

## MIT - Department of Electrical Engineering and Computer Science

### Outcomes

The associated program learning outcomes, and relationship to ABET Criteria 3 (a-k) and Criterion 8 are:

#### Program Outcome 1

Foundations: understanding of and ability to apply fundamental science and engineering of permanent value (ABET Criteria 3a, 3b, 3e, and 3k)

#### Program Outcome 2

Breadth: familiarity with many important technical areas, including for our students both EE and CS (ABET Criterion 3a)

#### Program Outcome 3

Depth: ability to apply in depth knowledge of one or more specializations within EECS (ABET Criterion 3a)

#### Program Outcome 4

Leadership: develop judgment and appreciation of the bigger picture (ABET Criteria 3f and 3h)

#### Program Outcome 5

Design: ability to participate in creative, synthetic, integrative activities of EE or CS design (ABET Criteria 3c and 3e)

#### Program Outcome 6

Curiosity: desire and ability to keep learning throughout life (ABET Criterion 3i)

#### Program Outcome 7

Communication skills: ability to express ideas persuasively, in written and oral form (ABET Criterion 3g)

#### Program Outcome 8

Social skills: ability to work with others, in professional and social settings (ABET Criterion 3d)

#### Program Outcome 9

Global view: appreciation of diversity in the world and in intellectual areas (ABET Criteria 3h and 3j)

#### Program Outcome 10

Professional ethics: ability to recognize and appreciate importance of ethical standards in professional work (ABET Criterion 3f)

More references are provided here. The ABET Criteria stated here refer to:

(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

(e) an ability to identify, formulate, and solve engineering problems  
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. Please refer to "ABET Criteria" in More Examples and Useful Links at the end of this section.

This one is measurable, with some thought required for the means of assessment, and might need multiple assessment points over time to assess how good students are doing in "professional and social settings" stated here.

## Stanford University - Criteria for Accrediting Engineering Programs

... .. Engineering programs must demonstrate that their students attain:

- 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 multi-disciplinary 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. In addition, an engineering program must demonstrate that its students attain any additional outcomes articulated by the program to foster achievement of its education objectives.
- l. (The above are the ABET proposed outcomes which Stanford follows. Stanford adds the following outcome.) background for admission to engineering or other professional graduate programs.

With conditions (within realistic constraints) and specific action (design) stated, this outcome is measurable.

"understanding" is hard to be measured. It can be, however, demonstrated through behaviours. In this case, actions associated with "ethical responsibility" can be used, e.g. "carry out the duties of an engineer ethically".

"communicate" can be replaced with a more specific action verb. The writer needs to mention here the type of communications and exactly what the ability is that the students will demonstrate.

A few areas could be identified here, i.e. what kind of contemporary issues?

## MIT - Mechanical Engineering

### Course 2 Program Educational Objectives

The educational objectives of the program leading to the degree Bachelor of Science in Mechanical Engineering are:

1. in their careers, graduates will bring to bear a solid foundation in basic mathematical and scientific knowledge and a firm understanding of the fundamental principles and disciplines of mechanical engineering;
2. graduates will use **proper** engineering principles when they model, measure, analyze and design mechanical and thermal components and systems;
3. graduates will have the professional skills necessary for formulating and executing design projects, for teamwork, and for effective communication; and
4. graduates will demonstrate the confidence, awareness of societal context, professional ethics, and motivation for life-long learning that is necessary for them to be leaders in their chosen fields of endeavor.

Which “engineering principles” is it referring to?

This one will need multiple assessment points longitudinally, and triangulation of assessment data from faculty, the student and his/her peers.

These objectives have been developed over a period of 150 years in an attempt to comply with the mission of MIT as an institution. That mission, as stated in the current edition of the *MIT Bulletin* is:

“The mission of MIT is to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21<sup>st</sup> century.

The objectives of this program are written in compliance with the mission of the university’s mission.

The Institute is committed to generating, disseminating, and preserving knowledge, and to working with others to bring this knowledge to bear on the world’s great challenges. MIT is dedicated to providing its students with an education that combines rigorous academic study and the excitement of discovery with the support and intellectual stimulation of a diverse campus community. We seek to develop in each member of the MIT community the ability and passion to work wisely, creatively, and effectively for the betterment of humankind.”

## More Examples and Useful Links

1. ABET Criteria  
<http://www.ece.uiuc.edu/abet/criteria.html>
2. UC Riverside: Chemical Engineering Curriculum  
<http://www.cee.ucr.edu/undergrad/chemcir.shtml>
3. University of Delaware: Department of Civil and Environmental Engineering  
[http://www.ce.udel.edu/ABET/Current%20Documentation/ABET\\_scoring\\_rubrics\\_index.html](http://www.ce.udel.edu/ABET/Current%20Documentation/ABET_scoring_rubrics_index.html)
4. UCLA : Electrical Engineering Department  
[http://www.eeweb.ee.ucla.edu/department\\_mission.php](http://www.eeweb.ee.ucla.edu/department_mission.php)
5. Computer Science ABET/ CAC Certification Information by University of Michigan College of Engineering  
<http://www.eecs.umich.edu/eecs/academics/abet/abet-cs.html>
6. Computer Engineering Assessment and Improvement by University of Michigan College of Engineering  
<http://www.eecs.umich.edu/eecs/academics/abet/abet-cse.html>