

# CRITERIA FOR ACCREDITING COMPUTING PROGRAMS

Effective for Evaluations During the  
2006-2007 Accreditation Cycle

Incorporates all changes  
approved by the  
ABET  
Board of Directors  
as of  
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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 creditable 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 2006-2007 Accreditation Cycle

### **I. Objectives and Assessments**

#### Intent

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.

#### Standards

- 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**

#### Intent

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.

#### Standards

- 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 2006-2007 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**

#### Intent

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

#### Standards

- 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**

#### Intent

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.

#### 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 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. These include General Criteria that would apply to all computing programs and 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, October 30, 2004, and October 29, 2005, for preliminary approval.

Subsequently, the ABET Board of Directors mandated that the General Criteria of ABET's four Accreditation Commissions be restructured so that the various criteria sections would occur in the same order. This restructuring has also included some revisions to improve the consistency and clarity of the criteria. Every effort has been made to accomplish these objectives without changing the intent of any of the criteria. Nevertheless, before being approved for final implementation in the accreditation process, the proposed criteria are presented here for circulation among the institutions with accredited programs and other interested parties for review and comment. It should also be noted that the existing definitions of objectives, outcomes, assessment, and evaluation will be included as a foreword in the criteria document.

Comments will be considered until June 15, 2007. The ABET Board of Directors will determine, based on the comments received and on the advice of the Computing Accreditation Commission, the content of the adopted criteria. If approved for implementation, the revised criteria will first be applied for accreditation actions during the 2008-2009 accreditation cycle.

Comments relative to the proposed criteria changes should be addressed to Accreditation Director at [accred@abet.org](mailto:accred@abet.org) or ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012.

## **PROPOSED Criteria for Accrediting Computing Programs**

It is the responsibility of the program seeking accreditation to demonstrate clearly that the program meets the following criteria.

### GENERAL CRITERIA

#### **Criterion 1. Students**

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

#### **Criterion 2. Objectives**

The program has documented measurable educational objectives based on the needs of the program's constituencies.

#### **Criterion 3. Outcomes**

The program has documented measurable outcomes, based on the needs of the program's constituencies. The program enables students to achieve the following outcomes by the time of graduation:

- (a) An ability to apply knowledge of computing and mathematics appropriate to the discipline
- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (d) An ability to function effectively on teams to accomplish a common goal
- (e) An understanding of professional, ethical, and social responsibilities
- (f) An ability to communicate effectively
- (g) An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security, and global policy issues
- (h) Recognition of the need for and an ability to engage in continuing professional development
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.

#### **Criterion 4. Continuous Improvement**

Each program must utilize multiple assessment measures in a process that provides documented results to demonstrate that the program objectives and outcomes are being met.

Each program must demonstrate that the results of the assessment of program objectives and outcomes are being evaluated to improve and further develop the program in accordance with a documented process.

### **Criterion 5. Curriculum**

The program's requirements are consistent with its educational objectives and are designed in such a way that each of the program outcomes can be achieved. 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 at least one year of up-to-date coverage of basic and advanced topics in the computing discipline associated with the program. In addition, the program includes mathematics appropriate to the discipline beyond the pre-calculus level. For each course in the major required of all students, its content, expected performance criteria, and place in the overall program of study are published.

### **Criterion 6. Faculty**

#### **A. Faculty Qualifications**

Faculty members teaching in the program are current and active in the associated computing discipline. They each have the educational backgrounds or expertise consistent with their expected contributions to the program. Each has a level of competence that normally would be obtained through graduate work in the discipline, relevant experience, or relevant scholarship. Collectively, they have the technical breadth and depth necessary to support the program.

#### **B. Faculty Size and Workload**

There are enough full-time faculty members to provide continuity, oversight, and stability, to cover the curriculum reasonably, and to allow an appropriate mix of teaching, professional development, scholarly activities, and service for each faculty member. The faculty assigned to the program has appropriate authority for the creation, delivery, evaluation, and modification of the program, and the responsibility for the consistency and quality of its courses.

### **Criterion 7. Facilities**

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

Computing resources are available, accessible, systematically maintained and upgraded, and otherwise adequately supported to enable students to achieve the program's outcomes and to support faculty teaching needs and scholarly activities. Students and faculty members receive appropriate guidance regarding the computing resources and laboratories available to the program.

### **Criterion 8. Support**

The institution's support for the program and the financial resources available to the program are sufficient to attract and retain qualified faculty members, administer the program effectively, acquire and maintain computing resources and laboratories, and otherwise provide an environment in which the program can achieve its educational objectives and outcomes. Support and resources are sufficient to provide assurance that the program will retain its strength throughout the period of accreditation.

**Criterion 9. Program Criteria**

Each program must satisfy applicable Program Criteria (if any). Program Criteria provide the specificity needed for interpretation of the General Criteria as applicable to a given discipline. If a program, by virtue of its title, becomes subject to two or more sets of Program Criteria, then that program must satisfy each set of Program Criteria; however, overlapping requirements need to be satisfied only once.

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. Outcomes and Assessment

The program enables students to achieve the following additional attributes by the time of graduation:

- (a) An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
- (b) An ability to apply design and development principles in the construction of software systems of varying complexity.

2. Faculty Qualifications

Some full time faculty members have a Ph.D. in computer science.

3. Curriculum

Students have the following amounts of course work or equivalent educational experience:

- (a) Computer science: One and one-third years.
- (b) Mathematics: One-half year that includes discrete mathematics. The additional mathematics might consist of courses in areas such as statistics, calculus, linear algebra, numerical methods, number theory, geometry, or symbolic logic.
- (c) Mathematics and science combined: One year that includes a substantial laboratory science experience.

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. Outcomes and Assessment

The program outcomes are consistent with those accepted by the information systems community.

The program enables students to achieve the following additional attribute by the time of graduation:

- (a) An understanding of processes that support the delivery and management of information systems within a specific application environment.

2. Faculty Qualifications

Some full-time faculty, including those responsible for the IS curriculum development, hold a terminal degree in information systems.

3. Curriculum

Students have course work or an equivalent educational experience that includes:

- (a) Information Systems: One year of core and advanced topics
- (b) The core topics include basic coverage of:
  - (1) a modern programming language
  - (2) data management
  - (3) networking and data communications
  - (4) systems analysis and design
  - (5) role of Information Systems in organizations
- (c) Advanced course work in information systems provides breadth and builds on the IS core topics to provide depth.
- (d) The information systems component of the program stresses information systems theoretical foundations, information systems analysis and information systems design.
- (e) Information Systems Environment: One-half year of processes that support the delivery and management of Information Systems.
- (f) Quantitative analysis or methods including statistics and mathematics beyond college level algebra.

**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 enables students to achieve the following additional attributes by the time of graduation:

- (a) An ability to use and apply current technical concepts and practices in the core information technologies
- (b) An ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems
- (c) An ability to effectively integrate IT-based solutions into the user environment
- (d) An understanding of best practices and standards and their application
- (e) An ability to assist in the creation of an effective project plan