ABET Update
Proposed Revisions to EAC General Criteria 3 and 5

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Synopsis

• The Engineering Accreditation Commission (EAC) of ABET has proposed revisions to the criteria for accrediting engineering programs. Revisions are proposed to Criterion 3, framing student outcomes that address relevant topic areas and moving some items into Criterion 5, Curriculum.
Learning Objectives

- Understand background for proposed changes to criteria, recent work completed, and the process for implementation
Topics

• Who is ABET?
• ABET update
• Basics of ABET Accreditation including:
  • Process
  • Guiding Principles
• Criteria Change Proposal
  • Process for Revising ABET Criteria
  • Proposed Criteria Revisions
Who Is ABET?
ABET Organizational Design

- ABET is a federation of 35 professional and technical societies.
  - Develop program criteria
  - Appoint Board of Delegates representatives
  - Nominate commissioners
  - Recruit and assign program evaluators
- ABET relies on the services of almost 2,200 volunteer experts supported by 33 full-time and 10 part-time staff.
ABET’s 35 Member Societies
ABET Accreditation Statistics
As of 1 October 2015 … 3,569 Programs

- Accredited programs by commission:
  ASAC:  81   CAC:  429
  EAC:  2437  ETAC:  640
The numbers would add up to 3587, but some programs are accredited by multiple commissions (i.e. CS&E, etc.)

Susan, 2/9/2016
ABET Accreditation: Process
ABET Accreditation Process

Objectives

• Assure that graduates of an accredited program are adequately prepared to enter and continue the practice of applied science, computing, engineering, and engineering technology
• Stimulate the improvement of technical education
• Encourage new and innovative approaches to technical education and its assessment
ABET Accreditation Process
What Does It Involve?

• Programs prepare Self-Study Report for evaluation team
• Program review conducted by team of peer colleagues:
  • From academe, industry, and government (members of ABET Member Societies)
  • Review the Self-Study Report, conduct the review visit
• Results posted each year, October 1st
• Periodic re-evaluation (maximum 6 years)
• Identical processes used outside the U.S.
Criteria: The Guiding Principles of Accreditation Decisions
Overview of Criteria

Goals

• Ensure the quality of educational programs
• Foster the systematic pursuit of quality improvement in educational programs
• Develop educational programs that satisfy the needs of constituents in a dynamic and competitive environment
Catalysts for Change in the ‘90s

- Proliferation of Criteria
- Need for Innovation in Programs
- Prescriptive Nature of Criteria
- Industry Call for Change
ABET Created a Paradigm Shift

• ABET introduced a new philosophy
• The conscious intention was to:
  • spend *less* effort examining what students were taught
  • spend *more* effort assessing what students learned.
Underlying Principle

• The process of accreditation is evidence-based and should drive decision-making to ensure excellence and enhance innovation in technical education.
• Evaluation centers on the evidence provided that supports achievement of each of the criterion
• Majority of evidence collected through assessment of student learning
Engineering Criteria 2000 (EC 2000)

- **Philosophy: “Outcomes-Based”**
  - Institutions and programs define mission and objectives to meet their constituents’ needs
  - Outcomes: preparation for professional practice
  - Demonstrate how criteria are being met
  - Wide national and international acceptance

- **Commitment to Continuous Improvement**
  - Process focus: outcomes and assessment linked to objectives; input from constituencies
  - Student, faculty, facilities, institutional support, and financial resources linked to program objectives
Harmonization of Criteria

Criteria Common to All Commissions
- Criterion 1 (Students)
- Criterion 2 (PEO)
- Criterion 4 (Continuous Improvement)
- Criterion 7 (Facilities)
- Criterion 8 (Support)

Commission-Specific Criteria
- Criterion 3 (Outcomes)
- Criterion 5 (Curriculum)
- Criterion 6 (Faculty)

Program Criteria
Program Criteria

• Each program seeking accreditation from the Engineering Accreditation Commission of ABET must demonstrate that it satisfies all Program Criteria implied by the program title.
Continuous Quality Improvement (CQI)

- ABET’s outcomes based criteria have been developed on the principles of continuous quality improvement.
- On-going process at institutions to improve quality of students’ educational experience
  - Systematic process: documented, repeatable
  - Assess performance against criteria
  - Take actions to improve program
- Accreditation is a part of CQI.
  - Verification that program meets certain level of quality, and CQI is part of the quality process.
Criteria Change:
Process for Revising
ABET Criteria
Who May Propose Revisions? (1)

