

School of Engineering  
Annual Program Report of Assessment of Student Learning Outcomes

**Part I: Cover Page**

<b><u>Title of Degree or Certificate Program</u></b>	<b><u>Degree Level</u></b> <i>(Certificate, Associate, Bachelors, Master's, etc.)</i>
Civil Engineering	Bachelors

Name of Academic Department: Civil, Construction & Environmental Engineering

Name of College/School/Branch: School of Engineering

Academic Year/Assessment Period: 2022-2023

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Date Submitted to College/School/Branch for Review: November 28, 2023

Date Reviewed by College Assessment and Review Committee (CARC) or the equivalent:

State whether ALL of the program's student learning outcomes (SLOs) are targeted/assessed/measured within one year, two years, OR three years:

Each SLO is assessed annually

If the program's SLO's are targeted/assessed/measured within two years or three years, please state whether this assessment record focuses on SLOs from the first year, second year, or third year:

N/A

## **Part II: Assessment Report**

**What Student Learning Outcomes were assessed during this reporting period? List in the table below.**

**For each SLO, indicate in the table how the SLO was assessed, briefly indicate what results were obtained, what analysis of the data indicated with regard to student learning, and what recommendations have been made regarding the program curriculum.**

<b>Student Learning Outcome</b>	<b>Assessment Measures incl. Measure Type (Direct or Indirect)</b>	<b>Performance Benchmark</b>	<b>Results</b>	<b>Analysis</b>	<b>Recommendations for Improvement/ Changes from Instructors</b>
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<p>1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics</p>	<p>Course work - Direct</p>	<p>All course-related assessments use a three-scale rubric as follows:  3 (Exemplary),  2 (Satisfactory),  1 (Unsatisfactory).  Target levels for outcomes attainment have been established as 75% of students assessed as 2 or better</p>	<p>The results of the assessment in CE 331 (Fall 2022) indicate that 94% (29/31) of the students were assessed as “2” or better.</p> <p>The results of the assessment in CE 308 (Spring 2023) indicate that 68% (19/28) of students were assessed as “2” or better.</p>	<p>This outcome was partially attained</p>	<p>(CE 331) It will be ideal to ask students to explicitly report the limitations associated with the measurements they take during the laboratory and how they can impact the conclusions they report.</p> <p>(CE 308) Many of the students were unprepared for this course. Many were unable to solve basic statics problems and had no understanding of moment and shear diagrams. Thus, it was necessary to re-teach basic things, which reduced the overall level of the course. CE202 and CE302 should be revised to reflect this situation.</p> <p>UG Committee Discussion: After discussion with instructors we ensure that the basic topics are covered. However, other factors (e.g., “pandemic”), could influence these outcomes. Should</p>
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					<p>continue monitoring to watch if this trend continues or changes.</p> <p>(CE Faculty) Need to work with students to strengthen fundamental knowledge and correct habits in classroom in entry level courses. Maybe consider dividing classes to smaller sections to improve quality of instruction. Consider adding Teaching Assistants (TA) going to lower division classes.</p>
<p>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</p>	<p>Course work - Direct</p>	<p>(see above)</p>	<p>The results of the assessment in CE 335 (Spring 2023) indicate that 76% (19/25) of students were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Fall 2022) indicate that 100% of students (13/13) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Spring 2023) indicate that 100% of students (16/16) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 335) Greater emphasis on design of systems that take into account global, and economic factors. Perhaps assess this outcome on an exam problem to ensure 100% of students are assessed.</p> <p>(CE 499) None.</p>

