CRITERIA FOR ACCREDITING COMPUTING PROGRAMS

Effective for Evaluations During the
2005-2006 Accreditation Cycle

Incorporates all changes
approved by the
ABET
Board of Directors
as of
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ABET

Computing Accreditation Commission

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INTRODUCTION

There are two sets of Criteria in this document, one applicable to Computer Science programs and one applicable to Information Systems programs. Within each set of Criteria, each Criterion begins with a statement of Intent. Each Intent is followed by a list of Standards.

> An *Intent* provides the underlying principles associated with a Criterion. For a program to be accreditable it must meet the Intent statement of every Criterion.

> *Standards* provide descriptions of how a program can minimally meet the statement of Intent. The word "must" is used within each Standard to convey the expectation that the condition of the Standard will be satisfied in all cases. For a program to meet the Intent of a Criterion, it must satisfy all the Standards in that Criterion or demonstrate an alternative approach to achieving the Intent of the Criterion.

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Criteria for Accrediting Computer Science Programs
Effective for Evaluations during the 2005-2006 Accreditation Cycle

I. Objectives and Assessments

<u>Intent</u>

The program has documented, measurable objectives, including expected outcomes for graduates. The program regularly assesses its progress against its objectives and uses the results of the assessments to identify program improvements and to modify the program's objectives.

<u>Standards</u>

I-1.   The program must have documented, measurable objectives.

I-2.   The program's objectives must include expected outcomes for graduating students.

I-3.   Data relative to the objectives must be routinely collected and documented, and used in program assessments.

I-4.   The extent to which each program objective is being met must be periodically assessed.

I-5.   The results of the program's periodic assessments must be used to help identify opportunities for program improvement.

I-6.   The results of the program's assessments and the actions taken based on the results must be documented.

II. Student Support

<u>Intent</u>

Students can complete the program in a reasonable amount of time. Students have ample opportunity to interact with their instructors. Students are offered timely guidance and advice about the program's requirements and their career alternatives. Students who graduate the program meet all program requirements.

<u>Standards</u>

II-1.   Courses must be offered with sufficient frequency for students to complete the program in a timely manner.

II-2.   Computer science courses must be structured to ensure effective interaction between faculty/teaching assistants and students in lower division courses and between faculty and students in upper division courses.

II-3.   Guidance on how to complete the program must be available to all students.

II-4.   Students must have access to qualified advising when they need to make course decisions and career choices.

II-5. There must be established standards and procedures to ensure that graduates meet the requirements of the program.

III. Faculty

Intent

Faculty members are current and active in the discipline and have the necessary technical breadth and depth to support a modern computer science program. There are enough faculty members to provide continuity and stability, to cover the curriculum reasonably, and to allow an appropriate mix of teaching and scholarly activity.

Standards

III-1. There must be enough full-time faculty members with primary commitment to the program to provide continuity and stability.

III-2. Full-time faculty members must oversee all course work.

III-3. Full-time faculty members must cover most of the total classroom instruction.

III-4. The interests and qualifications of the faculty members must be sufficient to teach the courses and to plan and modify the courses and curriculum.

III-5. All faculty members must remain current in the discipline.

III-6. All faculty members must have a level of competence that would normally be obtained through graduate work in computer science.

III-7. Some full-time faculty members must have a Ph.D. in computer science.

III-8. All full-time faculty members must have sufficient time for scholarly activities and professional development.

III-9. Advising duties must be a recognized part of faculty members' workloads.

IV. Curriculum

Intent

The curriculum is consistent with the program's documented objectives. It combines technical requirements with general education requirements and electives to prepare students for a professional career in the computer field, for further study in computer science, and for functioning in modern society. The technical requirements include up-to-date coverage of basic and advanced topics in computer science as well as an emphasis on science and mathematics.

Standards

Curriculum standards are specified in terms of semester hours of study. Thirty semester hours generally constitutes one year of full-time study and is equivalent to 45 quarter hours. A course or a specific part of a course can only be applied toward one standard.

General

IV-1. The curriculum must include at least 40 semester hours of up-to-date study in computer science topics.

