A REINVIGORATED FRAMEWORK OF PROGRAM-LEVEL ASSESSMENT OF CIVIL ENGINEERING

Department of Civil and Environmental Engineering

Yilei Shi, PhD, PE, F.ASCE

Introduction

- Bachelor of Science in Civil Engineering (BSCE) Program is offered in the Department of Civil and Environmental Engineering (CEE) at the College of Engineering and Computer Science (ECS).
- The BSCE Program has been accredited by ABET (Accreditation Board for Engineering and Technology) since 1936.
- ABET conducted campus visit in fall 2023 for reaccreditation. Three weaknesses and one concern were noted in the Final Statement of Accreditation in August '24.
- To address the weaknesses and concern, a reinvigorated framework of program-level assessment of BSCE is developed.

Reinvigorated Assessment Framework

Actions Taken	Before	After	Outcome
A new set of Program Educational Objectives (PEOs) was developed and established.	The previous set of PEOs were not clearly defined according to ABET criteria.	The new set of PEOs were clearly defined as broad statements that describe students' career and professional accomplishments that the program is preparing graduates to achieve.	This program weakness has been resolved as noted in the Final Statement of Accreditation.
A 6-year assessment cycle of all seven ABET Student Outcomes is established.	All faculty had to perform course assessment each semester leading to wear and tear.	Only selected courses need to be assessed at a time. Other courses are under evaluation and reassess stages.	Faculty are engaged in assessment effort, while PD and Chair have robust data for assessment.
Performance Indicators with rubrics of each ABET Student Outcomes are being developed, with several being assessed starting fall 2024.	No unified assessment grading rubrics were used. Course assessment results were sometimes difficult to generate meaningful data.	Unified grading rubrics are applied to each course's assessment. Results of course assessment can be easily compiled for program.	Program assessment results are easily compiled, discussed at department level. Faculty are more engaged in all assessment processes.

SO	'24-'25	'25-'26	'26-'27	'27-'28	'28-'29	'28-'29
1		A/E	C	A/E	C	A/E
2			A/E	C	A/E	C
3	A/E	C	A/E	C	A/E	C
4		A/E	C	A/E	C	A/E
5	A/E	C	A/E	C	A/E	C
6		A/E	C	A/E	C	A/E
7			A/E	C	A/E	C

SOs Assessed in 2024-25

3
- ECS 101 Intro to ECS
- CEE 327 Principles of Fluid Mechanics
- CEE 337 Intro to Geotechnical Eng.
- CEE 341 Intro to Environmental Eng.

5
- CEE 274 Sustainability in Civil and Environmental Engineering System
- CEE 475 Civil and Environmental Engineering Design

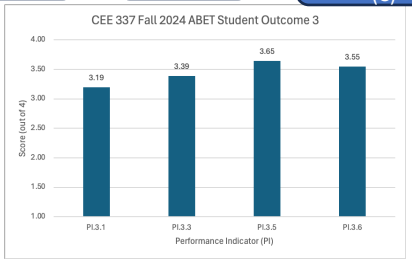
Program Facts

- Number of full-time CEE faculty: 18 (Civil & Env. Eng.)
- Number of CEE undergraduate students: ~250 (Civil & Env. Eng.)
- Number of CEE graduates every year: ~60 (Civil & Env. Eng.)

ABET Student Outcomes (SOs)

At the time of graduation students should have:

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.



Example Assessment Method

CEE 337 – Flipped class presentations

- Students were assigned with an In-Situ Test or Ex-Site Test as well as one professional geotechnical report or monitoring plan. They needed to learn by themselves of the test method and present in class to teach their peers of the test method. Students also made a presentation on the construction project, the information of which they needed to extract from the professional geotechnical report or monitoring plan.
- Instructor and a teaching assistant graded student presentation based on the performance indicators with rubric.
- The results were analyzed using Excel, and further fed into the designated web portal to record the assessment results. Program Director presented and discussed the assessment results in department faculty meeting, and further action items were recorded to be taken in the next cycle.