<p>3) an ability to communicate effectively with a range of audiences</p>	<p>Course work - Direct</p>	<p>(see above)</p>	<p>The results of the assessment in CE 382 (Fall 2022) indicate that 85% (22/26) of students were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Fall 2022) indicate that 100% of students (12/12) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Spring 2023) indicate that 100% of students (16/16) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 382) None.</p> <p>(CE 499) One crucial aspect to consider for this class is to improve the communication between industry mentors, students, and the instructor. One way of doing this is to engage the mentors in activities during the semester, such as seminars, panel discussions, and brainstorming sessions. I provided extensive feedback to students about writing and presentation skills, and it was clear to me that they improved in each deliverable.</p> <p>CE Faculty. Encourage a presentation combining storyboard and PowerPoint slides to improve communication of ideas for the project in capstone class. Consider including a poster in other public meetings to improve public presentation skills.</p>
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<p>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</p>	<p>Course work - Direct</p>	<p>(see above)</p>	<p>The results of the assessment in CE 350 (Fall 2022) indicate that 100% of students (4/4) were assessed as “2” or better.</p> <p>The results of the assessment in CE 350 (Spring 2023) indicate that 94% of students (16/17) were assessed as “2” or better.</p> <p>The results of the assessment in CE 335 (Spring 2023) indicate that 100% (25/25) of students were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 350) None.</p> <p>(CE 335) Integrate discussion of environmental justice within ethics and professional responsibilities components and find more ways to assess understanding of these concepts.</p>
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<p>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</p>	<p>Course work - Direct</p>	<p>(see above)</p>	<p>The results of the assessment in CE 160 (Fall 2022) indicate that 92% of students (26/28) were assessed as “2” or better.</p> <p>The results of the assessment in CE 160 (Spring 2023) indicate that 96% of students (26/27) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Fall 2022) indicate that 100% of students (13/13) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (Spring 2023) indicate that 100% of students (16/16) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 499) Check in regularly with students about team conduct. Provide resources early on to teams that may be struggling with team work.</p> <p>UG Committee Discussion (CE 499): Peer evaluations for teams that also includes mentors are helpful. Additionally, consider including tools to build Team dynamics. For example, team charters are a valuable tool</p> <p>CE Faculty: Consider adding a Team dynamic module at the beginning of CE 160 and capstone classes.</p>
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<p>6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions</p>	<p>Course work - Direct</p>	<p>(see above)</p>	<p>The results of the assessment in CE 305 (Fall 2022) indicate that 100% of students (26/26) were assessed as “2” or better.</p> <p>The results of the assessment in CE 360 (Spring 2023) indicate that 78% (out of 25 students) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 360) The outcomes are not satisfactory for all students, and the results are much lower than last year. There is no obvious cause for the lower scores except to note that overall the performance of this class was below that of previous years. It is noted that these students are “post-pandemic” and perhaps there is some effect from the prior two years of their education. Nonetheless, additional assignments that require the use and application of lab data is recommended as well as discussion in lecture that connects the lab testing to theory and practice.</p>
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7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies		Course work - Direct	(see above)	<p>The results of the assessment in CE 160 (Fall 2022) indicate that 85% of students (24/28) were assessed as “2” or better.</p> <p>The results of the assessment in CE 160 (Spring 2023) indicate that 96% of students (26/27) were assessed as “2” or better.</p> <p>The results of the assessment in CE 382 indicate that 83% of students (20/24) were assessed as “2” or better.</p>	This outcome was attained	None.

Indicate where your assessment plan and the full set of assessment data from this year for this program can be accessed.

The assessment plan and data are currently stored on the Civil Engineering Department server.

Based on the results and analysis provided for the student learning outcome(s) listed in the table above, for EACH student learning outcome, please state if the outcome was met, partially met, or not met. Briefly explain why:

<b>Student Learning Outcome</b>	<b>Results</b>
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Outcome partially attained
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	Outcome attained
3) an ability to communicate effectively with a range of audiences	Outcome attained
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	Outcome attained
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	Outcome attained
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Outcome attained
7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Outcome attained

Based on this year’s assessment, what suggestions do you have for changes to the assessment process or the SLOs for your program?