IV-2. The curriculum must contain at least 30 semester hours of study in mathematics and science as specified below under Mathematics and Science.

IV-3. The curriculum must include at least 30 semester hours of study in humanities, social sciences, arts and other disciplines that serve to broaden the background of the student.

IV-4. The curriculum must be consistent with the documented objectives of the program.

Computer Science

IV-5. All students must take a broad-based core of fundamental computer science material consisting of at least 16 semester hours.

IV-6. The core materials must provide basic coverage of algorithms, data structures, software design, concepts of programming languages, and computer organization and architecture.

IV-7. Theoretical foundations, problem analysis, and solution design must be stressed within the program's core materials.

IV-8. Students must be exposed to a variety of programming languages and systems and must become proficient in at least one higher-level language.

IV-9. All students must take at least 16 semester hours of advanced course work in computer science that provides breadth and builds on the core to provide depth.

Mathematics and Science

IV-10. The curriculum must include at least 15 semester hours of mathematics.

IV-11. Course work in mathematics must include discrete mathematics, differential and integral calculus, and probability and statistics.

IV-12. The curriculum must include at least 12 semester hours of science.

IV-13. Course work in science must include the equivalent of a two-semester sequence in a laboratory science for science or engineering majors.

IV-14. Science course work additional to that specified in Standard IV-13 must be in science courses or courses that enhance the student's ability to apply the scientific method.

Additional Areas of Study

IV-15. The oral communications skills of the student must be developed and applied in the program.

IV-16. The written communications skills of the student must be developed and applied in the program.

IV-17. There must be sufficient coverage of social and ethical implications of computing to give students an understanding of a broad range of issues in this area.

V. Laboratories and Computing Facilities

Intent

Laboratories and computing facilities are available, accessible, and adequately supported to enable students to complete their course work and to support faculty teaching needs and scholarly activities.

Standards

V-1.   Each student must have adequate and reasonable access to the systems needed for each course.

V-2.   Documentation for hardware and software must be readily accessible to faculty and students.

V-3.   All faculty members must have access to adequate computing facilities for class preparation and for scholarly activities.

V-4.   There must be adequate support personnel to install and maintain the laboratories and computing facilities.

V-5.   Instructional assistance must be provided for the laboratories and computing facilities.

VI. Institutional Support and Financial Resources

Intent

The institution's support for the program and the financial resources available to the program are sufficient to provide an environment in which the program can achieve its objectives. Support and resources are sufficient to provide assurance that the program will retain its strength throughout the period of accreditation.

Standards

VI-1.   Support for faculty must be sufficient to enable the program to attract and retain high-quality faculty capable of supporting the program's objectives.

VI-2.   There must be sufficient support and financial resources to allow all faculty members to attend national technical meetings with sufficient frequency to maintain competence as teachers and scholars.

VI-3. There must be support and recognition of scholarly activities.

VI-4. There must be office support consistent with the type of program, level of scholarly activity, and needs of the faculty members.

VI-5. Adequate time must be assigned for the administration of the program.

VI-6. Upper levels of administration must provide the program with the resources and atmosphere to function effectively with the rest of the institution.

VI-7. Resources must be provided to acquire and maintain laboratory facilities that meet the needs of the program.

VI-8. Resources must be provided to support library and related information retrieval facilities that meet the needs of the program.

VI-9. There must be evidence that the institutional support and financial resources will remain in place throughout the period of accreditation.

VII. Institutional Facilities

Intent

Institutional facilities including the library, other electronic information retrieval systems, computer networks, classrooms, and offices are adequate to support the objectives of the program.

Standards

VII-1. The library that serves the computer science program must be adequately staffed with professional librarians and support personnel.

VII-2. The library's technical collection must include up-to-date textbooks, reference works, and publications of professional and research organizations such as the ACM and the IEEE Computer Society.

VII-3. Systems for locating and obtaining electronic information must be available.

VII-4. Classrooms must be adequately equipped for the courses taught.

VII-5. Faculty offices must be adequate to enable faculty members to meet their responsibilities to students and for their professional needs.

