



Canadian Information Processing Society

Information Systems and Technology Accreditation Council

Accreditation Criteria

for

Undergraduate Information Systems (I.S.) and

Management Information Systems (M.I.S.) Programs

2006/2007

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Introduction

In keeping with the suggested Undergraduate IS curriculum (Couger et al., 1995), the term IS has been chosen to incorporate many different program emphases and encompasses names such as information systems, computer information systems, information management, information technology/resources management, information resources management and management information systems.



The scope of the IS field covers the *intersection* between organizations, people and information technology. IS, as shown in Figure 1, and “as an academic field encompasses two broad areas: (1) acquisition, deployment, and management of information technology resources and services (the information systems function), and (2) development and evolution of infrastructure and systems for information use in organizational processes (systems development) (Couger et al., 1995: 344). The information systems function spans information technology (computer and communications), data (both internal and external), organization-wide systems, departmental systems, individual information technology systems, new information technology tracking, and information technology strategy and planning. Systems development spans creating organizational and inter-organizational systems for use in data acquisition, communication, coordination, analysis, and decision support, while considering innovation, quality, human-machine issues and socio-technical design, and doing so through change management techniques.

The distinctive focus of IS programs is the management issues surrounding Information Systems in businesses. This business perspective must be paramount within the program to be considered for IS accreditation. Information systems, therefore, is the intersection of technology, people, tasks, data and organizations, such that the combinations of these factors create unique management influences, issues and problems for organizations to solve. The best IS solutions will be those that consider all of these forces as depicted in Figure 1.

Criteria

To assist in the identification and recognition of characteristics of programs for accreditation purposes, the following criteria have been adopted by the IS Accreditation Council.

Faculty
Students
Graduates
Currency of Content
Curriculum
Flexible Course Structure
Overview of Curriculum
Detailed View of Curriculum

Although the criteria are intended to specify minimum requirements, they also allow for and encourage two important characteristics of IS programs. These characteristics are the diversity of programs that exist among the various institutions and the innovative features that have been typical in these programs.

Innovative programs that maintain quality are encouraged. In judging a program's eligibility for accreditation, the Council will consider alternative modes of education, including variations in content, organization and delivery. For example, many programs have adopted a format wherein students combine on-campus study with on-the-job training; the experience gained by students during their periods of employment often contributes significantly to their education. Thus, such a program might be accredited partially on the basis of several required work terms in approved IS environments in place of one or two on-campus additional courses being required in IS.

In the evaluation process, the principal emphases are placed on the faculty and its qualifications, the students, the graduates, the resources (physical, fiscal, and human) and the curriculum.

The criteria are thus divided into five sections concerned with each of these major subdivisions. It remains the responsibility of the institution to demonstrate to the Council that its program meets the spirit of these guidelines.

Faculty

The heart of any educational program is the faculty. A competent, qualified, and forward-looking faculty gives an overall scholarly and professionally responsible atmosphere to the operation. An excellent faculty will usually identify and overcome problems in other areas and continue to provide a program worthy of accreditation, but no degree of excellence in other areas can continually offset the handicap presented by poor faculty quality or inadequate numbers of faculty. Thus, the first consideration for a program to be acceptable for accreditation is the presence and future assurance of a continuing critical mass of quality faculty. Educational institutions seeking accreditation for IS programs must have allocated the resources necessary to achieve a critical mass of quality faculty, committed to professionalism in IS, committed to the longevity and stability of the staff, and committed to maintaining the allocations required for its continuation.

The proper size of the faculty depends upon the enrolment and the program objectives, including the amount of extension and continuing education activities, and involvement in professional and technical societies. In research oriented schools, the amount of sponsored research and direction of graduate research should also impact the number of faculty positions. The size of the faculty must be large enough to provide experience and capability in a significant portion of the broad range of IS interests and to provide meaningful interaction among the faculty so as to support these interests. The program must not be critically dependent on one individual. The faculty should occupy permanent positions to ensure continuity and stability. Institutions with limited enrolment and resources are encouraged to select and emphasize a smaller number of quality programs rather than to compromise standards by initiating or trying to maintain programs with inadequate faculty support.