- Generally speaking, proposals for criteria changes (harmonized and non-harmonized) may come from any source
- ABET member societies will typically sponsor substantive changes to general or program criteria
- An accreditation commission itself may advocate for a change
Who May Propose Revisions? (2)

• Each of the four accreditation commissions has a standing committee known as the Criteria Committee

• All changes are deliberated upon by the commission’s criteria committee and recommendations are proposed for action at a meeting of the full commission
What Happens to Proposals That Pass? (3)

- The commission sends a recommendation to the Area Delegation of the Board of Delegates for “first reading”
- The Area Delegation may:
  - reject the commission proposal
  - request additional consideration by the commission
  - approve the commission proposal and release the proposed criteria change for a period of public review and comment
What Happens Then? (4)

- Comments are aggregated and reviewed by the commission criteria committee
- All proposed changes are deliberated upon by the criteria committee and recommendations are proposed for action at a meeting of a full commission
  - the commission may or may not make changes to the original proposal based upon comments received
What Happens Then? (5)

- The commission will submit the (potentially edited/revised) criteria change proposal to the Area Delegation of the Board of Delegates for “second reading”
What Happens Then? (6)

- The Area Delegation may:
  - reject the commission proposal
  - request additional consideration by the commission or request an additional period of public review and comment
  - approve the commission proposal and direct that the approved criteria:
    - become effective during the next accreditation cycle or
    - be phased in over a suitable period to allow programs seeking accreditation to develop an implementation plan
Proposed Criteria Revisions: A Work in Process
Process for Evaluation of Criteria 3 & 5

• In 2009, EAC Criteria Committee was completing harmonization of criteria across ABET’s four commissions.

• The committee recognized that non-harmonized Criterion 3, Program Outcomes, had not been reviewed since its original formulation in the mid-1990s.

• EAC was receiving requests from constituent groups for additional outcomes to be included in Criterion 3.

• EAC leadership was aware that each year a substantial percentage of the shortcomings cited were associated with Criterion 3.
Process for Evaluation of Criteria 3 & 5 (2)

• EAC convened a Criterion 3 task force to begin a review process.
• The task force developed a process for examining Criterion 3, including efforts to gain additional input from a broad range of constituents.
• EAC surveyed program evaluators during the 2010-11 cycle regarding the elements of Criterion 3 that led to citations of shortcoming.
• Shortcomings were reported in the every component of Criterion 3, mostly at the weakness or concern level.
• Data revealed that programs had difficulty determining the extent of outcome attainment with several Criterion 3 elements.
Process for Evaluation of Criteria 3 & 5

• The EAC undertook an outreach effort in 2012-13 to inform constituent groups that Criterion 3 was being reviewed and to solicit suggestions regarding changes.
• Some constituent groups informed the EAC that important outcomes were missing from Criterion 3; all suggestions brought the total to 75.
• At the same time the task force concluded that some of the 3(a)-3(k) components were interdependent, broad, and vague in scope, causing inconsistency in PEV interpretation of how well programs were complying with Criterion 3.
Process for Evaluation of Criteria 3 & 5

• With information collected the task force evaluated the existing 3(a)-3(k) outcomes and those suggested by constituents, grouping them into six topic areas that would drive a possible major change to Criterion 3.
• This possible change would also serve to align ABET criteria more closely with Washington Accord graduate attributes referencing *project management* and *finance*.
• The Criterion 3 task force presented their findings to the full EAC in July 2013 and their work was transferred to the EAC Criteria Committee.
Process for Evaluation of Criteria 3 & 5

- In July 2014, the EAC posted language articulating a potential revision to Criterion 3 on the ABET website and circulated this to constituent groups for informal comment in the fall of 2014.
- More than 100 comments were received from individuals and organizations.
Process for Evaluation of Criteria 3 & 5

Further EAC discussions in 2014-15 resulted in addition of a seventh topic area, now providing that the following topic areas would be addressed:

1) Engineering problem solving,
2) Engineering design,
3) Measurement, testing, and quality assurance,
4) Communication skills,
5) Professional responsibility,
6) Professional growth, and
7) Teamwork and project management
Process for Evaluation of Criteria 3 & 5