Criteria for Accrediting Information Systems Programs
Effective for Evaluations during the 2004-2005 Accreditation Cycle

I. Objectives and Assessments

Intent

The program has documented educational objectives that are consistent with the mission of the institution. The program has in place processes to regularly assess its progress against its objectives and uses the results of the assessments to identify program improvements and to modify the program's objectives.

Standards

I-1.   The program must have documented educational objectives.

I-2.   The program's objectives must include expected outcomes for graduating students.

I-3.   Mechanisms must be in place to periodically review the program and the courses.

I-4.   The results of the program's assessment must be used to help identify and implement program improvement.

I-5.   The results of the program's review and the actions taken must be documented.

II. Students

Intent

Students can complete the program in a reasonable amount of time. Students have ample opportunity to interact with their instructors and are offered timely guidance and advice about the program's requirements and their career alternatives. Students who graduate the program meet all program requirements.

Standards

II-1.   Courses must be offered with sufficient frequency for students to complete the program in a timely manner.

II-2.   Information systems programs must be structured to ensure effective interaction between teaching faculty and students.

II-3   Advising on program completion, course selection and career opportunities must be available to all students.

II-4.   There must be established standards and procedures to ensure that graduates meet the requirements of the program.

III. Faculty

<u>Intent</u>

Faculty members are current and active in the discipline and have the necessary technical breadth and depth to support a modern information systems program.

<u>Standards</u>

III-1   The interests, qualifications, and scholarly contributions of the faculty members must be sufficient to teach the courses, plan and modify the courses and curriculum, and to remain abreast of current developments in information systems.

III-2   All faculty members must have a level of competence that would normally be obtained through graduate work in information systems.

III-3   A majority of the faculty members should hold terminal degrees. Some full-time faculty members must have a Ph.D. in information systems or a closely related area.

III-4   All faculty members must remain current in the discipline.

IV. Curriculum

<u>Intent</u>

The curriculum combines professional requirements with general education requirements and electives to prepare students for a professional career in the information systems field, for further study in information systems, and for functioning in modern society. The professional requirements include coverage of basic and advanced topics in information systems as well as an emphasis on an IS environment. Curricula are consistent with widely recognized models and standards.

<u>Standards</u>

Curriculum standards are specified in terms of semester-hours of study. Thirty semester-hours generally constitutes one year of full-time study and is equivalent to 45 quarter-hours. A course or a specific part of a course can only be applied toward one standard.

General

IV-1.   The curriculum must include at least 30 semester-hours of study in information systems topics.

IV-2.   The curriculum must contain at least 15 semester-hours of study in an information systems environment, such as business.

IV-3.   The curriculum must include at least 9 semester-hours of study in quantitative analysis as specified below under quantitative analysis.

IV-4.   The curriculum must include at least 30 semester-hours of study in general education to

broaden the background of the student.

Information systems

IV-5. All students must take a broad-based core of fundamental information systems material consisting of at least 12 semester hours.

IV-6. The core materials must provide basic coverage of the hardware and software, a modern programming language, data management, networking and telecommunications, analysis and design, and role of IS in organizations.

IV-7. Theoretical foundations, analysis, and design must be stressed throughout the program.

IV-8. Students must be exposed to a variety of information and computing systems and must become proficient in one modern programming language.

IV-9. All students must take at least 12 semester hours of advanced course work in information systems that provides breadth and builds on the IS core to provide depth.

Information Systems Environment

IV-10. The 15 semester hours must be a cohesive body of knowledge to prepare the student to function effectively as an IS professional in the IS environment.

Quantitative Analysis

IV-11 The curriculum must include at least 9 semester-hours of quantitative analysis beyond pre-calculus.

IV-12 Statistics must be included.

IV-13 Calculus or discrete mathematics must be included.

Additional Areas of Study

IV-14. The oral and written communications skills of the student must be developed and applied in the program.

IV-15. There must be sufficient coverage of global, economic, social and ethical implications of computing to give students an understanding of a broad range of issues in these areas.

IV-16 Collaborative skills must be developed and applied in the program.

