Data

- accounting and AIS
- accounting software
- Audit and Control Language
- AIS audit evaluation
- AIS audits
- artificial intelligence
- assurance
- Baan
- Balanced Scorecard
- Business Process Design
- Computer Aided Software Engineering
- CIO role
- Control Objectives for IT
- computer ledger
- computer crime
- computer ethics
- controls
- cooking the books
- Committee of Sponsoring Organizations
- CPA
- Customer Relationship Management
- cycles and processes
- data mining
- data warehouses
- database implementation

- database management systems
- database life cycle
- Data Flow Diagram
- e-commerce
- Electronic Data Interchange
- Electronic Data Processing
- eEnterprise
- Elliott Committee
- Encryption
- Enterprise Resource Planning
- expert systems
- flowcharts
- fraud
- Great Plains

- Hardware
- html
- industry/ commerce and IT
- knowledge management

- modeling
- MS Access
- MS Excel
- Mind Your Own Business
- Oracle
- Peachtree
- PeopleSoft
- public key cryptography
- QuickBooks
- Resource Entity Agent
- risks
- Sage Line
- SAP R3
- Systems Development Life Cycle
- software evaluation
- Sarbanes Oxley
- spreadsheets
- Structured Query Language
- Strategic Lens
- strategic value of AIS
- supply chain management
- systems development
- systems documentation
- systems security
- Transfer Control Protocol-Internet Protocol
- Universal Machine Language
- value chain
- Visio
- web design
- Extensible Business Reporting Language
- Extensible Markup Language