ABET

# ABET Update

# Proposed Revisions to EAC General Criteria 3 and 5

ASEE EDI
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# 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

ABET

# 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

NCEES
advancing licensure for engineers and surveyors

sme

BMES

AIChE

CSAB
LEADING COMPUTING EDUCATION

SFPE

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

AMERICAN ACADEMY
OF ENVIRONMENTAL ENGINEERS & SCIENTISTS®

SPIE.

IIE

SPE International

ASABE

AIAA

IEEE

National Institute of Ceramic Engineers (NICE)

AMERICAN NUCLEAR SOCIETY

ASSE

swe

NSPS

ASME
SETTING THE STANDARD

INCOSE
International Council on Systems Engineering

SAE INTERNATIONAL

WEPAN

AIHA
Protecting Worker Health

THE SOCIETY OF NAVAL ARCHITECTS & MARINE ENGINEERS

ISA

TMS

AAMI
Advancing Safety in Medical Technology

National Society of Professional Engineers®

ASHRAE

SME
Society for Mining, Metallurgy & Exploration

NACME
NATIONAL ACTION COUNCIL FOR MINORITIES IN ENGINEERING

MRS
Materials Research Society
The Materials Gateway

CMAA

ASEE

## BOARD OF DIRECTORS

Serves As Strategic Planning Committee
Elected by the Board of Delegates

## BOARD OF DELEGATES

Societies appoint in proportion to # of programs with limits, and all member societies and associate member societies have at least 1 delegate.

### Area Delegations

- Engineering Technology
- Engineering
- Computing
- Applied Sciences

- ETAC
- EAC
- CAC
- ASAC

- Finance Committee
- Audit Committee
- Governance Committee
- Academic Advisory Council
- Industry Advisory Council
- Global Advisory Council

**Committees and Advisory Councils Also Serve As Resources To The Board of Directors**

- Accreditation Council
- Nominating Committee
- Awards Committee

# ABET Accreditation Statistics

## As of 1 October 2015 … 3,569 Programs

- Accredited programs by commission:

ASAC: 81 CAC: 429

EAC: 2437 ETAC: 640

| Commission | Domestic | | Non-Domestic | |
|---|---|---|---|---|
| | Programs | Institutions | Programs | Institutions |
| **ASAC** | **80** | **62** | **1** | **1** |
| **CAC** | **377** | **296** | **52** | **35** |
| **EAC** | **2071** | **424** | **366** | **76** |
| **ETAC** | **581** | **204** | **59** | **12** |

# Update

- Advisory Councils: Academic & Industrial
- Accreditation Processes
  - ISO 9001:2008 Certified
- Rebranding & Strategic Planning
  - Identify constituent needs; increase outreach
- ASEE Sponsorship
- Federal issues facing accreditation
- Natural sciences
- Expanding international engagement

# 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 <u>***evidence***</u> 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 | Commission-Specific Criteria |
| --- | --- |
| Criterion 1 (Students) | |
| Criterion 2 (PEO) | |
| | Criterion 3 (Outcomes) |
| Criterion 4 (Continuous Improvement) | |
| | Criterion 5 (Curriculum) |
| | Criterion 6 (Faculty) |
| Criterion 7 (Facilities) | |
| Criterion 8 (Support) | |
| | 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 (1)

- 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 (3)

- 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 (4)

- 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 (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 (6)

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 (7)

- 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 (8)

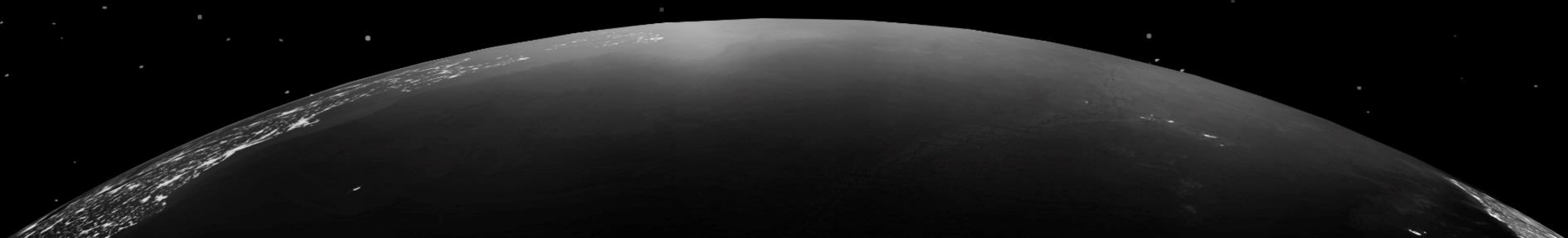
- The EAC's Criteria Committee believes that all of the elements of the Criterion 3 that are applicable in 2015-16 are included in the proposed revisions to Criterion 3, Criterion 5, and Introduction section, along with some additional elements.
- Proposed changes are extensive in Criterion 3, and less so in Criterion 5.
- The proposed introductory section contains definitions that currently are embedded in Criterion 5; hence, the proposed Criterion 5 is shortened.
- ***The proposed changes are significant in configuration and grouping, but modest in content.***

# Process for Evaluation of Criteria 3 & 5 (9)

- 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
  - Major Dept Heads' meetings (ASCE, ASME, ECEDHA) in 2013, 2014, 2015
  - ASEE Annual Meeting in 2013, 2014, 2015
  - 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.

