

Institutional Effectiveness Report 2020-2021

Program: Civil & Environmental Engineering BS

College and Department: College of Engineering – Civil Engineering

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Mission: The mission of the civil engineering program is to offer the strong academic content necessary to produce well-educated graduates who become innovative and productive members of society. Graduates will possess both the problem-solving skills and the fundamentals of critical thinking and analysis that are crucial for success within the framework of the civil and environmental engineering profession.

Program Goals

- PG 1. Graduates should demonstrate the ability for early career professional growth based on their grasp of fundamental concepts in civil engineering.
- PG 2. Graduates should utilize knowledge and skills to participate in civil engineering design and/or management processes.
- PG 3. Graduates should develop professionally through a commitment to life-long learning.

Student Learning Outcomes

Students should demonstrate...

- SLO 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- SLO 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
- SLO 3. an ability to communicate effectively with a range of audiences
- SLO 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.
- SLO 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
- SLO 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

SLO 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

A departmentally developed curriculum map can be found in Appendix 1 that shows the connections between courses and student learning outcomes.

Attainment of PG 1 is supported by Student Outcomes: 1,2,4,6

Attainment of PG 2 is supported by Student Outcomes: 3,4,5

Attainment of PG 3 is supported by Student Outcome: 7

Assessment Methods

1. *Course Components* are grades on a specific, recurring assignment or collection of assignments in a specific course. The assignment must be common to all faculty who teach the course.
2. *FE Exam* provides a measure of Civil Engineering content knowledge. The FE Exam topic area ratio scores provided to CEE by the National Council of Examiners for Engineering and Surveying. CEE requires all students to take the FE exam, so our scores are representative of all students.
3. *Final Course Grades* are accumulated across a graduating class. That is, the average grade in a specific course for all the students who graduated in a given term.
4. *Course Instructional Outcome Surveys and Senior Exit Surveys* are Likert scale survey questions. All have 4 answers: Strongly Disagree, Disagree, Agree, and Strongly Agree. CEE is experimenting with annual alumni surveys due to low response rates.

Expected Levels of Attainment: Because of scale differences between metrics, CEE has implemented color-coding to aid in the review process. The color coding and the criteria used in its application are found below:

SLO Attainment Color Coding Criteria

Color Code			
Attainment Level	Unacceptable	Acceptable	Excellent
Metric	Criteria		
Course Components (Out of 100)	Average < 70	Average ≥ 70	Average ≥ 80
FE Exam Ratio Scores (CEE Performance Index / Comparator)	Ratio Score < 0.80	Ratio Score ≥ 0.80	Ratio Score ≥ 0.90
Final Course Grades (4-Point Grading Scale)	Average < 2.50	Average ≥ 2.50	Average ≥ 2.75
Course Instructional Outcome Surveys (Out of 4)	Average < 2.50	Average ≥ 2.50	Average ≥ 2.75
Senior Exit Surveys (Out of 4)	Average < 2.50	Average ≥ 2.50	Average ≥ 2.75

The faculty chose to include multiple metrics for each SLO. Multiple metrics help the faculty to avoid unneeded reactions to statistical outliers that occur during any evaluation. As such, the occurrence of a single Unacceptable rating will not necessarily require a response.

The thresholds for a required response are:

- Multiple metrics in the red in a single academic year for a given outcome
- Single metrics in the red in consecutive academic years for a given outcome
- Multiple metrics that remain “in the yellow” (i.e., satisfactory) in multiple academic years for a given outcome. Yellow followed by red and vice versa are considered multiple “satisfactory” years as well as single years in the red.

In addition to these required responses, there are three additional ways in which responses may be initiated. During their reviews of the metrics, the Chair, the Faculty, or the Advisory Board can request action or further investigation even if all the metrics are Excellent. This flexibility allows the opportunity to begin investigations before they are required, hopefully reducing our response time in applying improvements. It also allows for improvements even when there are no issues.

