

# **ABET Accreditation Overview**

**Definitions, Requirements, and Responsibilities**

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*ABET Committee for Engineering Programs*

# What is ABET?

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- **ABET** – **A**ccreditation **B**oard for **E**ngineering and **T**echnology
- It is an organization responsible for monitoring, evaluating, and certifying the quality of engineering, engineering technology, computing, and applied science education in the United States and internationally.
- It is a federation of leading professional and technical societies representing large number of practicing professionals in indicated fields, such as:
  - ASEE – American Society of Engineering Educations
  - ASME – American Society of Mechanical Engineering
  - IEEE – Institute of Electrical and Electronic Engineering
  - BMES – Biomedical Engineering Society

# Accreditation Principal Objectives

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- Assure that graduates of an accredited program are adequately prepared to enter and continue the practice of the engineering profession.
- Stimulate the national/international improvement of engineering education.
- Encourage new and innovative approaches to engineering education and its assessment.
- Identify accredited programs to the public and employers.

# ABET Philosophy

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- Each Institution and Program define their own mission and objectives to meet the needs of their constituents.
- Emphasizes outcomes by preparing 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.

# Why is ABET accreditation important?

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- ABET helps to assure that the program maintains the high standards through auditing engineering programs on a regular basis (**Once every six years**).
- In some countries and for some employers, only graduates from ABET-accredited engineering programs are considered for employment.
- In some countries, having an engineering degree from an ABET-accredited engineering program is required to become a registered professional engineer.

# What the evaluators want to know?

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## How Program Educational Objectives (PEOs) meet the needs of constituencies:

- **Faculty:** Full-time lectures and professors of all ranks, they are responsible for working with the other program constituencies to identify appropriate PEOs and to develop the academic program to deliver those objectives.
- **Students:** Enrolled students that are the direct beneficiaries of the program. The PEOs are designed to identify the broad skills that they will need to have to be outstanding engineers.
- **Alumni:** Program graduates can offer an excellent opportunity to assess the effectiveness of the program through feedback about how their careers and how the program may be altered to improve the preparation of graduates.
- **Employers:** The employers of graduates are critical to the success of the program. Their feedback is essential in identifying the characteristics of graduates as outstanding engineers and leaders.

# Engineering Accreditation Criteria

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## General Criteria

- **Criterion 1.** Students
- **Criterion 2.** Program Educational Objectives
- **Criterion 3.** Program or Student Outcomes
- **Criterion 4.** Continuous Improvement (Assessment)
- **Criterion 5.** Curriculum (Professional Component)
- **Criterion 6.** Faculty
- **Criterion 7.** Facilities
- **Criterion 8.** Institutional Support

## Program Criteria

- Depending on the program specialty (e.g. Automotives)

# C1. Students

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



# C2. Program Educational Objectives

- Program objectives are what graduates are expected to have achieved within few years after graduation; **(three to five years)**.
- Each program must have a:
  - detailed and published educational objectives;
  - process based on the needs of constituencies in which the objectives are determined and periodically evaluated;
  - curriculum and process that assure achievement of the objectives;
  - system of on-going evaluation that prove achievement of the objectives;
  - system using evaluation results to improve the effectiveness of the program.

# C3. Program Outcomes (a-k)

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- 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.

# C4. Continuous Improvement – Assessment

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- Program outcomes are abilities that students should possess by the time they graduate (**Graduation Exit**).
- Programs must
  - ▣ demonstrate that the graduates have outcomes a to k;
  - ▣ have an assessment process with documented results;
  - ▣ provide evidence that the outcomes are being measured;
  - ▣ provide evidence that the results of the assessment process are applied to the further development and improvement of the program.

# C5. Curriculum – Professional Component

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- Prepare enrolled students for professional practice through curriculum to develop a major design experience
- Base on knowledge and 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
  
- ***PPU programs need to go out of the box ... !!***

# C6. Faculty

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- Faculty should ensure proper guidance of the program and its evaluation, development and improvement.
  
- Faculty should be of sufficient number and competencies:
  - to cover all curricular areas;
  - to accommodate adequate levels of student-faculty interaction;
  - for students advising and counseling about:
    - service activities
    - professional development
    - interactions with industrial and employers

# C7. Facilities

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- Facilities must be adequate to accomplish program objectives and provide a suitable atmosphere for teaching-learning activities, which should include:
  - Classrooms for lecturing
  - Classrooms with multimedia equipments
  - Laboratories with safe working environment
  - Equipment and Tools to support content
  - Computing and Information
  - Infrastructure for students and faculty activities
  - Certified Technicians and qualified operators
- 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.