V. Technology Infrastructure

Intent

Computer resources are available, accessible, and adequately supported to enable students to complete their course work and to support faculty teaching needs and scholarly activity.

Standards

V-1.   Each student must have adequate and reasonable access to the systems needed for each course.

V-2.   Documentation for hardware and software must be readily accessible to faculty and students.

V-3   All faculty members must have access to adequate computing resources for class preparation and for scholarly activities.

V-4   There must be adequate support personnel to install and maintain computing resources.

V-5   Instructional assistance must be provided for the computing resources.

VI. Institutional Support and Financial Resources

Intent

The institution's support for the program and the financial resources available to the program are sufficient to provide an environment in which the program can achieve its objectives. Support and resources are sufficient to provide assurance that an accredited program will retain its strength throughout the period of accreditation.

Standards

VI-1.   Support for faculty must be sufficient to enable the program to attract and retain high-quality faculty capable of supporting the program's objectives.

VI-2.   There must be sufficient support and financial resources to allow faculty members to attend national technical meetings with sufficient frequency to maintain competence as teachers and scholars.

VI-3   There must be support and recognition of scholarly activities.

VI-4   There must be office support consistent with the type of program, level of scholarly activity, and needs of the faculty members.

VI-5   Adequate time must be assigned for the administration of the program.

VI-6   Upper levels of administration must provide the program with the resources and atmosphere to function effectively with the rest of the institution.

VI-7   Resources must be provided to acquire and maintain laboratory facilities that meet the needs of the program.

VI-8   Resources must be provided to support library and related information retrieval facilities that meet the needs of the program.

VI-9   There must be evidence of continuity of institutional support and financial resources.

VII. Program Delivery

Intent

There are enough faculty members to cover the curriculum reasonably and to allow an appropriate mix of teaching and scholarly activity.

Standards

VII-1.   There must be enough full-time faculty members with primary commitment to the program to provide continuity and stability.

VII-2.   Full-time faculty members must oversee all course work.

VII-3   Full-time faculty members must cover most of the total classroom instruction.

VII-4   Faculty members must remain current in the discipline.

VII-5   All full-time faculty members must have sufficient time for scholarly activities and professional development.

VII-6   Advising duties must be a recognized part of faculty members' workloads.

VIII. Institutional Facilities

Intent

Institutional facilities including the library, other electronic information retrieval systems, computer networks, classrooms, and offices are adequate to support the objectives of the program.

Standards

VIII-1.   The library that serves the information systems program must be adequately staffed with professional librarians and support personnel.

VIII-2.   The library's technical collection must include up-to-date textbooks, reference works, and publications of professional and research organizations.

VIII-3.   Systems for locating and obtaining electronic information must be available.

VIII-4   Classrooms must be adequately equipped for the courses taught in them.

VIII-5   Faculty offices must be adequate to enable faculty members to meet their responsibilities to students and for their professional needs.

PROPOSED CHANGES TO THE CRITERIA

The following section presents proposed changes to the criteria for accrediting computing programs. Two categories of proposed changes are presented. The first is a set of General Criteria that would apply to all computing programs, and the second is a set of Program Criteria that are discipline specific and that would apply to specific types of computing programs.

These proposed General Criteria and Program Criteria were approved by the Computing Accreditation Commission (CAC) and were brought before the ABET Board of Directors on November 1, 2003 and October 30, 2004, respectively, for preliminary approval. Before being approved for final implementation in the accreditation process, these proposals are published here for circulation among the institutions with accredited programs and other interested parties for review and comment.

Comments will be considered until June 15, 2006. The ABET Board of Directors will determine, based on the comments received and on the advice of the CAC, the content of the adopted criteria. If approved for implementation, the revised criteria will first be applied by the CAC for accreditation actions during the 2007-2008 accreditation cycle.

Comments relative to the proposed criteria changes should be addressed to: Accreditation Director, Accreditation Board for Engineering and Technology, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012.

