GUIDELINES FOR A MINIMUM
PROGRAM FOR COLLEGES AND UNIVERSITIES
OFFERING BACHELORS DEGREES IN
INFORMATION SYSTEMS

A Report to the ACM Accreditation Committee
from the Information Systems Study Group

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INTRODUCTION

The tremendous demand for education in the use and application of computers and computer based systems in business, commerce and government has led to the establishment of Information Systems Departments and to the option of an Information Systems concentration in established Computer Science Departments. In fact, the Information Systems degree is now becoming one of the fastest growing and most popular in the area of computer education. This report is presented to the Computer Science and Information Systems education community as a preliminary proposal of ideas on which to base an accreditation standard. It was developed with the background that many Information Systems departments are incorporated in Schools and Colleges of Business, and an attempt was made to have the standard consistent with the American Association of Colleges and Schools of Business accreditation guidelines. The successful future of Information Systems depends on a firm foundation for graduating students; this work is directed towards offering a minimal or floor program for the Information Systems bachelors degree.

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GUIDELINES FOR INFORMATION SYSTEMS DEPARTMENTS

The Accreditation Committee of the Association for Computing Machinery (ACM) was formed in 1967 to provide information and guidance to various educational endeavors relating to the use and development of computing systems.

This report is one of a series that will be issued on guidelines for computer education. These reports are intended for use in the institutional and self study portion of the regional accrediting activities of the federation of Regional Accreditating Commissions of Higher Education.

The rapid increase in Information Systems departments at the college or university level in the last few years has led to some concern over the quality of programs that are being developed. It has been recognized that some guidance is necessary to maintain an identifiable area of education. The following guidelines are the recommendations of the Association for Computing Machinery. These are considered to be minimum requirements for an acceptable degree program in Information Systems.

A. CURRICULUM

There exist three basic categories of topic areas essential in the education of an "Information Systems Specialist". An integrated approach to Information Systems education should be designed to merge these three areas:

1. Organization Theory and Business Systems
2. Computer Systems Technology
3. Systems Theory and Systems Analysis and Design

Each area contributes significantly toward a successful system development and operation effort. It is important that a practicing individual have a basis in all three areas.

The following topics are a minimum set of information to be provided in the curriculum:

1.0 Organizational Theory and Business Systems

1.1 The Structure of Organizations – The concept of organizational structure. Line of authority and alternative organizational hierarchies. Strategic, tactical, supervisory, and operational decision process. Internal and external organization environments.

1.2 Organizational Interaction – Group theory, work relations, dependencies, communication skills, job performance and satisfaction, and organization behavior. Managing technological and organizational change.

1.3 Group Dynamics – Group Organizations, role play, participation, group decision making, tools (brain-storming, delphi, etc.)

1.4 Business Functions – Personnel, Order Processing, Production, Finance, Purchasing, Marketing, and other service and operational functions. Objectives and characteristics.

1.5 Business Information Systems – Structure of Manual and Computer-based information systems. Controls and Performance Measures. Information systems taxonomy and operating characteristics.

1.6 Management Presentation Skills – Presentation organization. Audience composition, presentation and communication skills, media selection evaluation. Use of graphics. Technical writing. Project management.

2.0 Computer Systems Technology

2.1 Logic Specification Skills – Algorithms, flow-charting and other logic specification tools. Languages, syntax, evolution of languages. Programming Style and Approaches, structured programming, program documentation, and programmer organization techniques. Debugging and Verification – Test Deck generation, Error detection and recovery.

2.2 Software Systems Organization – Basic computer structure and configuration. Data Representation (bits to DBMS). Encoding, access methods and storage mechanisms.

2.3 Hardware Organization – Basic Computer operation. Computer sizes and capacities. Computer System configurations, channels, networks, terminals, front-end processors, etc.

2.4 Data Structure and File Processing – Data Structures, Arrays, strings, stacks, queues, linked lists, etc. Complexity of algorithms for manipulation of data. File Organization, records, files, data bases (schemas, sub-schemas, dictionaries), buffering, and access method characteristics.

2.5 System Programs – Job Control Languages. Operating System concepts, deadlock, synchronization, scheduling, network control, memory management, and monitor and recovery capabilities. Utilities, compilers, assemblers, report generators, etc.