# C8. *Institutional Support*

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- PPU financial resources and constructive leadership must be adequate to assure quality and continuity of the program.
- PPU should attract and retain well-qualified and professional faculty.
- PPU should put in place resource to acquire, maintain and operate equipment and facilities.
- PPU should provide adequate support administrative staff.
- PPU should ensure support for quality improvement efforts.

# Program Criteria

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- Depending on the program that may also have:
  - ▣ Special structure or type criteria
  - ▣ Special educational objectives
  - ▣ Special outcomes
  
- Example:
  - ▣ Mechanical Engineering – Automotive Branch
  - ▣ May have additional program criteria and outcomes in addition to **a-k** ILOs.



# What ABET reviewer is looking for?

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- Comprehensive review of the program:
  - ▣ He will examine all aspects to judge compliance with criteria and policies, which assists in recognizing strong and weak points.
- To accomplish the review, the reviewer will:
  - ▣ Interview faculty, students, administrators, and staff to obtain an understanding of program compliance with criteria, policies and specific issues that arise from the Self-Study Report and from the on-site review.
  - ▣ Examine the following:
    - **Facilities** - To assure the instructional and learning environments are adequate and safe for the intended purposes.
    - **Materials** - Evaluators will review samples of displayed course materials including course syllabi, textbooks, example assignments and exams, and examples of student work, typically ranging from excellent through poor.

# What the reviewer is looking for?

- ▣ Examine the following (*continue ...*):
  - **Evidence** that the program educational objectives stated for each program are based on the needs of the stated program constituencies.
  - **Evidence** of a documented, systematically utilized, and effective process, involving constituents, for periodic review of the program educational objectives stated for each program.
  - **Evidence** of the assessment, evaluation, and attainment of student outcomes for each program.
  - **Evidence** of actions taken to improve the program.
  - **Student** support services to confirm adequacy of services appropriate to the institution's mission and the program's educational objectives and student outcomes.
  - **The process** for certifying completion of the program and awarding of the degree, including visits with persons responsible to ascertain that the process works as reported.

# Work Responsibilities

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- University Administrative Deanships/Departments
  - Provide resources and leadership required for program quality and continuity by involving:
    - Registration Deanship
    - Student Affairs Deanship
    - Computer Center
    - Human Resources
    - Financial Department
    - Alumni and advisory boards
- College Deanship
  - Provide support, data, policies etc.
  - Develop College review and improvement process
- Department
  - Evaluate all assessment input
    - Initiate corrective action
    - Distribute to committees
  - File an annual report
- Program Faculty: Teachers and technician involved
  - Course objectives, control curriculum
- Program ABET Committee
  - Input data, corrective action
- College ABET Committee
  - Provide Guidance, information, forms, training, etc.

# What is to be done and who is responsible?

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No.	Activity	Responsibility	Status
1.	University – Engineering College vision, mission and goals alignment	College Board	
2.	Program and department vision, mission and goals alignment	Department Board	
3.	Develop Improvement and Assessment Plan for Engineering College	College Board	
4.	College plan for gathering, documenting and reporting input on constituency needs	College Board ABET Committee	
5.	Program plan for gathering, documenting and reporting input on constituency needs	Department Board Program Committee	
6.	Establish Program Educational Objectives	Program Committee	
7.	Establish Student Learning Outcomes for program (ILOs)	Program Committee	
8.	Design curricula structure and the courses to achieve the program educational objectives and the ILOs	Program Committee	
9.	Document the mapping between courses and ILOs	Program Committee	
10.	Prepare syllabi for courses showing how course activities support ILOs	Faculty Program Committee	

# What is to be done and who is responsible?

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No.	Activity	Responsibility	Status
11.	Set the expected students' performance levels for ILOs	Department Board Program Committee	
12.	Develop a plan for assessing the program ILOs	Department Board Program Committee Faculty	
13.	Develop a plan for assessing the program educational objectives	Department Board Program Committee Faculty	
14.	Establish College-level performance objectives and indicators	College Board	
15.	Develop assessment plan for college performance objectives	College Board ABET Committee	
16.	Establish program performance objectives and indicators	Department Board Program Committee	
17.	Develop assessment plan for program performance objectives	Department Board Program Committee ABET Committee	

# What is to be done and who is responsible?

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No.	Activity	Responsibility	Status
18.	Establish the program advisory board or oversight group (Faculty and Professionals)	College Board Department Board	
19.	Develop college, department and program improvement process	College Board ABET Committee	
20.	Develop a plan for the documentation of the college level changes and improvements	College Board	
21.	Develop a plan for the documentation of the program changes and improvements	Department Board	
22.	Program Summary Assessment Report	Program Committee ABET Committee	
23.	College assessment plan completed and fully implemented	College Board ABET Committee	
24.	Preparing Self-Study Report	Program Committee ABET Committee	