Annual Schedule for Continuous Improvement

A new annual continuous improvement review schedule was proposed and introduced in Fall 2014. This new schedule leverages our existing year-round continuous improvement process and adds program-level reviews to that calendar. As noted above, this portion of the continuous improvement process continued despite the change-of-leadership issues, which affected a previous mid-cycle review.

Reminders of the new schedule will be integrated into the typical meeting agendas so that any future changes in departmental leadership should not result in lapses. There are two key events in the new schedule that will provide for program-level assessment, the CEE Fall Faculty Retreat and the CEE Fall Advisory Board Meeting. At each of these meetings, the CEE Chair presents all data from the prior academic year for review. If data indicate a need for programmatic review or action, or if the faculty or the Advisory Board wish to initiate a response where none is required, the CEE ABET committee will be notified of the need to initiate appropriate investigations and provide recommendations for improvement to the CEE faculty and/or the Advisory Board at the beginning of the Spring semester, if possible.

While the actual process is continuous, its components are presented herein based on the academic calendar, i.e., starting in August. In August, the CEE Faculty Fall Retreat includes a faculty review of all Student Outcome metrics plus any supplemental information deemed significant by the chair. This allows the faculty to determine if any required or desired actions are needed and to then assign such tasks to the ABET Committee. The faculty also review our Program Educational Objectives and departmental Vision and/or Mission statements to ensure they remain current. This meeting includes discussion of recent implementations from past reviews and continuing discussion of new actions under consideration as needed.

In October/November, the Advisory Board reviews Student Outcome metrics to add their insight and requests for investigation to those of the faculty. They also review any planned or recently implemented program changes.

The ABET Committee meets as needed through the fall semester to address any assigned tasks.

In March/April, the CEE Chair reviews Fall (July-December) FE Exam results. The Advisory Board also reviews both Program Educational Objectives and departmental Mission/Vision statements to give input for the upcoming Fall Faculty Retreat.

In June/July, Spring FE Results are typically received and staff tabulate all Student Outcome metrics from the prior academic year. These metrics are then reviewed by the Chair in preparation for the Fall Faculty Retreat, at which point the cycle begins again.

This schedule provides for annual opportunities to identify and react to both course-level and program-level issues as they become apparent. Thus, in addition to helping reduce dependence on a large-scale mid-cycle and end-of-cycle review, the new schedule allows for faster response to program-level issues.

Results

SLO 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Previously, the final technical (mentor) grade in the capstone course was used as the only direct assessment for SLO 1. Now, in order to robustly and adequately assess students' attainment of SLO 1, multiple course assessments will be used to demonstrate attainment. Courses chosen are required courses across the breadth of the curriculum such that all students would be assessed in each course. In each of these courses, specific final exam questions focusing on complex engineering problems were selected for assessment in order to ensure questions were "complex". The final exams in these courses were deemed to include at least 60% complex engineering problems in order to allow for a more robust assessment. In some courses, the entire final exam was considered to be exclusively composed of complex problems. Complex engineering problems were defined as "involving wide-ranging or conflicting technical issues, having no obvious solution, addressing problems not encompassed by current standards and codes, involving diverse groups of stakeholders, including many component parts or sub-problems, involving multiple disciplines, or having significant consequences in a range of contexts." Examples of these exams are included in the Appendix A.

The courses chosen, including applicable prerequisites in engineering, science, and mathematics, were:

1. CEE 3320 Structural Mechanics (Prerequisites: MATH 1920 Calculus II, PHYS 2110 Calculus-based Physics I, and CEE 3110 Mechanics of Materials)
2. CEE 3413 Environmental Engineering (Prerequisites: MATH 2110 Calculus III and CHEM 1110 Chemistry I)
3. CEE 3610 Transportation Engineering (Prerequisites: MATH 2110 Calculus III and CEE 3020 Surveying)
4. CEE 4800 Geotechnical Engineering (Prerequisites: GEOL 3210 Geology for Engineers and CEE 3030 Civil Engineering Materials)

Due to a change in the curriculum effective Fall 2021, it is anticipated that an additional required course, CEE 3500 – Introduction to Construction Engineering and Management, will be included in the list of assessed courses in the future.