3.0 Systems Theory and Systems Analysis and Design

3.1 Systems Concepts – General Systems Theory. System structure, components, boundaries, operating environments. Characteristics of systems.

3.2 Role of Systems Analyst – Interface with management, users, analysts and programmers. Organization and conduct of systems analysis effort. Selling and coordination of a system effort. Technical skills required.

3.3 System Life Cycle – Logical progression. Recognizing steps or phases. Life Cycle Management.

3.4 Project Management – Organization and planning. Personnel (assignment, sequencing activities, balancing resource utilization, cost and time estimating). Management tools (tables, Gantt charts, PERT/CPM, etc.)

3.5 Documentation – Need for documentation, Specification of requirements, design, and operations. Use in project control. Library organization. Documentation of design decisions.

3.6 Information Requirements Analysis – Capturing Requirements, Interviewing techniques, goal analysis, tools for requirements specification (PSL, ADS, SOP, Grid charting, etc.), and data dictionaries.

3.7 Systems Analysis and Design – Logical and Physical Systems Design. Cost/benefit analysis. Feasibility analysis and organizational impact analysis. Generating alternative designs. Deriving functional specifications, incorporation of controls and security. Hardware selection. Data and software design. Testing and implementation.

3.8 Change Management – Complete change over, phased over, parallel operation, and other migration strategies. Portability and Evaluation.

B. COURSE OFFERINGS

A minimum of 10 different Information Systems courses should be offered leading to the bachelors degree. These courses must cover 90% of the topics contained in the section on curriculum. There must be a graduated set of courses with early courses preparing students for the courses that follow with a more advanced treatment of a topic.

C. FACULTY

1.0 Full-time Academic Faculty

An academic faculty composed largely of full-time personnel is the very heart of a strong program of education for information systems. It is upon the full-time faculty that major responsibility rests for the planning and implementing of the department's undergraduate program.

A minimum of four full-time equivalent faculty members will be needed to staff an information systems department and provide adequate professional development for the faculty members. The percent of full-time equivalent staff employed on a full-time basis shall be at least 75 percent which shall be calculated as an average of the terms included in the academic year.

2.0 Part-time/Adjunct Faculty

It is recognized that part-time faculty enrich the curriculum and enable the department to respond to fluctuations in enrollment. However, only the minimum number of part-time faculty members should be utilized to perform these necessary functions. The percent of adjunct faculty employed on a part-time basis shall not be more than 25%.

3.0 Qualifications of Academic Faculty Members

The academic faculty shall possess the qualifications, experience, professional interests, and scholarly productivity essential for the successful conduct of a department of information systems. These qualities are demonstrated by:

> (a) The educational and professional background relating to depth and breadth of education and experience. Departments should strive to employ faculty who have formal educated or significant experience in the three major areas of information systems.
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> (b) Professional attainment and certifications.
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> (c) The extent of engagement in innovative curricula development, experimentation in teaching methods, updating course content, effective student counseling, and other meaningful efforts to improve the instructional program.
>
> (d) The level of research, writing, and publication that fits the institution's goals and purposes.
>
> (e) The extent of involvement in community service, executive education programs, consulting activities, and other business/industry/government interactions which contribute to professional development.

4.0 Institutional Policy

The existence of plans and policies that encourage and provide a framework for continuing professional development and increasing productivity.

D. TOTAL RESPONSIBILITIES OF ACADEMIC FACULTY MEMBERS AND TEACHING LOAD

In judging the academic load, consideration should be given to the total responsibilities borne by each member of the academic faculty. Judgement concerning teaching, research, and administrative loads of the academic faculty shall be based upon the average for the entire academic year rather than the experience of a single term only. Members of the academic faculty must not teach courses in excess of twelve credit hours per week. Assignment of responsibilities for graduate instruction, research direction, and thesis supervision, or major responsibilities such as committee responsibility should result in downward adjustment of the teaching load.

No faculty member shall have preparations in more than three different courses per week, nor in more than two fields. In terms of student load: a faculty member who is teaching full-time must not have more than 360 student semester/quarter credit hours to teach without significant help in terms of student assistants or laboratory assistants in the courses involved.

