

# Teaching Information Systems for Bachelor Programs in Computer Science

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**Abstract.** Today the information systems are common basis to achieve operational excellence, managerial diversity and improved decision making. The study of information systems involves sources from technical and behavioral disciplines. The technical approach includes computer science, management science, and operations research. The behavioral approach concerns psychology, sociology, and economics. This paper focuses on some didactical issues when implementing the technical approach to the study of information systems. The main discussion concerns the choice of the topics and learning activities for a course in information systems delivered to students majoring computer science or information technologies. We assert that students have to achieve information's systems literacy which encompasses how and why the technology is applied in organizations. We adhere to ACM and AIS IS 2010 Curriculum Guidelines.

**Keywords:** information systems, curriculum issues

## 1. Introduction

Nowadays information systems have become an important managerial tool that helps organizations to operate in a global economy thus representing a foundation for conducting business. Organizations are trying to become more competitive and efficient by transforming themselves into digital firms where nearly all core business processes and relationships with customers, suppliers, and employees are digitally enabled. Businesses today use information systems to achieve operational excellence; new products and services and an improved decision making. From a business perspective, an information system provides a solution to a problem or challenge facing a firm and provides real economic value to the business.

The study of information systems involves contributions from technical and behavioral disciplines. The technical approach includes computer science, management science, and operations research. The behavioral approach concerns psychology, sociology, and economics (see Fig.1) [1].

In the context of the above the goal of this paper is to focus on some didactical issues when applying the technical approach to the study of information systems. The main issue discussed concerns the choice of the topics and learning activities for a course in information systems delivered to students majoring computer science or information technologies. We assert that students have to achieve information's systems literacy which encompasses how and why the technology is applied in organizations. So, there is a need to find the proper balance between theory and practice. This balance could be achieved through the choice of relevant topics to be covered. We adhere to ACM [5] and AIS IS 2010 [4] Curriculum Guidelines. Finally we briefly discuss the relationship of information systems courses to other courses in computer science and information technology majors.



## 2.The Role of Information Systems in Business Today

An information system represents a combination of management, organization, and technology elements. The management dimension of information systems involves leadership, strategy, and management behavior. The technology dimension consists of computer hardware, software, data management technology, and networking/telecommunications technology (including the Internet). The organization dimension of information systems involves the organization's hierarchy, functional specialties, business processes, culture, and political interest groups.

Any information system supports a series of value-adding activities for acquiring, transforming, and distributing information to improve management decision making, enhance organizational performance, and, ultimately, increase firm profitability. Information technology cannot provide this value unless it is accompanied by respective changes in organization and management. The way the organization executes its business depends on the specific business processes and information systems facilitate their automation.

Information systems support the major functional areas of the business. Manufacturing and production systems deal with the planning, development, and fabrication of products or services, and control the flow of production. Finance and accounting systems manage the firm's financial assets and fund flows. Human resources systems manage employee records and track employee skills e.g. job performance, and training; and take care for employee compensation and career development.

In contemporary organizations information systems are serving operational, middle, and senior management. Systems serving operational management are transaction processing systems (TPS). Management information systems (MIS) and decision support systems (DSS) provide middle management with reports and access to the organization's current performance and historical records. Finally executives support systems (ESS) support senior management by providing data of greatest importance to senior management decision makers, delivered as graphs and charts or other convenient form.

In order to operate efficiently the organization also applies different kind of integrated enterprise applications e.g. supply chain management systems, customer relationship management systems, and knowledge management systems. These systems are designed to support organization-wide process coordination and integration. Supply chain management

systems help the firm manage its relationship with suppliers to optimize the planning, sourcing, manufacturing, and delivery of products and services. Customer relationship management uses information systems to coordinate all of the business processes surrounding the firm's interactions with its customers to optimize firm revenue and customer satisfaction. Knowledge management systems enable firms to optimize the creation, sharing, and distribution of knowledge to improve business processes and management decisions. Enterprise systems integrate the key internal business processes of a firm into a single software system. They span multiple functions and business processes and may be tied to the business processes of other organizations. Due to the use of Internet technology and standards, Intranet facilities assemble information from various systems and present it to the user in a Web page format. Extranets make portions of private corporate intranets available to outsiders.