Revised metrics for SLO 1 moving forward are shown in the table below. A Satisfactory (yellow) metric is noted for CEE 3610 for the 20-21 academic year. At this time, no action is necessary per the response thresholds noted previously. This metric will be closely monitored in upcoming semesters.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
Final Exam Component Grades - "Complex Engineering Problems"												
CEE 3320											81.4	74.7
CEE 3413											80.9	73.3
CEE 3500 - effective Fall 2021												
CEE 3610											78.0	77.1
CEE 4800											88.8	87.3
Senior Exit Surveys												
Survey question - (1a) - "Identify"								3.64	3.83	3.68	3.64	3.45
Survey question - (1b) - "Formulate"								3.54	3.75	3.63	3.55	3.45
Survey question - (1c) - "Solve"								3.62	3.63	3.68	3.61	3.36
Co-op Employer Survey												
"Identifies, formulates and solves complex engineering problems"										4	1	1
										3.46	3.20	3.20

SLO 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

For SLO 2, the faculty feel strongly that the best metrics come from CEE 4950 Senior Design Project, as this course provides the most comprehensive design experience. The two most direct metrics from this course are the final technical grades from Mentors and Faculty. The SLO 2 metrics are shown in the table below.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
CEE 4950 Senior Design Course Components												
Mentor Grade on Final Report - Engineering Design	88.6	86.0	76.4	87.0	90.2	89.2	93.5	86.0	87.6	COVID	86.7	89.3
Faculty Grade on Final Report - Engineering Design									85.2	COVID	86.6	86.0
Assessment of Needs - CEE 4950 Ch 2 "Beyond the Numbers"									92.0	COVID	91.2	81.1
Senior Exit Surveys												
Single survey question covers "Apply engineering design"								3.50	3.58	3.65	3.48	3.55
Single survey question covers "consideration of..."								3.50	3.71	3.72	3.67	3.73
Single survey question covers "...factors"								3.31	3.50	3.48	3.39	3.55
Co-op Employer Survey												
"Considers public health, safety, and welfare..."									4	1	1	
									3.00	3.20	3.20	

While the grade that students obtain in CEE 4950 is comprised of a multitude of individual components, both the mentor and faculty grades used for assessment in Student Outcome 2 are specifically focused on engineering design. The same general rubric, focusing on the technical portion of engineering design, is used for both faculty and mentors as shown in Figure 1. Figure 2 illustrates the separate rubric used in the capstone course for the second portion of SLO 2 - "...with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors."

Figure 1. Faculty and mentor rubric for technical portion (Engineering Design) of CEE 4950 final report.

Design - Appropriate standards used, determination of "loads", analysis undertaken	(a) Design work done to-date matches with expectation; (b) Design considerations are clearly spelled out (project parameters, loads, etc); (c) Analysis uses appropriate professional design standards and software - these standards are referenced; (d) Analysis is done correctly	Comments:
Results of design	(a) Results of design are presented in tables and/or figures; (b) Where applicable, results of design are presented in Drawings done to standard - E.g., appropriate details are presented; scales are shown; axis, where applicable, are labeled; all dimensions in the appropriate units are shown; (c) end of chapter summary is provided and appropriate in content; (d) introduction to chapter is provided and appropriate in content	Comments:

Figure 2. Rubric for Assessment of Needs

Every discipline uses ABET Keywords in their paragraph: public health, public safety, public welfare, global factors, cultural factors, social factors, environmental factors, economic factors	/ 20
Every discipline identifies public safety as a consideration The associated method is "followed appropriate standards." Standards should be identified by agency or entity (like AASHTO), not by resources (not the title of any of AASHTO's books)	/ 20
Every discipline also identifies at least one more consideration and associated method	/ 20
The consideration(s) the group identified are reasonable	/ 10
The group did not miss any other consideration(s) high grade = didn't miss any, low grade = missed several	/ 10

No issues are noted with Student Outcome 2. Thus, no action is indicated at this time according to the thresholds indicated above.

