

2013 Annual Assessment Report and Action Plan Construction Engineering Management Program

The terminology “Program Desired Learning Outcomes (PDLO’s)” of the 2012 assessment has been replaced with “Student Outcomes”, for consistency within the CCE School. Results of surveys from 30 graduating seniors, 16 alumni from the class of 2008, 8 alumni from the class of 2011, and 18 employers were reviewed by CEM faculty and the CEM Industry Advisory Committee of the CCE Industry Advisory Board. The surveys of graduating seniors were conducted by EBI for June 2013 graduates. The surveys of alumni and employers were conducted by the CCE School in June 2013. The following strengths and weaknesses were noted:

Strengths:

1. Overall customer satisfaction remains high:
 - a. Average scores for 27 respondents to the senior exit survey for “The Bottom Line – Overall Evaluation – Extent that the undergraduate engineering program experience fulfilled expectations” was 6.37 on the 7.0 scale, exceeding the target minimum score of 4.9.
 - b. Eight of eight 2011 graduates responding to the alumni survey were very satisfied or moderately satisfied with the educational preparation received in the OSU CEM program. Average score was 6.5 on the 7-point scale.
 - c. Sixteen of sixteen 2008 graduates responding to the alumni survey were very satisfied or moderately satisfied with the educational preparation received in the OSU CEM Program. Average score was 6.75 on the 7-point scale.
 - d. After throwing out very dissatisfied responses from two respondents because their write-in comments were very positive (indicating a misinterpretation of the question), all remaining respondents to the employer survey reported that they were very satisfied (8) or moderately satisfied (9) with the “average recent OSU CEM graduate’s educational preparation.” Average score was 6.47 on the 7-point scale.
 - e. In 2013, graduating seniors in CEM scored their “Overall Program Effectiveness” (6.27/7) and “Overall Learning” (tie at 6.12/7) highest of any of the programs in the College of Engineering, and scored “Overall Satisfaction” (6.32/7) second highest of COE programs.
2. Achievement of CEM Program Student Outcomes remains high:
 - a. Average scores for graduating seniors for 16 of 17 Student Outcomes exceeded the target minimum of 4.9 on the 7.0 scale. “Knowledge of contemporary issues” was the one Student Outcome that did not meet the minimum, with a score of 4.85, with 27 graduates responding.

- b. For alumni from the 2008 graduating class, average scores for 16 of 17 Student Outcomes exceeded the target minimum of 4.9 on the 7.0 scale. Sixteen alumni responded to the survey. Like the 2013 graduating seniors, “Knowledge of contemporary issues . . .” was the one Student Outcome that did not meet the minimum. The average score was 4.4.
- c. For alumni from the 2011 graduating class, average scores for 16 of 17 Student Outcomes exceeded the target minimum of 4.9 on the 7.0 scale. Eight alumni responded to the survey. “Understanding impact of engineering solutions in a global/societal context . . .” was the one Student Outcome that did not meet the minimum. The average score was 4.4.
- d. Average scores from 19 employers for 16 of 17 Student outcomes exceeded the target minimum of 4.9 on the 7.0 scale. Like the 2013 graduating seniors and the alumni from the 2008 graduating class, “Knowledge of contemporary issues . . .” was the one Student Outcome that did not meet the minimum. The average score was 4.8.

Weaknesses:

1. Graduating seniors, alumni from 2008, and employers on average, rated Student Outcome J, “Knowledge of contemporary issues, including public policy” below 4.9 on the 7-point scale. Scores were 4.85, 4.8, and 4.8 respectively. These scores are only slightly below the target minimum score of 4.9, but this is considered a weakness.
2. Alumni from the class of 2011, on average, rated their preparation for Student Outcome H, to understand the “. . . impact of engineering solutions in a global, economic, environmental, and societal context,” at 4.4 on the 7-point scale. This is below the target minimum score of 4.9, but reflects input from only eight alumni.