# PROPOSED C3/C5 REVISIONS

Criteria for Accrediting Engineering Programs



# We wrote an introductory paragraph explaining our aspiration.

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.

# We grouped all definitions together (1)

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:

**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.

**College-level Mathematics** – College-level mathematics consists of mathematics above pre-calculus level.

**Engineering Science** – Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems.

# We grouped all definitions together (2)

**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 optimally into solutions.

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

**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.

# 3a An ability to apply knowledge of mathematics, science, and engineering.

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

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

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

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

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.

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

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

# 3b An ability to design and conduct experiments, as well as to analyze and interpret data.

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

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

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

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

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.

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

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

## 3c An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

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

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

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

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

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.

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

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

# 3d An ability to function on multidisciplinary teams.

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

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

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

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

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.

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

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

# 3e An ability to identify, formulate, and solve engineering problems.

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

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

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

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

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.

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

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

# 3 f An understanding of professional and ethical responsibility.

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

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

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

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

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.

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

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

# 3 g An ability to communicate effectively.

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

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

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

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

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.

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

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

# 3h The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

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

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

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

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

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.

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

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

3 i

# A recognition of the need for, and an ability to engage in life-long learning.

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

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

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

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

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.

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

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

# 3 j A knowledge of contemporary issues.

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

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

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

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

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.

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

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

# 3k An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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

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

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

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

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.

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

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

**(Washington Accord - Graduate attributes)**

ABET

# CRITERION 5

Curriculum

5

**The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:**

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:

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

(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.

(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.

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.

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**(a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.**

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:

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

(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.

(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.

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.