SLO 3. an ability to communicate effectively with a range of audiences

Communication skills continue to be assessed separately for both oral and written in CEE 4950. Written communication skills are directly measured for both the technical report and poster presentation. The oral presentation component will be separated out moving forward in both semesters as "Presentation Skills", so as to not include the "Quality of Slides," which functions as a measure of both written and oral communication skills.

SLO 3 metrics are shown in the table below.

CEE 4950 Senior Design Course Components												
CEE 4950 Senior Design - Written Report (Technical Writing)	81.4	83.0	74.8	86.0	80.1	87.4	86.5	84.4	87.6	COVID	95.1	83.3
CEE 4950 Senior Design - Oral Presentation (Presentation Skills)			89.9		93.0		90.0		93.3	COVID	95.6	91.5
CEE 4950 Senior Design - Oral Presentation (Quality of Slides)			91.9		93.8		89.3		95.2	COVID	93.6	91.0
CEE 4950 Senior Design - Poster Presentation		91.0	92.4	88.2	93.2	90.2	91.6	90.7	90.1	COVID	COVID	91.6
Senior Exit Surveys												
Single survey question covers (3) - Writing							3.35		3.38	3.48	3.58	3.27
Single survey question covers (3) - Oral							3.29		3.50	3.36	3.48	3.45
Co-op Employer Survey												
"Produces effect written communications..."										4	1	1
"Delivers effective oral presentations..."										3.20	3.20	4.00
										3.60	2.40	4.00

No issues are noted with Student Outcome 3. Thus, no action is indicated at this time according to the thresholds indicated above.

SLO 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.*

In order to capture different parts of SLO 4, the outcome was split into two parts, with their respective direct assessment metric.

1. “an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments...”
2. “...which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.”

For both parts of SLO 4, CEE 4920 Professionalism and Ethics was used. Previously, the main focus was on the final course grade. However, for the Spring 2020 semester, two new assignments were to be given to students in order to directly assess this outcome. Unfortunately, due to the COVID situation and transition to online course content, these assessments were not conducted but are planned for future semesters.

SLO 4 metrics are shown in the table below.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
FE Exam Ratio Scores												
Ethics & Business Practices	1.06	0.96	0.81	1.01	1.01	0.96	1.01	1.06	0.84	COVID	0.92	0.90
Instructional Outcome Survey Question(s)												
CEE 4920 Professionalism and Ethics	3.77	3.71	3.67	3.74	3.79	3.62	3.62	3.79	3.35	COVID	3.66	3.44
Senior Exit Surveys												
Single survey question covers "ethical and professional responsibilities..."								3.57	3.57	3.54	3.76	3.45
Single survey question covers "make informed judgments..."								3.50	3.57	3.44	3.48	3.36
Co-op Employer Survey												
"Recognizes professional and ethical responsibilities"									4		1	1
"Displays an understanding...impact of engineering (including global, cultural...)"									3.40	3.46	4.00	3.20
											3.20	2.40

No issues are noted with Student Outcome 4. Thus, no action is indicated at this time according to the thresholds indicated above.

SLO 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*

SLO 5 was broken into three parts for assessment. Many of the assessments were similar to the previous student outcomes.

1. “an ability to function effectively on a team whose members together provide leadership...” – CEE 4950 Senior Design focused on leadership such that a previous assessment was given on leadership and has been carried over to the new student outcome.
2. “...create a collaborative and inclusive environment...” – Peer evaluations are a part of our CEE 4950 grading scheme. In other words, students are directly assessing each other regarding their group. While part of this assessment could fall under the “function effectively on a team...” part of the student outcome, it was strongly felt that a collaborative and inclusive environment is fundamental to the function of a team. As such, the prior peer evaluation has been continued, albeit with slightly different assessment wording.
3. “...establish goals, plan tasks, and meet objectives...” – Students were previously assessed on management principles, which will continue under the new student outcomes. In addition, to increase focus on these principles, in Fall 2019, students were required to further apply this portion of the student outcome by creating a project management schedule in Microsoft Project. This schedule was assessed by both mentors and faculty. The new metric will continue to be improved upon in future semesters.