Summary and Action Plan: (After Discussion with IAC, November 1, 2013)

1. Weakness 1 – preparation for “knowledge of contemporary issues, including public policy”: This is one of the ABET a)-q) outcomes adopted by the CEM Program around the turn of the century for consistency across the CCEE Department. After 2014, the CEM Program will be working toward approximately 21 outcomes defined by ACCE that will not include this outcome. CEM may still adopt it as an outcome if it chooses to do so, but the CEM Program recommends that it be dropped. Consequently, no action is required
2. Weakness 2 – preparation for understanding “. . . the impact of engineering solutions in a global/societal context.”: This is one of the ABET a)-q) outcomes adopted by the CEM Program around the turn of the century for consistency across the CCEE Department. After 2014, the CEM Program will be working toward approximately 21 outcomes defined by ACCE that will not include this outcome. CEM may still adopt it as an outcome if it chooses to do so, but the CEM Program recommends that it be dropped. Consequently, no action is required
3. The response of only 8 alumni from the class of 2011 (from an e-mail list of 41 from a class of over 80 graduates) is a cause for concern. The CEM Program will follow the IAC’s recommendation to also solicit employers of large numbers of CEM graduates to encourage any of their employees from the target class to respond to the survey. Forming a Linked-in group for graduating CEM seniors each year is a possible method for improving response that will be attempted in 2014. If response rates are not better for future alumni surveys, other methods of outcomes assessment must be considered.
4. Communications, written and oral, formal and informal: As usual, communications is considered extremely important by all constituencies, and preparation is not as good as all would like. CEM faculty will continue to include as many written and oral communications exercises as can be reasonably incorporated into the curriculum. CEM faculty will consider proposing teaching the writing intensive course (Construction Project Management) twice a year rather than once a year to cut the class size in half. CEM faculty will consider requiring the Obtaining Construction Contracts class and teaching it twice a year. In addition, the CCE School is adding a writing resource person to the staff to assist with writing in all CCE coursework.
5. Negotiation: Negotiation continues to be a topic where improvement of preparation is desirable. A negotiation exercise will be introduced in CEM 443, Construction Project Management.

6. Risk Management: Risk Management continues to be a topic where improvement of preparation is desirable. The risk assessment exercise recently introduced into CEM 442, Building Construction Management, will be retained. CEM faculty will consider introduction of a risk management class. (At the January 8, 2014 CEM Faculty meeting, it was decided that a separate class is not warranted.)
7. Estimating: Estimating continues to be a topic where improvement of preparation is desirable. Assessments will continue to be monitored to see if changes in the structure of the two estimating courses implemented in the 2012 – 2013 time frame are producing positive results.
8. Submittals: Ability to effectively process submittals continues to be a topic where improvement of preparation is desirable. The submittal exercise introduced into CEM 442 will be retained. In addition the submittal process is discussed in other required courses. The need for submittals and administrative procedures associated with them are topics in CE 424, Contracts and Specifications, and in CEM 443, Construction Project Management. Both are required courses. Discussion of write-in comments from the employer and alumni surveys of the 2013 cycle seem to indicate that greater depth of understanding in technical courses may help improve submittal processing preparation. The CEM faculty believes that devoting significantly more effort to the topic of submittals would lean toward training and detract from the overall goal of educating future construction managers and industry leaders. No action is planned.
9. Field Operations: Knowledge of field operations and issues continues to be a topic where improvement of preparation is desirable. The CEM 407 junior field-trip will be retained. Summer internships will continue to be actively promoted.
10. Relevant, practical, work experience: Summer internships will continue to be actively promoted. CEM faculty will consider devoting student chapter speaker meeting time Fall Quarter each year to having interns report on their internship experience during the summer. One option to be considered will be to require that each presenting company include a brief presentation from their intern(s). (At the January 2014 CEM Faculty/Staff meeting, Lauren agreed to add this request for presenting companies.)
11. Safety: A job hazard analysis component will be introduced in the CEM 443, Construction Project Management, term project. The CEM faculty will consider replacing the required H 385 safety course with a safety course offered by CEM faculty. (At the January 2014 CEM Faculty meeting, discussion resulted in the decision to continue having the H 385 course as the required safety course.)
12. Understanding of building codes: CEM faculty believe that CEM graduates should know enough about building codes to ask the right questions of owners, designers, and code officials. The CEM faculty does not see a practical way to