Teaching loads must leave enough time for professional development of the faculty. To function effectively as teachers, faculty Members must devote a significant amount of their time to seeking new understanding through research and scholarship, industrial interaction, instructional innovation, consulting, or other professional development activities. A significant common aspect of these activities is communication of ideas to other practising professionals, scientists, and engineers outside the home institution.

Sabbatical leaves are important to faculty development, for they offer the individual an opportunity to develop professionally and allow for visiting faculty. Other evidence of institutional interest in faculty development, such as adequate resources for professional development, should be present.

Students

An accredited IS program must have good students. Student selection and retention standards must be appropriate to the program. When students transfer from other institutions or from a branch campus, standards for evaluation and selection of these students should be clearly enunciated, and should show that these students are of similar quality and have substantially the same knowledge as those students who have taken all their work on the main campus. When IS courses are regularly taken on other campuses, the main campus faculty should be involved with answers to questions of curricular content.

A student advisory system is an important component in a IS educational program. The advisory system should embrace course selection and similar matters, and it should also include career guidance. Various aspects of professionalism and ethics may be dealt with through the guidance system.

Curriculum and career guidance is best handled by well-informed faculty Members who are given the time and administrative support for personal interaction with individual students. Advisors should be familiar with accreditation policies and guidelines.

The level of guidance needed will be a function of the flexibility of the curriculum in a particular school. Care should be taken by advisors not to assume responsibility of choice that should be exercised by the student.

Graduates

IS graduates are expected to understand the disciplines of organizations (such as marketing, accounting and finance), and the disciplines of information systems (such as analysis, design, and management). They are expected to be good problem solvers, excellent oral and written communicators, and be experienced in teamwork. The graduates are best suited to jobs which require both an ability to create and maintain information systems with and understanding of the goals and work processes of the systems= users. IS graduates are being prepared to take up positions in organizations in several areas. They may:

- Join the IS department of an organization in a junior programming or analyst capacity
- Join a liaison role or department that specializes in services such as training, end user support or technical support.
- Join a department in an IS support or technical analysis (e.g., financial analyst) position, where the user of information systems is a fundamental component of their job.
- Join or form an outsourcing or consulting organization and perform any of the roles outlined above for clients.
- Proceed to graduate school for more in-depth training.

Resources

An accredited program must have buildings, offices, laboratories, computing facilities, computing equipment, support staff and fiscal resources that are appropriate for the characteristics of the program being evaluated. Evidence to this effect should be presented.

* Learning Units (LU) are drawn from the "IS'97 Mod

The availability of IS resources and support staff to a program in IS is of vital importance. An appropriate variety of technology, methodological and network facilities must be readily accessible to all students and faculty. Minimal computer downtimes, reasonable access and competent support staff are essential. There should be a regular plan for updating equipment and discarding obsolete equipment. Reliable and fast repair service together with a modest amount of equipment duplication is essential.

The program must have competent clerical, administrative, and technical support and services. Salary budgets must be consistent with the faculty size and student enrolment. Current expense budgets must allow reasonable amounts of travel and supplies. Technology and methodological tool budgets must allow students and faculty enough time that they use it as an effective learning aid.

There must be adequate access to library materials and other intellectual resources to support the program. The collections must be maintained and refreshed so as to remain current, and there must be a breadth of materials included. Electronic networking sufficient to provide students and faculty access to external resources is also important.

Currency of Content

A major challenge within IS is to keep pace of the rapidly changing technology and trends that underlay the field. As such, an accredited IS program is expected to have a process for keeping its program current. The objective of this process must include but not be limited to keeping in step with current practice and exposing new and evolving IS

topics. For instance, several areas that are now evolving include Electronic Commerce and Knowledge Management, but can be interpreted, embraced and introduced differently for different schools. This freedom of expression is encouraged by the council but must be evaluated for quality in the emergent stages individually.

It is, hence, incumbent upon the school to demonstrate this capability to keep the content current, and to outline the process through which it is accomplished to the satisfaction of the visitation team.

A significant component of an accredited program must be practical in nature; students must have direct experience with non-trivial problem-solving. This component will help to develop students' creativity in solving open-ended problems through practice in formulating problem statements and specifications, considering alternative solutions, determining feasibility and cost, and communicating the results including detailed systems descriptions. Projects and courses that require teamwork are strongly encouraged.

