

THE IMPORTANCE OF ACCREDITATION OF ENGINEERING PROGRAMS (ABET)

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IMPORTANCE OF ACCREDITATION

In the United States, accreditation is used to assure quality in educational institutions and programs. Accreditation is a voluntary, non-governmental process of peer review. It requires an educational institution or program to meet certain defined standards or criteria. Accreditation is sometimes confused with certification. In general, institutions and programs are accredited, and individuals are certified.

The Accreditation Board for Engineering and Technology (ABET) is a professional accrediting organization that accredits programs, not institutions.

Accreditation serves to notify:

- parents and prospective students that a program has met professional standards;
- faculty, deans and administrators of a program's strengths and weaknesses and of ways to improve the program;
- employers that graduates are prepared to begin professional practice;
- taxpayers that their funds are spent well; and
- the public that graduates are aware of public health and safety considerations.

WHY DO WE CARE ABOUT ABET ACCREDITATION?

- ABET audits engineering programs on a regular basis to assure that the program maintains high standards.
- In some countries, having an engineering degree from an ABET-accredited engineering program is required to become a registered professional engineer.
- For some jobs and companies, having an engineering degree from an ABET-accredited engineering program is required just to be considered for employment.

WHY IS ABET ACCREDITATION IMPORTANT?

- The accreditation criteria help to define what your degree should provide you
- **The accreditation criteria help to define what you may market yourself as.**
- The accreditation process helps your department to continually analyze and improve its courses and curriculum
- The accreditation process requires that your voice be heard in evaluating the program
- **To apply for a position, most companies require graduation from an ABET accredited program**

WHAT IS ABET ?

- **Accreditation Board for Engineering and Technology**
- Formed: May 1932
- Organization responsible for monitoring, evaluating, and certifying the quality of engineering, engineering technology, computing, and applied science education in the United States.
- A federation of 31 professional and technical societies representing over 1.8 million practicing professionals these fields

Member Societies (These are the lead organizations)

ASEE: American Society of Engineering Educations
(General Engineering, Engineering Physics)

ASME: American Society of Mechanical Engineering
(Mechanical Engineering)

IEEE: Institute of Electrical and Electronic Engineering
(Electrical and Computer Engineering)

BMES: Biomedical Engineering Society (Biomedical Engineering)

ABET ORGANIZATION

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EAC

**Engineering
Accreditation
Commission**

1787 programs at
364 schools

ETAC

**Technology
Accreditation
Commission**

670 programs at
226 schools

ASAC

**Applied Science
Accreditation
Commission**

71 programs at
54 schools

CAC

**Computing
Accreditation
Commission**

261 programs at
220 schools

<http://www.abet.org/accreditation/>

<http://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2016-2017/>

ABET PHILOSOPHY

- Each Institution and Program define their own mission and objectives to meet the needs of their constituents.
- Emphasizes outcomes that prepare graduates from the program for entry into professional practice.
- Programs must demonstrate how their criteria and educational objectives are being met.
- Programs must design processes leading to continuous program improvement.
- Programmatic diversity is a strength of engineering education for the U.S.
- **ABET accredits programs – It does not certify individuals.**

Program outcomes are abilities that students should possess by the time they graduate.

Program objectives are what graduates are expected to have achieved within a few years (say, five years) after graduation.

OBJECTIVES VS. OUTCOMES

Program Educational Objectives (PEOs): are broad statements that describe the career and professional accomplishments that the program is preparing its graduates to achieve. (3 to 5 Years after graduation)

Program Outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program. (At graduation)

CURRENT EAC CRITERIA

1. Students
2. Program Educational Objectives
3. Students Outcomes
4. Continuous Improvements
5. Curriculum
6. Faculty
7. Facilities
8. Institutional Support

CRITERION 1 - STUDENTS

- Institutions must evaluate, advise, and monitor students.
- Institutions must have policies for acceptance of transfer students and validation of transfer courses.
- Institutions must have procedures to assure all students meet all program requirements prior to graduation

CRITERIA 2 – PROGRAM EDUCATIONAL OBJECTIVES

Each program must have:

- Detailed published educational objectives
- Process based on needs of constituencies in which objectives are determined and periodically evaluated
- A curriculum and process that assure achievement of the objectives
- A system of on-going evaluation that demonstrates achievement of the objectives
- Use evaluation results to improve the effectiveness of the program

CRITERION 3 – STUDENT OUTCOMES

- Programs must demonstrate their graduates have outcomes from “a” to “k” plus any additional outcomes that may be articulated by the program.
- Programs must have an assessment process with documented results
- Evidence that the outcomes are being measured
- Evidence that the results of the assessment process are applied to the further development and improvement of the program

CRITERION 4. CONTINUOUS IMPROVEMENT

- The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained.
- The results of these evaluations must be systematically utilized as input for the continuous improvement of the program.
- Other available information may also be used to assist in the continuous improvement of the program

CRITERION 5 – CURRICULUM

- Prepare students for professional practice through curriculum culminating in a major design experience
 - Base on knowledge/skills from earlier work
 - Incorporating engineering standards and multiple realistic constraints
- Two semesters (32 hours) of math and basic sciences
- Three semesters (48 hours) of engineering topics
- General education component

CRITERION 6 - FACULTY

- Sufficient number and competency to cover all curriculum
- Sufficient in number to accommodate adequate levels of student-faculty interaction, advising and counseling, service, professional development, and interactions with industrial and professional practitioners and employers.
- Ensure proper guidance of the program and its evaluation, development and improvement

CRITERION 7 - FACILITIES

- Classrooms, laboratories, and associated equipment must be adequate to accomplish program objectives and provide an atmosphere conducive to learning
- Provide opportunities to learn the use of modern engineering tools
- Infrastructure to support scholarly activities of the students and faculty and the educational objectives of the program

CRITERION 8 – INSTITUTIONAL SUPPORT

- Institutional support, financial resources and constructive leadership must be adequate to assure quality and continuity of the program
- Attract, retain, and provide for professional development of a well-qualified faculty
- Resource to acquire, maintain and operate equipment and facilities
- Adequate support personnel
- Support of quality improvement efforts

HOW DOES A DEGREE PROGRAM GET ACCREDITED?

- A panel of ABET experts evaluates the program: courses, curriculum, people, and facilities
- The degree program must meet General Criteria that apply to all engineering degrees
- The program must also meet Program Criteria, which are specific to Engineering
- The department must demonstrate that it uses a continual process of evaluating the courses and curriculum, and makes changes when needed
- The department must even show that it examines and improves its own evaluation process
- **For detailed steps:**

www.abet.org/accreditation/get-accredited-2/get-accredited-step-by-step/

OBJECTIVES VS. OUTCOMES

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STUDENTS OUTCOMES

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) 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
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