introduce more coverage of building codes without detracting from overall educational objectives. However, the low scores indicate that consideration of further action is needed. Can code exercises be incorporated in existing project assignments? Can incorporation of codes be included in the estimating courses? Do students learn somewhere how to access codes? (After a lengthy discussion at the January 2014 CEM Faculty meeting, no practical method was found to improve coverage of building codes in the curriculum.)

13. Ability to function effectively away from computers: The 2013 assessment indicates that employers see preparation to be below the target minimum. CEM faculty questions the value of the question. Technological advancements mean that future CEM graduates will seldom be away from computers, tablets, and smart phones. Discussion at the November 1, 2013 industry advisory committee resulted in the decision to drop the question from future surveys.
14. Planning and Scheduling: Discussion at the June 2013 IAC meeting and the September 2013 CEM faculty meeting indicate that the low preparation score may be based on an expectation that graduates will be familiar with the details of whatever construction process that they are to schedule. On-the-job experience is really required to achieve this level of preparation. The survey question will be reworded to replace “planning and scheduling” with “knowledge of scheduling basics and ability to work with scheduling software such as P6.” The CEM faculty will consider requiring the Obtaining Construction Contracts class as part of the CEM graduation requirements. (At the January 2014 CEM Faculty meeting, it was agreed that, starting with the 2015-2016 academic year, CEM 431 would be required for CEM graduates and that it would be offered Fall and Winter Quarters. A Category II Proposal is required.)
15. Future ACCE Outcomes: The CEM faculty will review the CEM curriculum in light of the new standards, including new student learning outcomes, to be implemented after the 2013-2014 academic year. (At the January 2014 CEM Faculty meeting, discussion indicated that major changes are not likely to be required. The topic will be addressed more thoroughly after the October 2014 visit by the ACCE reaccreditation team and after the new ACCE-mandated student outcomes have been formally adopted. At that time the CCE strategic planning activity will also be resumed.)

Appendix A: Other Assessment Information from 2013:

1. One topic with average scores for preparation below the target minimum for employers and alumni in both the 2012 and 2013 assessment cycle (see table below) was “understanding of building codes.” It should be noted that importance scores by employers are also low. Time did not permit discussion of this lower priority at the June 2013 Industry Advisory Committee meeting. The CEM faculty did discuss this topic at their September 26 meeting. At that meeting it was noted that local building code officials present in CEM 442, Building Construction Management, each year. The CEM faculty believes that building codes are not a high priority for emphasis – the students need to know enough to ask the right questions of owners, designers, and code officials. The CEM faculty has no action to recommend, pending discussion with the IAC.

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	4.7	4.7	0.0
2013 Employer	3.9	4.9	-1.0
2005-2010 Alumni (57) surveyed in 2012	4.1	5.2	-1.1
2011 Alumni (08) surveyed in 2013	3.6	5.5	-1.9
2008 Alumni (15) surveyed in 2013	3.9	5.4	-1.5

2. “Ability to function effectively away from computer” was an ability scored low by employers and alumni in the 2013 assessment cycle (see table below). The CEM faculty did not have any recommendation for action regarding this ability. It may be argued that as technological change continues to accelerate, it will be highly unlikely that graduates will be away from their computers, or smart-phone surrogates. Perhaps the question needs to be reworded or eliminated.

