Assessing Math, Science & Engineering Skills in Civil Engineering

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Introduction

CEE ABET ASSESSMENT

The CEE program at UH is accredited by ABET. Assessment of SLOs is an important part of the accreditation process. In this poster, we show how the CEE BS program utilizes multiple sources of evidence to evaluate student ability to apply mathematical skills in solving engineering programs and how the program utilizes results to make programmatic improvement. The faculty uses the results from the FE Exam, a licensure exam, and embedded course assessment to guide the curriculum improvement. Rubrics have been created and used in assessment. They are also evaluated annually to ensure they reflect the current curriculum requirement. The assessment results have led to curriculum changes that enhance student learning from multiple perspectives.

Student Learning 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.

SLOs Assessed in ‘13

a) 1. an ability to apply knowledge of mathematics, science, and engineering

Use of Results

The program assessment coordinator and course instructors collect and summarized the assessment results. Results are disseminated to the faculty via emails and department meetings. The program faculty collaboratively interpreted the results and discussed improvement strategies. The program used the assessment results and made multiple curricular improvements, such as changing the Structure analysis course from the electives to required courses, limiting enrollment, increasing frequency of course offerings, modifying expectations on the rubric, and applying appropriate standards to students at different academic levels.

Assessment Methods

Outcome a was assessed using CEE 381 (Structural Analysis) in Spring 2013 and the results from the FE Exam

Conclusions

The student performance did not meet the departmental target (more than 80% students scoring 3 and 4’s and fewer than 5% students scoring 1). As the students assessed were juniors and the target was set for the graduating class, the data indicate either more work needs to be done to bring students up to the desired level of performance, or a scaled scoring system needs to be used to compensate the mismatch between the expectation (target) and the status of the students assessed.

Action Plan

1. Integrate review of fundamental concepts into course lectures
2. Modify scoring system to reflect the expectations of Juniors.
3. Merge CEE 381 and CEE 482 to provide a holistic coverage of the subject in a single required course.