5

**(b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.**

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

5

## (c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

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

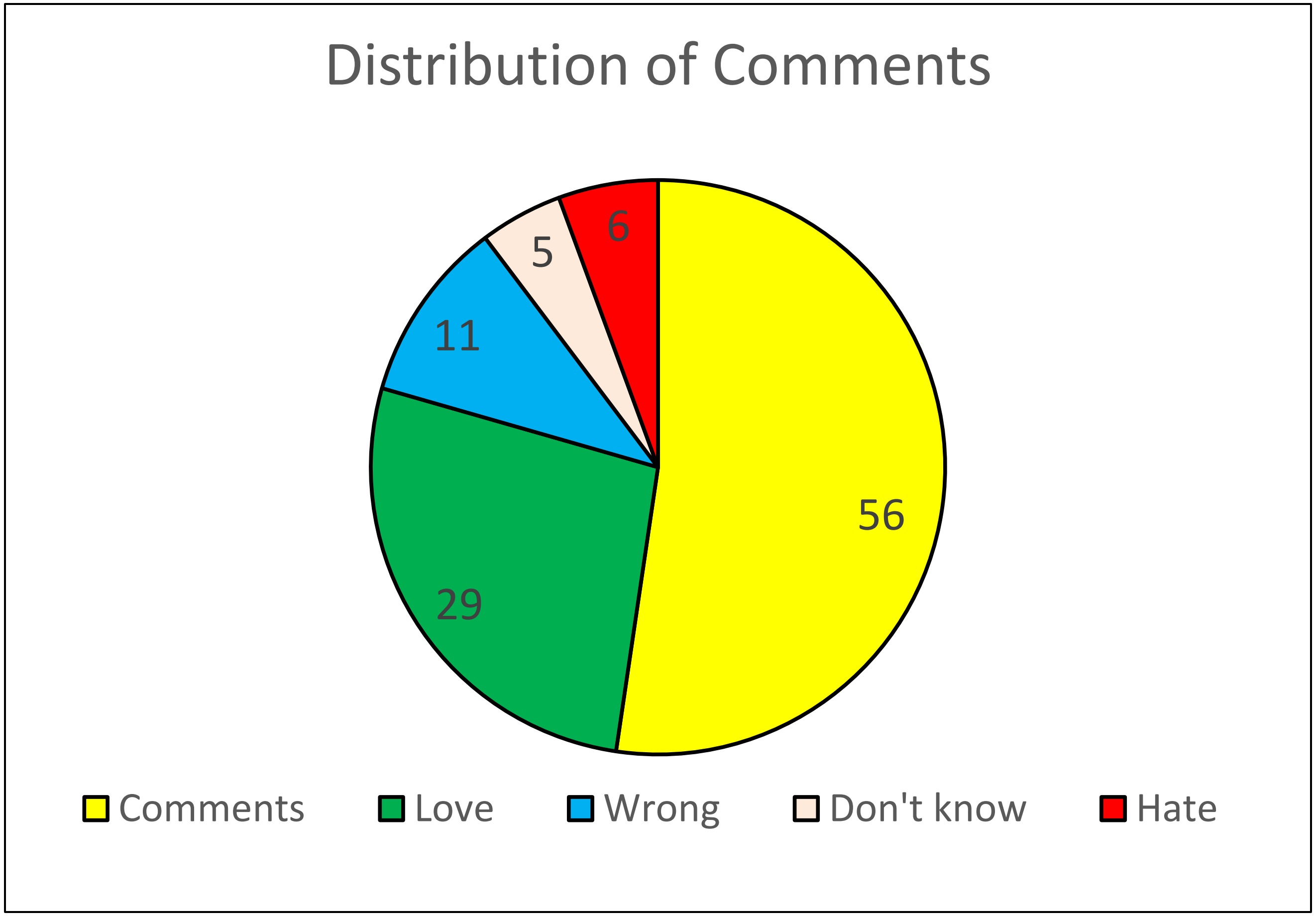
5

**Students must be prepared for engineering practice 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 realistic constraints. One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.**

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

# Update on Feedback on Proposed Revisions to C3 and C5

# On-line comments are much more positive in this cycle. There are 107 total



# Some people thought the introductory paragraph was mandatory – we intended aspirational.

*INTRODUCTION*

*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.*

# There are some criteria that most people seem to like.

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

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

# In addition to online comments, we have received several letters.

- ASME CEA sent a draft statement that supports the changes and offers constructive criticism
- IEEE CEAA sent a report indicating overall positive feedback with some suggestions for improvement

# The Criteria Committee is meeting (by phone) and reviewing all comments.

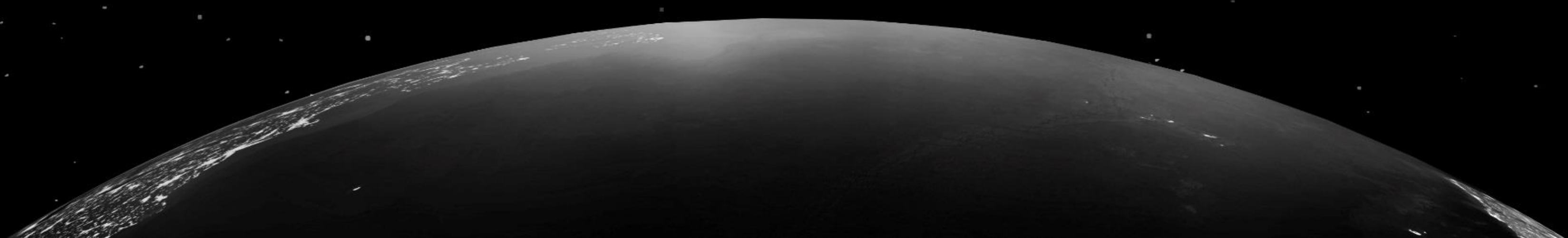
- Diversity/Inclusion
- Design Definition
- Uncertainty/Risk – where does it go?
- Broad Education (don’t limit to HSS)
- Something is missing
- Some criterion contain too many elements

# Next Steps

- The EAC recognizes that programs must reconfigure assessment tools and practices to map course content to the proposed organizational structure of Criterion 3 and to a lesser extent of Criterion 5.
- Because of the magnitude of change that has been proposed, a phase-in period for compliance following adoption of the proposed changes would be reasonable and appropriate
- Based on feedback received and the recommendation of the EAC, the Engineering Area Delegation may decide to extend the review and comment period for one additional year.
- Likewise, due to the breadth and complexity of the proposed changes and the impact to programs demonstrating compliance with Criteria, a phase-in implementation period may be recommended by the EAC to the Engineering Area Delegation.

ABET

# THANK YOU



# Questions?

# ABET Website Portal for Comment

**http://www.abet.org/news/abet-releases-criteria-proposal-for-public-comment/**

# The Revised Criteria (as proposed)

# Proposed Revisions

*INTRODUCTION*

*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.*

# Proposed Revisions

- *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.*

# Proposed Revisions

- *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:*

# Proposed Revisions

- *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.*
- *College-level Mathematics – College-level mathematics consists of mathematics above pre-calculus level.*

# Proposed Revisions

- *Engineering Science* – *Engineering sciences are based on mathematics and basic sciences but carry knowledge further toward creative application needed to solve engineering problems.*
- *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 optimally into solutions.*

# Proposed Revisions

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

# Proposed Revisions

***Criterion 3. Student Outcomes***

***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.***

1. ***An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.***
2. ***An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.***
3. ***An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.***

# Proposed Revisions

*Criterion 3. Student Outcomes (cont'd)*

4. *An ability to communicate effectively with a range of audiences.*
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.*
6. *An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.*
7. *An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.*

# Proposed Revisions

***Criterion 5. Curriculum***

*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:*

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

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.*

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.*

***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.***

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