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	5.4	6.2	-0.8
2013 Employer	4.5	6.1	-1.6
2005-2010 Alumni (57) surveyed in 2012	5.0	5.6	-0.6
2011 Alumni (08) surveyed in 2013	4.9	6.4	-1.5
2008 Alumni (15) surveyed in 2013	5	5.8	-0.8

3. The 2013 average employer rating below target minimum for preparation for planning and scheduling was discussed at the June 27 IAC meeting and at the September 26 CEM faculty meeting (see table below). The CEM faculty agreed with the IAC meeting summary that noted that, “. . . the parts of planning and scheduling where improved preparation is desired is in the knowledge of sequencing of construction activities that is only fully developed through on-the-job experience with specific types of construction. Perhaps the question should be phrased to assess the preparation in knowledge of scheduling basics and ability to work with scheduling software such as P6.” The CEM faculty agreed that the topic is of very high importance. Requiring the “Obtaining Construction Contracts” class experience for all graduates would probably improve preparation.

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	5.9	6.4	-.5
2013 Employer	4.8	6.4	-1.6
2005-2010 Alumni (57) surveyed in 2012	5.1	6.2	-1.1
2011 Alumni (08) surveyed in 2013	5.2	6.8	-1.6
2008 Alumni (15) surveyed in 2013	5.3	6.1	-0.8

Appendix B: Follow-Up on 2012 “Assessment Report and Action Plan”:

Each item from the 2012 document is reproduced in italics, followed by discussion of action(s) taken.

1. *Overall ratings of customer satisfaction indicate that there are no serious, significant issues that need to be addressed. No action required*
2. *Although the graduating seniors rating for “Ability to design and conduct experiments including analysis and interpreting data” fell below the target minimum score (4.82 vs. 4.9), this PDLO was rated 14 of 17 in importance by the alumni and 17 of 17 in importance by the employers. The employers rated the preparation substantially higher than the importance (5.4 vs. 4.5). No action is required. No action has been taken for reasons stated.*
3. *Although the alumni rating for PDLO “Understanding contemporary issues, including public policy” fell below the target minimum score (4.3 vs. 4.9), this PDLO was rated 16 of 17 in importance by the alumni, and 15 of 17 in importance by the employers. The employers and graduating seniors gave passing scores (5.0 and 5.4) for preparation. No action is required. No action has been taken for reasons stated. The fact that 3 of 4 constituencies in the 2013 assessment cycle rated this preparation below the target means that this outcome will again be reviewed and discussed.*
4. *Because of the high importance placed on effective communication, faculty should be continually looking for practical opportunities to include in their courses exercises that improve communication skills. No specific additions were noted. Courses continue to require significant communication exercises. Assessments in 2013 produced similar results as resulted in 2012, although somewhat lower (see table below).*

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates	5.52		
2013 Graduates	5.39		
2012 Employer	5.9	6.7	-0.8
2013 Employer	5.7	6.7	-1.0
2005-2010 Alumni (57) surveyed in 2012	5.5	6.6	-1.1
2011 Alumni (08) surveyed in 2013	6.2	7	-0.8
2008 Alumni (15) surveyed in 2013	6.1	6.3	-0.2

5. *CEM faculty will consider adding a negotiation component to the Construction Project Management class and look for opportunities to include negotiation exercises in all coursework that they teach. Consideration was given, but no action was taken. The 2013 assessment cycle retained preparation values above the 4.9 minimum, but with a larger gap between importance and preparation for the employer survey (see table below).*

	<i>Preparation</i>	<i>Importance</i>	<i>Gap (Prep.- Imp)</i>
2012 Graduates	5.2		
2013 Graduates	5.4		
2012 Employer	5.4	6.1	-0.7
2013 Employer	5.0	6.1	-1.1
2005-2010 Alumni (57) surveyed in 2012	5.1	6.3	-1.2
2011 Alumni (08) surveyed in 2013	5.8	6.8	-1.0
2008 Alumni (15) surveyed in 2013	5.7	6.0	-0.3

6. *CEM faculty will work with Dr. Sillars to determine an appropriate risk assessment addition to CEM 343, Construction Planning and Scheduling, or CEM 342, Estimating II. Instead, Dr. Sillars added an exercise in CEM 442, Building Construction Management. The 2013 assessment cycle showed little change, except a larger gap between importance and preparation in the employer survey (see table below).*