Proposed
General Criteria
For
Accrediting Computing Programs

1. Objectives, Outcomes, and Assessment

The program has documented measurable objectives and expected outcomes for graduating students, based on the needs of the program's constituencies. The program uses a documented process to regularly assess the extent to which its objectives and expected outcomes are being met. The results of the assessments are used to develop and implement plans to effect continuous improvement of the program.

2. Student Support

Students can complete the program in a reasonable amount of time. Students have ample opportunity to interact with their instructors. Students are offered timely, qualified advising about the program's requirements and their career alternatives. Students who graduate from the program meet all program requirements.

3. Faculty Qualifications

Faculty members are current and active in the computing discipline associated with the program. Collectively, they have the technical breadth and depth necessary to support the program.

4. Faculty Size and Workload

There are enough faculty members to provide continuity and stability, to cover the curriculum reasonably, and to allow an appropriate mix of teaching, professional development and scholarly activities for each faculty member.

5. Curriculum

The program's requirements are consistent with its objectives and expected outcomes. The curriculum combines technical and professional requirements with general education requirements and electives to prepare students for a professional career and further study in the computing discipline associated with the program, and for functioning in modern society. The technical and professional requirements include up-to-date coverage of basic and advanced topics in the computing discipline associated with the program, and appropriate mathematics.

6. Technology Infrastructure

Computing resources are available, accessible, and adequately supported to enable students to achieve the program's expected outcomes and to support faculty teaching needs and scholarly activities.

7. Institutional Support and Financial Resources

The institution's support for the program and the financial resources available to the program are sufficient to provide an environment in which the program can achieve its objectives and expected

outcomes. Support and resources are sufficient to provide assurance that the program will retain its strength throughout the period of accreditation.

8. Institutional Facilities

Institutional facilities including the library, other electronic information retrieval systems, computer networks, classrooms, and offices are adequate to support the objectives and expected outcomes of the program.

PROPOSED
PROGRAM CRITERIA FOR
COMPUTER SCIENCE
AND SIMILARLY NAMED COMPUTING PROGRAMS
Lead Society: CSAB

These program criteria apply to computing programs using computer science or similar terms in their titles.

1. Objectives, Outcomes, and Assessment

The documented process incorporates relevant data in its assessment of the extent to which the program's objectives and expected outcomes are being met.

2. Faculty Qualifications

Individual faculty members have the technical breadth and depth consistent with their expected contributions to the program.

3. Faculty Size and Workload

The full-time faculty members assigned to the computer science program have the appropriate authority for the creation, delivery, evaluation, and modification of the program, and the responsibility for the consistency and quality of its courses. If advising is done by faculty members, then that component of the faculty workload is recognized. If faculty members install and maintain computing resources and laboratories then that component of the faculty workload is recognized.

4. Curriculum

Students have the following specified amounts of course work or an equivalent educational experience.

- Computer science: 40 semester hours
- Math: 15 semester hours that includes discrete mathematics
- Math and science combined: 30 semester hours

The computer science component of the program stresses theoretical foundations, problem analysis and solution design. The oral and written communications skills of the students are developed and applied within the program. All students are exposed to a broad range of issues relating to the social and ethical implications of computing. All students are provided with a substantial laboratory science experience.

5. Technology Infrastructure

Students in the computer science program receive appropriate guidance regarding the computing resources and laboratories available to the program. The computing resources and laboratories available to the program are properly maintained and upgraded as needed.

6. Institutional Support and Financial Resources

Institutional support and resources are sufficient for the program to attract and retain high-quality faculty, to administer the program effectively, and to acquire and maintain computing resources and laboratories.

PROPOSED
PROGRAM CRITERIA FOR
INFORMATION SYSTEMS
AND SIMILARLY NAMED COMPUTING PROGRAMS
Lead Society: CSAB

These program criteria apply to computing programs using information systems or similar terms in their titles.

1. Faculty Qualifications

Faculty members assigned to the program have the educational backgrounds or expertise consistent with their expected contributions to the information systems program. All faculty members teaching in the discipline must have a level of competence that would normally be obtained through graduate work in information systems or relevant experience, and IS scholarship. Some full-time faculty, responsible for the IS curriculum development must also hold a terminal degree in information systems.