SLO 5 metrics are shown in the table below.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
CEE 4950 Senior Design Course Components												
CEE 4950 Senior Design - Leadership paper		82.0	73.6	85.0	79.7	77.0	92.6	75.0	95.0	COVID	85.0	92.5
CEE 4950 Senior Design - Management paper		75.0	72.8	91.0	85.7	79.0	77.0	88.0	93.0	COVID	81.6	91.3
CEE 4950 Senior Design - Project Mgmt (MS Project)									80.0	COVID	91.2	91.8
CEE 4950 Senior Design - Peer Eval	87.4	88.0	88.0	91.0	77.3	92.0	81.6	95.0	94.7	COVID	93.3	89.9
Instructional Outcome Survey Question(s)												
CEE 4950 Senior Design	3.77	3.80	3.60	3.77	3.54	3.88	3.40	3.69	3.69	COVID	3.55	3.78
Senior Exit Surveys												
Single survey question covers leadership								3.36	3.46	3.52	3.61	3.73
Single survey question covers collaborative and inclusive environment								3.46	3.58	3.50	3.55	3.55
Single survey question covers "establish goals, plan tasks, and meet objectives"								3.50	3.67	3.48	3.58	3.36
Co-op Employer Survey												
"Works effectively with other employees"									4	1	1	
"Establishes goals, plans tasks, meets objectives"									3.80	4.00	4.00	
									3.40	3.20	4.00	

No issues are noted with Student Outcome 5. Thus, no action is indicated at this time according to the thresholds indicated above.

SLO 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

In order to capture different parts of SLO 6, the outcome was split into three parts, with their respective direct assessment metric. Previously, assessment was conducted primarily using the final course grade or final lab component grade for those courses containing a laboratory component. In essence, all parts of the student outcome were lumped together. In order to extrapolate any potential issues, an attempt was made to focus exclusively on four lab-based courses where formal lab reports are submitted by the students. Therefore, for each of the four courses, the final lab report was chosen as the most appropriate measure, broken down into three parts.

1. “an ability to develop and conduct appropriate experimentation, ...” – As can be seen in the table below, respective lab reports chosen for assessment were broken down by report section. The Introduction and Methodology sections were chosen to represent the “develop and conduct” portions of this student outcome.
2. “...analyze and interpret data...” – The Results and Discussion section(s) of respective lab reports were chosen to represent the “analyze and interpret” portions of this student outcome.
3. “...and use engineering judgment to draw conclusions.” – The Conclusion section was used to assess this portion of the student outcome.

Because of the differences between labs and faculty teaching those labs, coordination of activities took longer than the other student outcomes. By the beginning of January 2020, all labs had a plan for documenting this student outcome; however, due to COVID, not all labs were conducted and subsequently, data are unavailable for some labs. At the same time, some data could be collected from prior semesters. Moving forward, it is expected that all data will be collected.

SLO 6 metrics are shown in the table below.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21		
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	
Average Course Component Grades													
"Develop and Conduct" - Introduction and Methodology													
CEE 3030												3.95	86.0
CEE 3040									3.57	3.33		3.94	3.68
CEE 3120								3.63		3.58		3.67	3.78
CEE 3430								3.67	3.75	3.52	3.13	3.71	88.3
"Analyze and Interpret" - Results and Discussion													
CEE 3030												3.58	68.0
CEE 3040									3.20	2.80		2.75	3.42
CEE 3120								3.53		3.49		3.55	3.50
CEE 3430								3.52	3.81	3.86	3.82	3.40	89.9
"Use Eng. Judgment" - Conclusions													
CEE 3030												3.57	70.0
CEE 3040									3.20	3.24		3.13	3.42
CEE 3120								3.53		3.39		3.55	3.34
CEE 3430								3.37	3.8	3.81	3.68	3.72	90.2
Senior Exit Surveys													
Single survey question covers "develop and conduct"								3.14		3.50	3.38	3.45	3.45
Single survey question covers "analyze and interpret"								3.50		3.67	3.56	3.73	3.64
Single survey question covers "draw conclusions"								3.21		3.75	3.60	3.64	3.36
Co-op Employer Survey													
"Uses engineering judgement to draw conclusions"										4		1	1
										3.40		3.20	3.20

No issues are noted with Student Outcome 6. Thus, no action is indicated at this time according to the thresholds indicated above.