E. COMPUTER FACILITIES

1.0 Service

There will be a hands on facility available for student use sometime during the student's coursework in the department. Laboratory experiences will be provided for some of the upper division courses on a dedicated computer or via simulation on a shared system. The students must have access to a timeshared or batch oriented computer system with several high level languages, such as COBOL, FORTRAN, BASIC, APL, GPSS, PL/1 and a data base management system. The system must have sufficient speed and capacity to provide a normal turn-around of submitted student programs of at least three times a day. The computer center should communicate regularly with and be responsive to information systems students and faculty. The academic computer center staff should have the ability and opportunity to educate faculty and students to access the computer system effectively in a world of rapidly changing computer technology.

2.0 Budget

The computer and equipment budget should be consistent and equitable in light of the information systems department enrollment and objectives and the need for high quality service.

3.0 Organization and Relationships

3.1 The institution's administration and faculty and the academic computer center's staff should have in operation an effective communication, planning, and acquisition/lease mechanism to guide and

build the computer hardware/software resources.

3.2 The faculty is responsible for generating planned student usage of resources and the academic computer staff must be able to help effectuate these plans through student guidance on selection and access and through faculty liaison on computer software holdings.

3.3 The academic computer center staff should seek whatever appropriate relationships with other computer centers which can expand the total software/hardware resources at its disposal.

F. LIBRARY AND LIBRARY SERVICE

1.0 Objective

The information systems library should be viewed as an information laboratory having the function of aiding in the communication and advancement of knowledge by providing for the acquisition and utilization of information resources. Maximum access to and dissemination of information resources, consistent with the nature and form of materials, should be facilitated by application of contemporary technology as well as library policies, procedures, and hours.

2.0 Service

The library should be so organized and staffed as to provide effective access, selection, user education, and retrieval services. The library should communicate regularly with and be responsive to its prime users – information systems students and faculty. The staff should have the ability and opportunity to educate faculty and students to handle information effectively in a world of rapidly expanding knowledge and dynamic learning technology.

3.0 Organization and Relationships

3.1 The school's administration and faculty and the library's staff should have in operation an effective communication, planning, and acquisition mechanism to guide and build the resources collection.

3.2 The faculty is responsible for generating planned student usage of resources and the library staff must be able to help effectuate these plans through student guidance on selection and access and through faculty liaison on reserve holdings.

3.3 The library should seek whatever appropriate relationships with other libraries which can expand the total resources at its disposal.

3.4 The library, as an information laboratory, should provide sufficient space to accommodate (1) all information resources, (2) retrieval equipment, (3) work space for students and faculty, (4) space for readers and other users, (5) offices and work areas for the library staff, and (6) space for special functions such as exhibits and discussions.

4.0 Resources

4.1 The library should conceive its total resources broadly to include texts, readings, periodicals, serials, research reports, monographs, theses, pamphlets, micro-texts, visuals, audio and video tapes, and films.

4.2 Basic resources consist of recognized materials in the specified areas of the common body of knowledge and related fields. Extended collections of resources are necessary for graduate programs. They are typified by significantly greater depth in research, historical, and methodology materials as well as acquisition lists issued by established professional organizations which can be used to guide library development.

5.0 Budget

5.1 The Information Systems library budget should be consistent and equitable in light of the school's enrollment and objectives and the need for high quality service, as described above.

5.2 Initiation and maintenance of graduate programs requires a significant increment in both initial and continuing budgetary support.

5.3 Budgetary planning should anticipate progress imminent in information technology.

G. FINANCIAL RESOURCES AND OTHER FACILITIES

1.1 The budget shall be sufficient to support acceptable objectives. The physical facilities, including buildings, equipment, and library, should be suitable to serve the stated objectives of the school.

1.2 Distribution of physical facilities and resources available to subject fields, day and evening programs, and locations should be such that each student or group of students has reasonable access to them.

2.0 Offices and Secretarial Assistance

2.1 Offices should provide sufficient privacy and space to carry out the faculty's responsibilities. Sufficient secretarial assistance should be provided to faculty.

2.2 Part-time faculty members should have access to office space and secretarial help.

3.0 Classrooms

General and specific purpose classrooms should be appropriate in size and design to the courses offered.