

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: 2021-2022

Submitted By (include email address): Susan Bogus Halter, [sbogus@unm.edu](mailto:sbogus@unm.edu)

Date Submitted to College/School/Branch for Review: January 25, 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>
1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Course work - Direct	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	The results of the assessment in CE 331 indicate that 81% (22/27) of students were assessed as “2” or better.  The results of the assessment in CE 308 indicate that 74% (20/27) of students were assessed as “2” or better.  FE exam results showed that 35% of our students passed compared to 63% nationally.	This outcome was partially attained	This was the first year since the pandemic that our students were required to take the FE exam. The pass rate of our students increased from Fall 21 to Spring 22, but is still below the national average. Instructors should strive to incorporate FE exam material into appropriate classes.
h2) 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	Course work - Direct	(see above)	The results of the assessment in CE 335 indicate that 83% students were assessed as “2” or better.  The results of the assessment in CE 499 (fall 2021) indicate that 100% of students (12/12) were assessed as “2” or better.  The results of the assessment in CE 499 (spr 2022) indicate that 100% of students (18/18) were assessed as “2” or better.	This outcome was attained	(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>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 indicate that 90% of students (26/29) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (fall 2021) indicate that 100% of students (12/12) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (spr 2022) indicate that 100% of students (18/18) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>(CE 382) While the students were able to communicate through their writing, much improvement can be made. I recommend that students be provided more examples of written engineering work products in courses taken earlier in the program and provided opportunities to write similar reports as part of other course work on a regular basis. Not only should they be capable of answering quantitative questions, they should be able to communicate in writing and spoken word what the equations mean.</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</p>
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					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.
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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 2021) indicate that 100% of students (18/18) were assessed as “2” or better.</p> <p>The results of the assessment in CE 350 (spr 2022) indicate that 94% of students (16/17) were assessed as “2” or better.</p> <p>The results of the assessment in CE 335 indicate that 95% of students were assessed as “2” or better.</p> <p>FE exam results showed our students scored at a ratio of 0.85 compared to all test takers which is below the target of 0.95.</p>	<p>This outcome was partially attained</p>	<p>(CE 350 – fall) Specifically tie ethical behavior and professional responsibility to considering the impact of engineering situations in global, economic, environmental, and societal contexts and how this should be part of making informed engineering judgments. Add objective assessment(s).</p> <p>(CE 350 - spring) No suggested improvements at this time. First time with revised assessment tools.</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 2021) indicate that 89% of students (32/36) were assessed as “2” or better.</p> <p>The results of the assessment in CE 160 (spr 2021) indicate that 95% of students (19/20) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (fall 2021) indicate that 92% of students (11/12) were assessed as “2” or better.</p> <p>The results of the assessment in CE 499 (spr 2022) indicate that 100% of students (18/18) were assessed as “2” or better.</p>	<p>This outcome was attained</p>	<p>None at this time</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 indicate that 100% of students (26/26) were assessed as “2” or better.</p> <p>The results of the assessment in CE 360 indicate that 71% of the 23 students were assessed as “2” or better.</p>	<p>This outcome was partially attained</p>	<p>(CE 360) The results from Criterion 3 and 4 are not satisfactory, 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 overall 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 2021) indicate that 92% of students (33/36) were assessed as “2” or better.</p> <p>The results of the assessment in CE 160 (spr 2022) indicate that 85% of students (17/20) were assessed as “2” or better.</p> <p>The results of the assessment in CE 382 indicate that 86% of students (25/29) were assessed as “2” or better.</p>	This outcome was attained	(CE 382) Most students were able to make superficial connections between street design and the themes listed (street design can impact health/safety, etc.), but a deeper understanding of the relationship between transport engineering and human behavior and outcomes was not evidenced. I recommend that students be provided more examples of the implications of engineering decisions throughout the curriculum.

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 met
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 met
3) an ability to communicate effectively with a range of audiences	Outcome met
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 partially met
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 met
6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Outcome partially met
7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Outcome met

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 December 7, 2022, 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)

Item ID	Suggestion	Summary of Activity	Status
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)
21-22-S1	Notify students during advising and add a note on advising curriculum sheets for all undergraduate degree programs that FE (engineering programs) or AIC (construction management program) exams are required for graduation	New item. This replaces suggestion 20-21-S1.	
21-22-S2	Undergraduate committee should review timing of assessments (annually vs. every 3 years), considering whether students are meeting the outcomes. Suggest this be done Fall 2023.	New item	

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: 2021-2022 assessment results reviewed by faculty and recommendations discussed and approved December 7, 2022

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 December 7, 2022, 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)

<b>Item ID</b>	<b>Change</b>	<b>Summary of Activity</b>	<b>Status</b>
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	Completed (remove in next year's report)
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 material and laboratory material (item moved from previous table to this table because it relates to course changes)	CE 305 increased integration between lecture and lab; CE 360 has incorporated more to provide explicit links between lecture and lab through quizzes and discussions (the schedule does not always line up); continue to consider ways to	Completed (remove in next year's report)

		improve linkage between lectures and labs possibly by rearranging order of material	
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.	UNM maintains online faculty support resources	Completed (remove in next year's report)
19-20-C2	All faculty teaching courses in FE exam topics should review the exam topics each year	Faculty agree that this should be an ongoing effort	Ongoing (faculty agreed that these efforts should continue)
19-20-C3	Faculty teaching courses used for assessing ethics should review the FE exam ethics topic areas each year	Faculty agree that this should be an ongoing effort	Ongoing (faculty agreed that these efforts should continue)
21-22-C1	Schedule a faculty meeting in spring semester to discuss FE exam results and expectations	New item	
21-22-C2	Undergraduate committee should lead effort to review course prerequisites and program restrictions	New item	

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.