SLO 7. *an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.*

During the Fall 2020 semester, the final technical (mentor) grade in the capstone courses was dropped from use as a measure of attainment for SLO 7. Instead, components of a student project were chosen to demonstrate attainment of the student outcome. The course, CEE 4800 Geotechnical Engineering, is a senior-level required course in the curriculum.

In the course project, students are required to research a topic in geotechnical engineering beyond what is taught in class (“acquire new knowledge”) and develop an informational resource covering the topic (“apply new knowledge”). Since this project has been conducted for several semesters, some prior semester data could be obtained.

The revised metrics for SLO 7 are presented in the table below.

	2015-16		2016-17		2017-18		2018-19		2019-20		2020-21	
	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr	Fall	Spr
Specific Course Assignment												
CEE 4800 Project - Report - Technical Summary - "Acquire"									88.3		82.2	86.7
CEE 4800 Project - Resource - Technical Content - "Apply"									83.9		82.5	85.0
Senior Exit Surveys												
Single survey question covers "acquire"							3.64	3.67	3.56		3.61	3.36
Single survey question covers "apply"							3.64	3.75	3.52		3.61	3.55
Co-op Employer Survey												
"Displays an ability to acquire and apply new knowledge"									4		1	1
									3.60		4.00	3.20

No issues are noted. Thus, no action is indicated at this time according to the thresholds indicated above.

Modifications for Improvement:

SO 1, SO 2, & SO 7

As part of the 6-year ABET accreditation process for the BSCE program, a reaccreditation visit occurred in Fall 2020. From this review, one weakness was initially documented:

“This criterion requires the program to regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The documents provided by the program show that student outcome (1) is assessed directly using an overall "Mentor (Technical) Grade" on the final report for CEE4950, Senior Design Project, and indirectly assessed using a question in the Senior Exit Survey. However, the provided rubric used to calculate the Mentor (Technical) Grade for the final report of CEE4950 does not explicitly measure a student's ability to solve complex engineering problems by applying principles of engineering, science, and mathematics. Similarly, student outcomes (2) and (7) are also directly assessed using the same overall Mentor (Technical) Grade on the final report of CEE4950 without explicit scoring criteria related to those outcomes in the grading rubric. The Mentor (Technical) Grade on the final report of CEE4950 was the only direct assessment method used to assess these three student outcomes. While the program has a documented process for assessing and evaluating the extent to which the student outcomes are being attained, the extent of attainment of

outcomes (1), (2), and (7) is confounded by the use of an overall grade. Thus, the program lacks strength of compliance with this criterion.”

We acknowledge that the use of the same overall grade from CEE 4950 Senior Design for three Student Outcomes does not permit independent consideration of the extent of attainment of Student Outcomes (1), (2), and (7).

A revision of the assessment metrics and addition of new assessment metrics during the Fall 2020 semester was implemented to provide unique metrics for each of the three noted Student Outcomes. This due process response provides a summary of the changes to the assessment metrics to eliminate the confounding of results for Student Outcomes (1), (2), and (7).

It should also be noted that Co-op employer survey results have been added to all student outcomes as an external, but indirect, measure of attainment of the student outcome. The caveat with this particular data, though, is that the sample size may be fairly low. The sample size is given above the associated data. In other words, in a given semester, only one (1) to four (4) Co-op employer surveys may be received. Therefore, this data must be analyzed carefully as there may be significant fluctuations from semester-to-semester. While not part of the response to the aforementioned Weakness, this metric provides another performance indicator for all student outcomes as well as an indication of continuous improvement.

SO 5

Starting Fall 2019, students were required to further apply management design principles by creating a project management schedule in Microsoft Project. The assignment provided an additional assessment measure for SO 5 and an additional assignment to support students' application of management principle. Results from 2019-20 and 2020-21 show improvement in students' performance on this learning outcome.

Appendices

1. Curriculum Map