Concepts should be applied to real-world examples. Whereas practical aspects should be included at all levels of the program, the major portion of the practical component is to be satisfied in advanced courses. Students, individually and as Members of teams, must be required to design and implement a system, program or process to achieve stated objectives. Throughout the design process, decision-making must include the application of technology, people, systems and business fundamentals. The problem solution should include the establishment of objectives and criteria, analysis, synthesis, documentation, implementation, testing, and evaluation. It is desirable that problems include a variety of realistic constraints such as economic factors, performance thresholds, ergonomics, organizational structures, data structures, time, compliance with standards, interoperability with other systems, and conformance to ethical, professional and legal restrictions.

Curriculum

The diversity of possible IS graduates poses a complex challenge for defining the IS curriculum. In general, an IS program is likely part of a life-long learning process where the IS courses are but one source of knowledge and experience. Instruction in the necessary topics provides a foundation but should be combined with courses and/or experience in other disciplines, the most common being computer science or other business areas. The curriculum defined below reflects this position.

In specifying criteria for achieving accreditation in any discipline, there is a tension between establishing minimum standards and encompassing flexibility within which students can set individual goals and tailor their programs to meet diverse needs. The IS Accreditation Council has adopted the following criteria to strike a balance between these objectives.

I. Curriculum review within an IS program is necessary to keep issues current and integrated with the enduring lessons. The course and program review process should allow faculty and students the opportunity to critique and shape the curriculum, and where possible to consult with practitioners or IS advisors.

II. Joint programs are encouraged so as to combine the best strengths of different schools. As such, joint programs may span different institutions drawing the faculty, students, courses and resources from the most appropriate partner. The criteria for accreditation will be applied across the combined group of schools.

III. As an adjunct to specific areas of instruction, the program must also include training to develop students' written and oral communications skills. Not only should students be taught to present information both verbally and in writing, but they should practice collecting information through reading and listening and assembling the information for various audiences. The realization of this requirement in the program can be tailored to suit other institutional goals, but the IS faculty must support this activity.

IV. An accredited IS program must include the equivalent of at least four years of postsecondary study (not necessarily all at the same institution) and lead to a baccalaureate degree. Furthermore, it must require that all students satisfy certain breadth and depth criteria to be eligible for the degree. The minimum breadth requirements in an accredited program are expressed in terms of equivalent years of study, as follows:

Examples of a possible 2+2 program structure might be:

- Two years of study in subjects other than IS and Business
- One to one and a half years of study in Business areas that are not IS
- One-half to one year of study in IS

OR

- At least two courses in subjects other than IS and Business
- Two to two and a half years of study in Business areas that are not IS
- One year or more of study in IS

The set of courses in each area should exhibit some breadth, and some of the courses in each area should be at an intermediate or advanced level. This distribution leaves each student with the flexibility to satisfy additional institutional requirements and to accomplish personal objectives.

Curriculum within an IS program must meet certain standards to qualify for IS accreditation. These fall under the categories:

- Curriculum (A) Information Systems
- Curriculum (B) Technology
- Curriculum (C) Business
- Curriculum (D) Other non-business and non-IS areas
- Curriculum (E) Professionalism and Practical Examples

Flexible Course Structure

The curriculum described below is meant to outline the content areas and in no way determines the structure or required courses in an IS program. The topics can be covered in various courses inside and outside of the program's home affiliation. Joint degrees between institutions are supported in principle as long as standards are upheld.

The extent of IS curriculum coverage within the prescribed areas will vary by programs but must cover the following topics and meet a minimum level of the Learning Units (LU)* outlined.

Overview of Curriculum:

- Curriculum (A) - Information Systems Topics (Evaluated as IS Level 0, 1 or 2):

- (A.1) Business Systems Modelling and Analysis
- (A.2) Business System Design & Development
- (A.3) IS Project Management
- (A.4) Business System Implementation
- (A.5) Managing the IS function
- (A.6) Types and roles of IS within Business
- (A.7) Information and Society

- Curriculum (B) - Technology Topics (Evaluated as Technology Level 0, 1 or 2):

This is technology interpreted within a system or business context.

