

Assessment of Student Outcomes in Engineering      Effective: May 12, 2022

This policy details the assessment of student learning outcomes in Bachelor of Engineering programs within the School of Engineering. Assessment of learning outcomes and the use of the results to guide subsequent modification and improvement of our Engineering programs is a fundamental component of the academic administration of the School of Engineering. This policy updates and supersedes all prior policies.

The department regularly conducts detailed Student Outcome assessments as part of satisfying the requirements of the ABET Engineering Accreditation Commission (EAC). Details of the accreditation processes and requirements are available in the current edition of the *Accreditation Policy and Procedures Manual (APPM)* published by ABET and available at [www.abet.org](http://www.abet.org). The APPM is in a continual process of modification and improvement by ABET in response to the needs of the engineering education community, so this document will be periodically updated to reflect the latest requirements.

This document provides a detailed mapping between the assessment of ABET Student Outcomes that Engineering programs must undertake to maintain ABET accreditation and the Maritime College Institution-Wide Student Learning Outcomes (IWSLO) which are used for assessment of the full range of degree programs at the college.

Terminology

ABET has its own terminology for assessment which corresponds closely to the SUNY standard in use at Maritime College, e.g.:

<u>ABET-EAC term</u>	<u>SUNY term</u>
Student Outcome	Learning Outcome (LO)
Course Objective	Course Learning Outcome (CLO)
Program Educational Objective (PEO)	Program Learning Outcome (PLO)

Student Outcomes are a list of abilities that engineering students in accredited programs are required to demonstrate. They are determined by ABET and are listed on the following page.

Course objectives are specific tasks or goals that students are expected to demonstrate competence in at the conclusion of a given academic course. Course objectives are determined by individual programs and approved by the home department of the program. They are listed in the Institutional Syllabus for each Engineering course.

Program Educational Objectives describe what students will know and be able to do upon completion of an accredited engineering program. PEOs are subject to periodic review and modification by the Engineering Advisory Board in service to the School Engineering.

## ABET Student Outcomes

The following Student Outcomes are required to be assessed by the Engineering Accreditation Commission of ABET as part of an engineering program's ongoing accreditation efforts:

<b>Student Outcome</b>	<b>Description</b>
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.

Every Engineering course addresses one or more Student Outcome. Specific courses in each program are used to formally assess the extent to which students demonstrate the ability described in the Outcomes. A chart showing which Student Outcomes are addressed or assessed in each course is maintained by the Engineering Department. In addition, Student Outcomes to be addressed or assessed are listed in the Institutional Syllabus for each course.

Assessment data from specified courses is used to feed back into each program through the process of Continuous Improvement as mandated by the ABET APPM. Based on an evaluation of the level to which outcomes are achieved, each program proposes and enacts changes in program courses and/or program curricula to improve outcomes. Such changes may include modification of course emphasis, course content, changes in where Outcomes are addressed or assessed, new course development, etc. Such changes may also be suggested based on discussion within the department or in consultation with the Engineering Advisory Board.

## Maritime College Institution-Wide Student Learning Outcomes (IWSLO)

The following Student Learning Outcomes have been specified for degree programs at Maritime College:

### **Institution-Wide Student Learning Outcomes**

#### **I. Intellectual Learning**

- a. Communication: Students will be able to communicate effectively in both written and oral forms.
- b. Critical Analysis: Students will be able to comprehend, analyze, and evaluate information and make decisions via synthesis and application of this information.
- c. Quantitative and Scientific Reasoning: Students will be able to analyze information to formulate conclusions using critical quantitative methods.
- d. Information Literacy: Students will be able to explore, critique, and integrate print and digital resources.
- e. General Education: Students will gain knowledge of global civilizations and the natural world through the study of liberal arts and sciences.
- f. Technological Proficiency: Students will be able to utilize technology to increase productivity and/or solve complex problems.
- g. Competency in the Major: Students will be able to demonstrate proficiency in their major.

#### **II. Applied Learning**

- a. Within the classroom: Students will gain practical experience in labs, seminars, simulations or workshops.
- b. Beyond the classroom: Students will gain practical and professional experience via Summer Sea Term, Cadet Observer experiences or internships.

#### **III. Development in Leadership and Teamwork**

- a. Students will be prepared to lead and act with character and civility so as to solve problems.
- b. Students will learn to work as a team in academic, athletic, regimental, or club activities.

#### **IV. Global Awareness**

Students will be cognizant of the social, political, and economic conditions of an increasingly international society and will value the diverse perspectives offered by others.

#### **V. Personal and Social Responsibility**

Students will gain an enhanced sense of social responsibility based upon ethical principles and values.

## Mapping Maritime College IWSLO to ABET Student Outcomes

The relationship between ABET Student Outcome assessment required for engineering accreditation and the set of Maritime College IWSLO is summarized graphically below. At their discretion, ABET can modify the list of Student Outcomes to be assessed or the required accreditation procedures, so this mapping will be subject to periodic updating.

<u>Maritime College IWSLO</u>	<u>ABET Student Outcomes</u>							
<b>I. Intellectual Learning</b>	1	2	3	4	5	6	7	Additional Outcomes
a. Communication			•					
b. Critical analysis	•					•		
c. Quantitative & scientific reasoning	•					•		
d. Information literacy	•	•	•			•		Library assessment
e. General education				•				SUNY GenEd satisfied
f. Technological proficiency	•	•				•		
g. Competency in the major	•	•				•		B.E. degree
<b>II. Applied Learning</b>								
a. Practical experience in labs, seminars, simulations or workshops	•	•				•		Engineering Lab courses, Ship Systems sequence for USCG Lic
b. Practical & professional experience in SST, Cadet Observer or Internships							•	SST & USCG Licensure, Industrial Internships
<b>III. Development in Leadership &amp; Teamwork</b>								
a. Lead & act with character & civility				•	•			
b. Work as a team in various settings					•			
<b>IV. Global Awareness</b>								
Cognizance of social, political & economic conditions in society		•		•	•		•	
<b>V. Personal &amp; Social Responsibility</b>								
Enhanced sense of social responsibility based on ethical principles & values				•				