2. Faculty Size and Workload

The full-time faculty members assigned to the information systems program have authority for the creation, delivery, evaluation, and modification of the   program, and the responsibility for the consistency and quality of its courses. Advising is done by qualified individuals. If faculty are assigned advising or other duties such as laboratory installation and maintenance, these duties must be recognized as part of the faculty workload.

3. Curriculum

The curriculum is consistent with widely recognized IS model curricula and standards; deviations are the result of Objectives, Outcomes and Assessment. The professional requirements include an emphasis on business and management. Students have the following specified amounts of course work or an equivalent educational experience.

- Information Systems: 30 semester hours (core plus advanced topics)
  - The core topics (These need not be 3 credit-hour courses) shall include at least 12 semester hours with basic coverage of (1) a modern programming language, (2) data management, (3) networking and data communications, (4) systems analysis and design and (5) role of IS in organizations.
  - Also included in the 30 semester hours, all students must take at least 12 semester hours of advanced course work in information systems that provides breadth and builds on the IS core topics to provide depth.
- The information systems component of the program stresses information systems theoretical foundations, information systems analysis and information systems design.
- Business and Management: at least 15 semester hours. The 15 semester hours must provide basic coverage of functional business areas including accounting, marketing, finance and organizational behavior.
- The oral and written communications skills of the students are developed and applied within the program.
- All students are exposed to a broad range of issues relating to global, economic, social and

    ethical implications of technology.
- The collaborative skills of the students are developed and applied in the program.
- Quantitative analysis or Methods: 6 semester hours that includes statistics.

4. Technology Infrastructure

Students in information systems receive appropriate guidance regarding the information systems technology resources and technology laboratories available to the program. The computing resources and laboratories available to the program are properly maintained and upgraded as needed.

5. Institutional Support and Financial Resources

Institutional support and resources are sufficient for the program to attract and retain high-quality faculty, to administer the program effectively, and to acquire and maintain computing resources and laboratories.

PROPOSED
PROGRAM CRITERIA FOR
INFORMATION TECHNOLOGY
AND SIMILARLY NAMED COMPUTING PROGRAMS
Lead Society: CSAB

These program criteria apply to computing programs using information technology or similar terms in their titles.

1. Objectives, Outcomes and Assessment

The program outcomes minimally include the following abilities:

(a) Use and apply current technical concepts and practices in the core information technologies;
(b) The ability to analyze, identify and define the requirements that must be satisfied to address problems or opportunities faced by organizations or individuals;
(c) Design effective and usable IT-based solutions and integrate them into the user environment;
(d) Assist in the creation of an effective project plan;
(e) Identify and evaluate current and emerging technologies and assess their applicability to address the users' needs;
(f) Analyze the impact of technology on individuals, organizations and society, including ethical, legal, security and global policy issues;
(g) Demonstrate an understanding of best practices and standards and their application;
(h) Demonstrate independent critical thinking and problem solving skills;
(i) Collaborate in teams to accomplish a common goal by integrating personal initiative and group cooperation;
(j) Communicate effectively and efficiently with clients, users and peers both verbally and in writing, using appropriate terminology;
(k) Recognize the need for continued learning throughout their career.

2. Student Support

Students receive timely feedback on their performance. For each required course, students are given a clear indication of its content, the expected performance criteria and its place in the overall program of study.

3. Faculty Qualifications

Faculty members assigned to the program have the educational backgrounds or expertise consistent with their expected contributions to the information technology program.

4. Faculty Size and Workload

The full-time faculty members assigned to the information technology program have authority for the creation, delivery, evaluation, and modification of the   program, and the responsibility for the consistency and quality of its courses.   Advising is done by qualified individuals. If advising is done by faculty members, then that component of the faculty workload is recognized.

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5. Curriculum

The curriculum is designed in such a way that its successful completion guarantees achievement of the program outcomes.

6. Institutional Support and Financial Resources

Institutional support and resources are sufficient for the program to attract and retain high-quality faculty, to administer the program effectively, and to acquire and maintain computing resources and laboratories.