- (B.1) Programming and programming environments Including operating systems
- (B.2) Computer Architecture
- (B.3) Data Communication
- (B.4) File and Database Systems
- (B.5) System Architecture

Curriculum (C) - Business Topics (Yes/No evaluation):

A thorough grounding in business fundamentals is important to prepare students of IS to contribute to Canadian businesses. Relevant courses in this area include:

- (C.1) Marketing
- (C.2) Finance/Economics
- (C.3) Accounting
- (C.4) Organizational Behaviour/Human Resource Management
- (C.5) Production/Operations Management/Management

Science/Operations Research

- (C.6) Strategy/Policy/Organizational Theory
- (C.7) Business Communications

Curriculum (D) - Other Non-Business, Non-IS (called Other) Topics (Yes/No evaluation):

- (D.1) Any discipline outside IS and Business. Examples are:

Humanities

Social sciences

* Learning Units (LU) are drawn from the "IS'97 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems," page 48, Figure A6.2, titled "Learning Units in IS '97" as published by a consortium of IS-related US professional associations (ACM, AIS, AITP). Course Levels, in terms of intensity, coverage and difficulty are designated in brackets, such as Level (1), (2), (3) and (4). Course Level (1) represents awareness/recognition and Course Level (4) represents deep knowledge of applying the concept.

Sciences
Arts
Engineering
Health sciences
Education
Law
Linguistics
Computer science.
Curriculum (E) - Professionalism
- (E.1) Professionalism

Detailed View of Curriculum:

The extent of IS curriculum coverage within the prescribed areas will vary by programs but must cover the following topics and meet a minimum level of the Learning Units (LU)* outlined.

Curriculum (A) - Information Systems Topics (Evaluated as IS Level 0, 1 or 2): Similarly to the program as a whole, the curriculum within IS must offer a breadth of exposure along with a depth of understanding.

All students in an accredited program must take courses across the following areas, each of which illustrates a range of topics that might be included. The curriculum may be arranged around these topics in any desired combination or focus to meet institutional or program objectives but must include at least five courses. Furthermore, at least one-third of the course requirement in IS must be met by intermediate or advanced courses chosen from at least two of the areas, where an intermediate or advanced course is one which requires another course from the same area as a prerequisite.

The classification of subtopics is not intended to limit the scope of IS nor the areas to be included or excluded at particular institutions, but rather it is illustrative of a range of topics that an accredited program might be expected to provide.

- (A.1) Business Systems Modelling and Analysis
 - Systems and IT concepts (1) LU 1
 - Information and quality (1) LU 6
 - Systems and quality (1) LU 5
 - IS theory (2) LU 16
 - Systems and quality and IS (2) LU 22
 - IS requirements/work-flow planning (2) LU 99
 - Information measurements/data/events (3) LU 42
 - IS Data Modelling (3) LU 88
 - IS Database conceptual/logical models (3) LU 95
 - Info analysis: Individual vs group (1) LU 13.03
 - Info analysis: Finding IS/IT requirements (2) LU 13.04

- (A.2) Business System Design & Development
 - IS Life Cycle: Developing with packages (2) LU 13.08
 - IS Application development/code generate (3) LU 93
 - IS Database application structuring (3) LU 91
 - IS Development testing (3) LU 103
 - IS Applications, production systems (4) LU 110
 - IS Development standards (2) LU 28
 - IS Development risks/feasibility (2) LU 77
 - IS Conversion Planning (2) LU 97
 - IT Systems specification (3) LU 8
 - Problem solving, with packages (3) LU 14
 - IS Analysis and design tasks (3) LU 72
 - IS Continuous improvement and IS (3) LU 78
 - IS Design and implementation (3) LU 75
 - IS Rapid prototyping (3) LU 76
 - IS Requirements and specifications (3) LU 74
 - Systems and quality metrics/assessment (3) LU 84
 - IS Development and conversion (3) LU 98
 - IS Functional specifications (3) LU 96
 - IS Requirements and Database (4) LU 111