- With topic areas identified for a revised Criterion 3, the resulting language includes items that are considered more appropriately placed in Criterion 5, Curriculum.
- As a result, revisions are also proposed to the language of Criterion 5.
Process for Evaluation of Criteria 3 & 5

- The EAC’s Criteria Committee believes that all of the elements of the Criterion 3 that are applicable in 2015-16 are included in the proposed revisions to Criterion 3, Criterion 5, and Introduction section, along with some additional elements.
- Proposed changes are extensive in Criterion 3, and less so in Criterion 5.
- The proposed introductory section contains definitions that currently are embedded in Criterion 5; hence, the proposed Criterion 5 is shortened.
Process for Evaluation of Criteria 3 & 5

- Ongoing communication efforts include:
  - Presentations to ABET Industrial and Academic Advisory Councils in 2013 and 2015
  - Presentations by ABET staff at several professional society meetings in 2014 and 2015.
  - Inside Higher Ed update
  - ASEE Prism January 2016 display ad
  - Multiple issues of Catalyst (ABET e-newsletter)
  - NSPS PE Magazine (January/February 2016) issue
  - Prism “Last Word” letter by AAC authors in Mar 2014 issue.
  - Email blast to EAC institutional contacts in Fall 2014
  - Website description of WIP and portal for comment in Fall 2014
  - Report to ASEE Assoc Deans in 2014 and 2015
  - Update ticker on ABET website
  - In addition, a link on the ABET website was established so that constituents could provide comments directly.
Next Steps in the Evaluation Process

- Over 200 comments were received during the 2015-16 cycle.
- All comments were read by the Criteria Committee and sub-groups were formed to handle various topics.
- The Criteria Committee generated a new proposed revision and suggested that it be considered for a first reading.
- The EAC agreed with the Criteria Committee and voted to send the revisions to the Engineering Area Delegation and ask them to perform another first reading.
PROPOSED C3/C5 REVISIONS

Criteria for Accrediting Engineering Programs
These criteria are intended to provide a framework of education that prepares graduates to enter the professional practice of engineering who are
(i) able to participate in diverse multicultural workplaces;
(ii) knowledgeable in topics relevant to their discipline, such as usability, constructability, manufacturability and sustainability; and
(iii) cognizant of the global dimensions, risks, uncertainties, and other implications of their engineering solutions.
Further, these criteria are intended to assure quality to foster the systematic pursuit of improvement in the quality of engineering education that satisfies the needs of constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following criteria.
2015-16 Cycle

These criteria are intended to provide a framework of education that prepares graduates to enter the professional practice of engineering who are
(i) able to participate in diverse multicultural workplaces;
(ii) knowledgeable in topics relevant to their discipline, such as usability, constructability, manufacturability and sustainability; and
(iii) cognizant of the global dimensions, risks, uncertainties, and other implications of their engineering solutions.

Further, these criteria are intended to assure quality to foster the systematic pursuit of improvement in the quality of engineering education that satisfies the needs of constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following criteria.
These criteria apply to all accredited engineering programs. Furthermore, these criteria are intended to foster the systematic pursuit of improvement in the quality of engineering education that satisfies the needs of its constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following criteria.
2015-16
The Engineering Accreditation Commission of ABET recognizes that its constituents may consider certain terms to have certain meanings; however, it is necessary for the Engineering Accreditation Commission to have consistent terminology. Thus, the Engineering Accreditation Commission will use the following definitions:

2016-17
The Engineering Accreditation Commission of ABET recognizes that its constituents may consider certain terms to have certain meanings; however, it is necessary for the Engineering Accreditation Commission to have consistent terminology. Thus, the Engineering Accreditation Commission will use the following definitions in **applying the criteria:**
**2015-2016**

**Basic Science** – Basic sciences consist of chemistry and physics, and other biological, chemical, and physical sciences, including astronomy, biology, climatology, ecology, geology, meteorology, and oceanography.

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**2016-2017**

**Basic Science** – Basic sciences are disciplines focused on knowledge or understanding of the fundamental aspects of natural phenomena. Basic sciences consist of chemistry and physics and other natural sciences including life, earth, and space sciences.
2015-2016
College-level Mathematics –
College-level mathematics consists of mathematics above pre-calculus level.