Information systems and the organizations in which they are used interact with and influence each other. They are to be designed to serve the needs of important organizational groups and conforms the organization's structure, task, goals, culture, politics, and management. In addition information systems help businesses and leverage their core competencies by promoting the sharing of knowledge across business units. They facilitate business models based on large networks of users.

Summarizing, information systems must be employed strategically in order to improve the organization's efficiency, effectiveness, and profitability. They provide most of the communication tools that organizations need for managing businesses on a global scale. Innovative managers and their employees need information system literacy as it concerns basic technologies, applications and development strategies. They need to be familiar with the powerful communication and information tools available to them.

So, what should students majoring computer science or information technologies know? First of all they need a general knowledge on the foundations of information systems so as to take an active role in the future of technology as a key enabler to the effectiveness of business organizations and a truly global society. Next, students are to be familiar with technological innovations in computer hardware and software, data management and networking. Last but not least they have to be acquainted with information system engineering issues.

The course provides focus on managing in a digital world though valuing, securing, building, and ethical comprehension of Information Systems. Taking into account that we apply the technical approach students will gain the experience required to influence technology-enabled growth in whatever industry or pursuit they choose.

### **3.Body of knowledge of the course Information systems**

This is a required course in the CS and IT core curricula designed to introduce systems ideas, concepts, and principles of Information Systems (IS) that every student of technology should know. The course should also represent the managerial aspects and to give an understanding of how Information Systems can be used to support the organization's strategic objectives. Implementation of new computer systems must be evaluated for feasibility (Can they be implemented?) and cost effectiveness (Should they be implemented?). The importance of keeping the user involved in the development or purchase process will be emphasized.

In the information age, information technology is widely used strategically to improve the organization's efficiency, effectiveness, and/or profitability. Today, information systems provide most communication tools that organizations need for managing businesses on a global scale. To be effective in a worldwide market, managers need to be familiar with the

powerful communication and information tools available to them. This course offers a framework that can be used to examine technology needs with an emphasis on satisfying business objectives.

The course introduces the fundamental concepts of information systems. It helps understanding issues concerning hardware, software and data management. A classification of the different kinds of information systems is presented. The course comprises topics related to software modeling process, analysis and modeling of data and information systems development. Students have to achieve information's systems literacy e.g. how and why information technologies are applied in organizations.

Upon completion of this course, learners should successfully demonstrate the following generic and specific competences:

1. Evaluate current level of understanding and competence with Information Systems as outlined in the course.
2. Integrate the informational knowledge with personal career.
3. Demonstrate the ability to use critical thinking skills to evaluate an area of Information Systems that is directly related to current career.
4. Illustrate the ability to communicate in an online environment via learning content management system Moodle and create a sense of a learning community.
5. Discuss the role of information systems in enterprises, including the digital firm.
6. Learn and implement the concepts of e-commerce and e-business.
7. Evaluate the suitability of various configurations of hardware, software, database and telecommunications to solve business problems.
8. Evaluate the uses of the Internet and intranets for business.
9. Evaluate the potential impact of new information technology on business processes.
10. Explain the importance of protecting organizational information technology resources and list strategies for providing that protection.
11. Examine the ethical issues pertaining to managing information systems in terms of intellectual property, privacy and security.
12. Discuss information systems security and control.
13. Develop strategies for managing information technology to obtain a competitive advantage.
14. Compare/contrast the activities in each of the phases of the Systems Development Life Cycle.
15. Evaluate types of DSS, MIS and ESS.
16. Explain technical opportunities for global value chains.

A balance between theory and practice is respected following ACM and AIS IS 2010 Curriculum Guidelines. Students will be able to:

1. Compare and contrast the roles of hardware, software, people, and data resources in an information system.
2. Relate a computer user's needs to the appropriate hardware and software resources.
3. Evaluate the effect of data communications on business operations.
4. Compare and contrast the functions and capabilities of Transaction Processing, Management Information systems and Decision Support systems.
5. Relate the level of organizational support to the success of end-user computing.
6. Relate the level of user involvement in a systems development project to the success of the project.