- (A.3) IS Project Management
 - IS Development project close down (2) LU 109
 - IS Development and project management (3) LU 94
 - Quality and performance management (3) LU 127
 - IS Development project planning (3) LU 105
 - IS Development project management (4) LU 106
 - IS Development project management (4) LU 107
 - IS Development project management tools (4) LU 108
 - IS Life cycles and projects (4) LU 116

- (A.4) Business System Implementation E.g., installation process, conversion, IS change management, and power/politics
 - Implementing and event driven applications (2) LU 13.13
 - IS Database and IS Implementation (3) LU 90
 - IS Database application implementation (3) LU 92
 - Implementing a simple database design (2) LU 13.12

- (A.5) Managing the IS function Including IS strategy and Business Process Redesign
 - IS management of the IS function (2) LU 123
 - IS planning (2) LU 26
 - Information use strategies (3) LU 15
 - IS strategic component (2) LU 17
 - Planning for IS development and management (2) LU 18
 - IS Careers (1) LU 11

Personal, performance evaluation (1) LU 30
IS Implementation, outsourcing (2) LU 29
IS Implementation and outsourcing (2) LU 125
IS policies and standards (2) LU 122
IS Management and department organization (3) LU 120
IS Responsibility to sell designs to management (3) LU 115
Personal, leadership and IS (3) LU 121
Business on the Internet or Electronic Commerce

- (A.6) Types and roles of IS within Business Decision Support Systems, Group Support Systems, Executive Systems, Expert Systems

Problem solving, small IS (1) LU 3
Knowledge work software (3) LU 2
IT and obtaining objectives (2) LU 9
Characteristics of an IS Professional (1) LU 10
Personal, cognitive processes (2) LU 19
Personal goals and decisions (2) LU 20
Decision Making, Simon Model (2) LU 21
Systems, role of mgmt, users, designers (2) LU 23
Systems, work-flow, org. systems (2) LU 24
Models, org: relation to IS (2) LU 25
IS types (2) LU 27
IS society and ethics (for org. systems) (2) LU 31
Work and activity concepts (1) LU 13.01
Support: individuals versus groups (1) LU 13.02
Desktop Applications (e.g., Spreadsheets, Productivity tools)
Organizing personal data resources (2) LU 13.05
Accessing/retrieving/storing data (2) LU 13.07
Configure and customize a package (3) LU 13.09
Implementing a personal IS application (3) LU 13.16

- (A.7) Information and Society e.g., Ethics, Privacy, Security, law

IT and Society (1) LU 4
Ethics and the IS professional (1) LU 12
IS professional code of ethics (2) LU 85
Ethics and legal issues (3) LU 119
Personal, life-long learning (4) LU 118
Privacy

Curriculum (B) - Technology Topics (Evaluated as Technology Level 0, 1 or 2):

This is technology interpreted within a system or business context.

- (B.1) Programming and programming environments Including operating systems

IT systems software components/interact (1) LU 65
OS environments and resources (1) LU 68

OS functions (2) LU 67
Procedural/event driven programming (2) LU 13.10
Problem solving, environments/tools (2) LU 52
Problem solving, IS applications, substructures (2) LU 56
Problem solving, modules/cohesion/coupling (2) LU 50
Problem solving, v? - systems view (2) LU 49
Problem solving, language comparison (2) LU 51
Programming: language comparison (2) LU 61
IS software quality metrics (2) LU 83
Problem solving, complexity metrics (2) LU 82
IS applications, programming environment (2) LU 104
IS implementation with objects/event driven (2) LU 101
Problem solving, design, test, debug (3) LU 60
Problem solving, file/DB editors/reports (3) LU 59
Problem solving, top down implementation (3) LU 48
Problem solving, with files/Databases (3) LU 58
IS application with programming languages (3) LU 100
Implementing simple algorithms (2) LU 13.11
ADT's, classes, objects (2) LU 44
ADT's: Data and file structures (2) LU 53
Data: characters, records, files, mmedia (2) LU 43
Object representation of a system (2) LU 46
Problem solving, formal problems and IS (2) LU 45
ADT's: Database models and functions (2) LU 89
ADT's: Arrays, lists, trees, records (3) LU 54
ADT's: Indexed files, keys (3) LU 55
Problem solving, algorithm development (3) LU 47
Problem solving, Data/File applications (3) LU 57
OS, install, multi-media (2) LU 69
OS, interoperability and system integration (2) LU 70
OS, install multi-user system (3) LU 71
IS Commercial implementations (3) LU 73