2016-2017
College-Level Mathematics –
College-level mathematics consists of mathematics that requires a degree of mathematical sophistication at least equivalent to that of introductory calculus. For illustrative purposes, some examples of college-level mathematics include calculus, differential equations, probability, statistics, linear algebra, and discrete mathematics.
2015-2016
Engineering Science – 
Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems.

2016-2017
Engineering Science – 
Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems. **These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other.**
Engineering Design – Engineering design is the process of devising a system, component, or process to meet desired needs, specifications, codes, and standards within constraints such as health and safety, cost, ethics, policy, sustainability, constructability, and manufacturability. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources into solutions. The process involves identifying opportunities, performing analysis and synthesis, generating multiple solutions, evaluating those solutions against requirements, considering risks, and making trade-offs to identify a high quality solution under the given circumstances. For illustrative purposes only, examples of possible constraints include accessibility, aesthetics, constructability, cost, ergonomics, functionality, interoperability, legal considerations, maintainability, manufacturability, policy, regulations, schedule, sustainability, or usability.
2015-2016

**Teams** – A team consists of more than one person working toward a common goal and may include individuals of diverse backgrounds, skills, and perspectives.

2016-2017

**Team** – A team consists of more than one person working toward a common goal and should include individuals of diverse backgrounds, skills, or perspectives consistent with ABET’s policies and positions on diversity and inclusion.
2015-2016

One Academic Year – One academic year is the lesser of 32 semester credits (or equivalent) or one-fourth of the total credits required for graduation with a baccalaureate degree.

2016-2017

The definition of one Academic Year was deleted.
General Criterion 3: Student Outcomes

2015-2016
The program must have documented student outcomes. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7) plus any additional outcomes that may be articulated by the program.

2016-2017
The program must have documented student outcomes that support the program educational objectives. Attainment of these outcomes prepares graduates to enter the professional practice of engineering. Student outcomes are outcomes (1) through (7), plus any additional outcomes that may be articulated by the program.
General Criterion 3: Student Outcomes

2015-2016
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.

2016-2017
(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
General Criterion 3: Student Outcomes

2015-2016
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.

2016-2017
(2) An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
General Criterion 3: Student Outcomes

2015-2016
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

2016-2017
No Changes were Made
General Criterion 3: Student Outcomes

2015-2016
4. An ability to communicate effectively with a range of audiences.

2016-2017
No Changes were Made
General Criterion 3: Student Outcomes

2015-2016
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

2016-2017
No Changes were Made
General Criterion 3: Student Outcomes

2015-2016
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.

2016-2017
(6) An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge.
General Criterion 3: Student Outcomes

2015-2016
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

2016-2017
(7) An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.
CRITERION 5
Curriculum
General Criterion 5: Curriculum

2015-2016
The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The curriculum must support attainment of the student outcomes and must include:

2016-2017
The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The program curriculum must provide adequate content for each area, consistent with the student outcomes and program educational objectives, to ensure that students are prepared to enter the practice of engineering. The curriculum must include:
General Criterion 5: Curriculum

2015-2016
(a) one academic year of a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the program.

2016-2017
(a) *a minimum of 30 semester credit hours (or equivalent)* of a combination of college-level mathematics and basic sciences *with experimental experience appropriate to the program.*
General Criterion 5: Curriculum

2015-2016
(b) one and one-half academic years of engineering topics, consisting of engineering sciences and engineering design appropriate to the program and utilizing modern engineering tools.

2016-2017
(b) **a minimum of 45 semester credit hours (or equivalent)** of engineering topics **appropriate to the program**, consisting of engineering sciences and engineering design, and utilizing modern engineering tools.
General Criterion 5: Curriculum

2015-2016
(c) a broad education component that includes humanities and social sciences, complements the technical content of the curriculum, and is consistent with the program educational objectives.

2016-2017
(c) a broad education component that complements the technical content of the curriculum and is consistent with the program educational objectives.
General Criterion 5: Curriculum

2015-2016
Students must be prepared to enter the professional practice of engineering through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple constraints.

2016-2017
(d) a culminating major engineering design experience based on the knowledge and skills acquired in earlier course work that incorporates appropriate engineering standards and multiple constraints.
THANK YOU
Questions?
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