The following table tracks progress on suggestions made in previous years as well as those identified based on this year’s assessment. CCEE faculty met on October 4, 2023, to agree on the status of these suggestions and to identify new suggestions.  
 (Note: Item ID in the following table indicates the academic year that the suggestion was made)

<b>Item ID</b>	<b>Suggestion</b>	<b>Summary of Activity</b>	<b>Status</b>
18-19-S1	Faculty teaching courses with outcomes assessment responsibilities should review the outcome(s) and design assessment tool(s) before the course begins	Courses identified for assessments are presented to faculty at the start of each academic year	Ongoing (faculty agreed that this should stay on list)
18-19-S2	Provide regular reminders to faculty about assessment responsibilities (e.g., annual retreat in fall semester; monthly faculty meetings)	Accreditation update is scheduled into the annual retreat and each monthly faculty meeting	Ongoing (faculty agreed that this should stay on list)
19-20-S1	Continue use of FE exam and AIC exam for assessment purposes (Note: the requirement for these exams has been waived in 2020 due to COVID-19)	New item, no activity to report at this time  UG Committee: After the pandemic we lost continuity on using FE Data as the requirement was waived for some time. The department should gather and assess FE and AIC data for recent years.	Ongoing (faculty agreed that this should stay on list)
20-21-S1	Confirm that the curriculum sheet, the website and university catalogue for students in all undergraduate degree programs that FE (engineering programs) or AIC (construction management program) exams are required for graduation	This replaces suggestion 19-20-S1.	Ongoing  UG Committee discussion: add the following edit: the curriculum sheet, the website and university catalogue
22-23-S1	UG Committee will consider moving to a three-year assessment cycle instead of a one-year assessment cycle.  First Year: Collection  Second Year: Analyses  Third Year: Implementation	Initially proposed in Undergraduate Committee Meeting. Pending discussion with the faculty.	Ongoing

Describe any changes to the assessment plan or the SLOs that are in progress based on this year's or previous year's assessment.

None

List what groups (committees, faculty meetings, department leadership, etc.) within your program reviewed the assessment results either from the current year, or from previous years, during the current academic year.

Civil Engineering Faculty: 2022-2023 assessment results reviewed by faculty and recommendations discussed and approved October 4, 2023.

Describe any curricular or course changes that are currently in progress based either on this year's assessment, or on previous year's assessment results.

The following table tracks progress on curricular and course changes identified in previous years as well as those identified based on this year's assessment. CCEE faculty met on October 4, 2023, to agree on the status of these suggestions and to identify new suggestions. (Note: Item ID in the following table indicates the academic year that the planned change was identified)

Item ID	Change	Summary of Activity	Status
18-19-C2	To strengthen compliance with Outcome 1, CE 331 is incorporating more programming (e.g., MATLAB) into the course; other courses could consider the same approach (item moved from previous table to this table because it relates to course changes)	CE 331 dedicated two labs to Python; SOE to develop a new computer programming course focused on engineering applications that all students will have to take	Ongoing (faculty agreed that these efforts should continue)
18-19-C3	To strengthen compliance with Outcome 3, ask Advisory Board members and other industry professional for a variety of professional writing examples that we can share with students; also inform students of writing assistance available at CAPS (item moved from previous table to this table because it relates to course changes)	Pulling examples from CE 499/497 reports to share with future students; examples have also been pulled from CE 160 and students can relate well to these student examples; still need to pursue examples from industry; several classes (CE 160, CE 350, etc) are providing information on CAPS	Ongoing (faculty agreed that these efforts should continue)
18-19-C4	To strengthen compliance with Outcome 6, provide greater integration between lecture	CE 305 increased integration between lecture and lab; CE 360 has incorporated more to provide	Ongoing

	material and laboratory material (item moved from previous table to this table because it relates to course changes)	explicit links between lecture and lab through quizzes and discussions (the schedule does not always line up); continue to consider ways to improve linkage between lectures and labs possibly by rearranging order of material	(faculty agreed that these efforts should continue)
19-20-C1	Due to COVID-19, faculty have had to move to virtual instruction. Faculty should continuously work to improve their online instruction techniques.	Instruction is in person, so this item is not valid anymore.	Completed
19-20-C2	All faculty teaching courses in FE exam topics should review the exam topics each year	New item, no activity to report at this time	Ongoing
19-20-C3	Faculty teaching courses used for assessing ethics should review the FE exam ethics topic areas each year	New item, no activity to report at this time	Ongoing
22-23-C1	No new recommendations made		

Describe your plans for assessment of student learning during the upcoming academic year.

Continue to collect data from courses using new SLOs and FE results.