- (B.2) Computer Architecture

IT hardware and software (1) LU 7
IT hardware architectures (1) LU 64
IT peripheral devices (2) LU 63

- (B.3) Data Communication

Telecom, arch., topologies, protocols (2) LU 37
Telecom, central/distributed systems (2) LU 36
Telecom, devices, media, systems (2) LU 32
Telecom, economics, design issues (2) LU 34
Telecom, hardware and software (2) LU 38
Telecom, org. supported by (2) LU 33

Telecom, services, reliability, security (2) LU 39
Telecom, standards, std orgs. (2) LU 35
Telecom, systems view hw/sw (2) LU 62
IS managing emerging technologies (in telecom) (2) LU 124
Telecom, installation, implementation (2) LU 40

- (B.4) File and Database Systems

Database terminology and concepts (2) LU 13.06
IS Database applications development (3) LU 81

- (B.5) System Architecture

For instance, what models or concepts are available for pulling technology together to address business problems. Examples are:

Telecom, LAN, install, configure (2) LU 41
Client/server
Network configurations
Combinations of (B.1) through (B.4) above

Curriculum (C) - Business Topics (Yes/No evaluation):

A thorough grounding in business fundamentals is important to prepare students of IS to contribute to Canadian businesses. Relevant courses in this area include:

- (C.1) Marketing
 - (C.2) Finance/Economics
 - (C.3) Accounting
 - (C.4) Organizational Behaviour/Human Resource Management
 - (C.5) Production/Operations Management/Management Science/Operations Research
 - (C.6) Strategy/Policy/Organizational Theory
 - (C.7) Business Communications
- Verbal, written and interpersonal skills
Interpersonal, synergistic solutions (2) LU 86
Interpersonal, consensus development (3) LU 79
Interpersonal, group dynamics (3) LU 80
Interpersonal, agreements/commitment (3) LU 87
Personal, time/relationship management (3) LU 126
Personal, presentation (4) LU 117
Interpersonal, empathetic listening (4) LU 113
Interpersonal, goal/mission alignment (4) LU 114
Personal, proactivity/principled action (4) LU 112

Curriculum (D) - Other Non-Business, Non-IS (called Other)

Topics (Yes/No evaluation):

- (D.1) Any discipline outside IS and Business. Examples are:
humanities
social sciences

sciences
arts
engineering
health sciences
education
law
linguistics
computer science.

IS applications can be found in all human endeavours, so education in any discipline outside IS has the potential to prepare students in a field of direct relevance to these future livelihoods. This area of study provides a foundation for learning that is important to the holistic development of students.

The diversity of backgrounds needed by various IS professionals necessitates flexibility within these accreditation requirements. Innovation in establishing institutional requirements or in promoting each individual's ability to reach personal goals is encouraged. Nevertheless, this section identifies topics that enhance a program's ability to meet the needs of IS students.

As is maintained throughout the curriculum section, the goal of breadth in exposure must be balanced by the goal of depth in understanding, which can best be achieved through the selection of complementary courses having a common focus.

It is useful to educate IS students in non-technical disciplines. Through courses in humanities or social science, students will gain understanding of political theories and processes, knowledge of individual and group social interactions, appreciation of cultures and history, sensitivity to the literary and fine arts, and fluency in languages. Not only is this important background for future self-study, but several aspects have direct bearing on particular areas, such as linguistics that is central to natural language processing, cognitive science that provides mechanisms to evaluate human-computer interaction, law that can be applied to assessing liability of IS professionals, and ethics that helps to evaluate social implications of computing. Therefore, outside of IS and business courses, students should be encouraged to choose courses such that their programs include course in social sciences and humanities.

Curriculum (E) - Professionalism - (E.1) Professionalism

Aspects of professionalism are to be emphasized throughout the curriculum. Courses in social implications of systems may also be offered, but ethical and legal issues surrounding systems, including social responsibility of analysts, designers, programmers and users, must be included in many courses so that students learn that these aspects are part of IS, not merely tangential disciplines.

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