

#### IV. PROPOSED CHANGES TO THE CRITERIA

Proposed changes to certain sections of the Criteria for Accrediting Engineering Programs **have been approved** by the ABET Engineering Area Delegation as of October 20, 2017, for implementation in the 2019–20 accreditation review cycle.

The changed sections are:

- The Introduction and Definitions that apply to all parts of the engineering accreditation criteria
- The General Criteria for Accrediting Baccalaureate Level Programs
  - Criterion 3, Student Outcomes
  - Criterion 5, Curriculum

Text for the revised sections is provided below. Programs scheduled for a general review in the 2018 – 19 should not begin transitioning to the newly approved criteria. Programs scheduled for a general review in the 2019 -2020 cycle and beyond may begin to transition as soon as possible.

#### **Criteria for Accrediting Engineering Programs for implementation in the 2019 -2020 accreditation cycle**

##### **Introduction**

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.

##### **Definitions**

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:

**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.

**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.

**Complex Engineering Problems** - Complex engineering problems include one or more of the following characteristics: involving wide-ranging or conflicting technical issues, having no obvious solution, addressing problems not encompassed by current standards and codes, involving diverse groups of stakeholders, including many component parts or sub-problems, involving multiple disciplines, or having significant consequences in a range of contexts.

**Engineering Design** – Engineering design is a process of devising a system, component, or process to meet desired needs and specifications within constraints. It is an iterative, creative, decision-making process in which the basic sciences, mathematics, and engineering sciences are applied to convert resources into solutions. Engineering design involves identifying opportunities, developing requirements, performing analysis and synthesis, generating multiple solutions, evaluating solutions against requirements, considering risks, and making trade-offs, for the purpose of obtaining a high-quality solution under the given circumstances. For illustrative purposes only, examples of possible constraints include accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, regulations, schedule, standards, sustainability, or usability.

**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.

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

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

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.

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

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. 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
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

#### **Criterion 5. Curriculum**

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:

- (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.
- (b) a minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design, and utilizing modern engineering tools.
- (c) a broad education component that complements the technical content of the curriculum and is consistent with the program educational objectives.
- (d) a culminating major engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier course work.

The following section presents proposed program criteria as approved by the ABET Engineering Area Delegation on October 20, 2017, on first reading. These are now published for a review and comment period. Comments will be considered until June 15, 2018. The ABET Engineering Area Delegation will determine, based on the comments received and on the advice of the EAC, the content of any adopted criteria. These criteria would only become effective if approved at the ABET Engineering Area Delegation meeting in the fall of 2018 and the earliest possible implementation would be for accreditation reviews during the 2019-20 academic year.