7. Explain the effect of information technology on the managers, structure and activities of organizations.

To achieve the educational goals of this course, the following core concepts are to be mastered:

1. Globalization through Information Systems software.
2. Managing in a Digital World: Information Systems Hardware.
3. Enabling Commerce using the Internet and World Wide Web.
4. Information Systems Classification.
5. Valuing Information Systems Investments: Database Management.
6. Managing the Information Systems Infrastructure: Networking and Cloud technology.
7. Development of Information Systems.

#### **4.Learning activities**

*Information Technologies Initial Pre self-analysis:* Write a one page assessment of students' current state of understanding Information Systems as it applies to relevant field of study. The students' knowledge of Information Technologies as it applies to the field of study. Review the recommended course schedule or the text book for the topics covered in the class. Include one outside resource. Cite this resource in the body of the text and list it as a reference, using the APA format. Post the assignment on Moodle.

*Globalization Paper:* Globalization has had a significant influence on how companies accomplish tasks over the last 20 years, and globalization has been a major driver of changes in the computer industry. The students will write a five to eight page paper on the influence and impact of globalization on companies, people, projects, technology, and the art of doing business. The students should look at globalization from an Information Systems viewpoint – what communication systems, data sharing systems, political, ethical, legal, geographical and economic factors come into play when a company is considering outsourcing work to another company. The paper will be graded on the degree of research, addressing all the technological and social variables that influence an outsourcing decision including political and economic concerns that can influence the decision to outsource to a company in another country. The students should pay attention to the local and global impact that outsourcing has on organizations and society for both the host and outsource countries and employees. Post the assignment on Moodle.

*The Influence of Technology Paper:* Technology has become part of the everyday fabric in our daily life. Computers and the capabilities programmed into them help provide the basis of our modern society. Examples range from food production and distribution to entertainment, news, games, and just about everything we touch or use. The student will write a ten to fifteen page paper on the differences between the technology in use in 1990 and the technology in use today. The student should critically evaluate the pace of change over the last 60 years and predict where technology will be in 2020. The student will review and identify the job skills in management and technology needed for continually development of professional identity in relationship to how work, play, and life will be lived in 2020. Post the assignment on Moodle

*Quizzes:* There are two short (up to 30') quizzes during the course. They comprise multiple choice, fill in the blanks and yes/no questions. Quizzes can be considered as training for the exams. There are no make-ups! If an absence is excused, the quiz will be given at the soonest possible time, after the student returns.

*Panel Discussion and Topic Presentation:* Students are supposed to take part in different panel discussions. The topic is to be chosen from the learning content. Students are expected to develop a PowerPoint slide show which should demonstrate a high quality design and have at least 10 slides.

## 5. Examinations and grading

The grade comprises the evaluation of the current learning performance and could be composed as follows:

Overview of Required Assignments	% of Final Grade
Information Technologies Initial Pre self-analysis	10%
Globalization Paper	10%
The Influence of Technology Paper	20%
Panel Discussions and Topic Presentations (Participation)	10%
Quizzes (two equally weighted)	30%
Final Exam including Information Systems Final post self-analysis	20%
TOTAL	100%

## 6. Conclusion

IT programs should produce graduates who apply information technologies in a wide range of settings. The IS courses for CS and IT specialists should focus on the technical and developmental aspects, but on the organizational and managerial views as well. This is because of the twofold role these specialists play: designers and developers, but managers of their own work. Organizations of all kinds are dependent on networked computing infrastructure and IT people should be prepared to compose, deploy, and maintain this infrastructure, nevertheless in the context of Information Systems or other.

The Information Systems course itself is a specific focus in every Computer Science program around which many other courses can be integrated and expose the value of competences they produce. We can mention here courses like Database systems, Data mining, Network technology, Web design, Software engineering etc. This predetermines its position in the upper level of the bachelor program.

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