	<i>Preparation</i>	<i>Importance</i>	<i>Gap (Prep.- Imp)</i>
2012 Graduates	5.2		
2013 Graduates	5.6		
2012 Employer	5.4	6.1	-0.7
2013 Employer	5.1	6.5	-1.4
2005-2010 Alumni (57) surveyed in 2012	5.1	6.4	-1.3
2011 Alumni (08) surveyed in 2013	5.0	6.1	-1.1
2008 Alumni (15) surveyed in 2013	5.7	6.4	-0.7

7. *CEM faculty will check future assessments to determine if 2011-2012 changes in the two estimating courses are changing scores for construction estimating*

preparation. The gap between importance and preparation for estimating increased in the 2013 assessment cycle for the employer survey (see table below). The preparation score by employers remains slightly above the target minimum of 4.9.

	<i>Preparation</i>	<i>Importance</i>	<i>Gap (Prep.- Imp)</i>
2012 Graduates			
2013 Graduates			
2012 Employer	5.3	6.2	-0.9
2013 Employer	5.0	6.3	-1.3
2005-2010 Alumni (57) surveyed in 2012	5.0	6.1	-1.1
2011 Alumni (08) surveyed in 2013	5.4	6.9	-1.5
2008 Alumni (15) surveyed in 2013	5.1	5.9	-0.8

8. *CEM faculty to determine where the introduction of a submittal processing exercise would be most practical and beneficial.* Dr. Sillars introduced an exercise in CEM 442. It will be at least one more year before any impact of this change can be detected in annual assessments. The 2013 assessment cycle showed an increase in the gap between importance and preparation for submittal processing preparation (see table below). The preparation score by employers remains slightly above the target minimum of 4.9.

	<i>Preparation</i>	<i>Importance</i>	<i>Gap (Prep.- Imp)</i>
2012 Graduates			
2013 Graduates			
2012 Employer	5.9	6.1	-0.2
2013 Employer	5	6.1	-1.1
2005-2010 Alumni (57) surveyed in 2012	4.4	5.7	-1.3
2011 Alumni (08) surveyed in 2013	4.8	6.1	-1.3
2008 Alumni (15) surveyed in 2013	4.4	6	-1.6

9. *Alumni low scores for preparation for “field operations and issues” will be discussed with the CEM Industry Advisory Committee.* The discussion with the IAC resulted in a decision by CEM faculty to add a one-day field-trip to Portland

to the CEM 407 Junior Seminar class in Fall 2013. The field-trip was a success. As may be seen in the table below, the 2013 assessment cycle also shows scores below minimum for this issue. Further action should be considered.

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	5.5	6	-0.5
2013 Employer	4.6	6.2	-1.6
2005-2010 Alumni (57) surveyed in 2012	4.5	6	-1.5
2011 Alumni (08) surveyed in 2013	4.8	6.4	-1.6
2008 Alumni (15) surveyed in 2013	4.5	6.2	-1.7

10. *CCE School Head will be reminded of the importance placed on “relevant, practical work experience” by alumni and employers.* The Acting School Head was reminded, and both he and the current School Head are aware and supportive of this priority. The Industry Outreach staff position which was vacant from July 2012 until January 2013 has been filled with an individual qualified to assist with this priority. The 2013 assessment cycle shows no real change, except that the eight alumni responding from the class of 2011 produced a score below the target minimum (see table below). This was the first time that a constituency scored this issue below the target minimum. It should be noted that the senior exit survey from 2013 showed that only 1 of 28 graduating seniors responding to the question on number of internships indicated that he or she had not had an internship.

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	5.5	6.2	-0.7
2013 Employer	5.5	5.7	-0.2
2005-2010 Alumni (57) surveyed in 2012	5.2	6.5	-1.3
2011 Alumni (08) surveyed in 2013	4.6	6.2	-1.6
2008 Alumni (15) surveyed in 2013	5.4	6.2	-0.8

11. *CEM faculty will explore addition of OSHA 10-hr or 30-hr training into existing coursework, or through the addition of a 1-credit required course.* Discussion of this issue with the industry advisory committee in 2012 did not result in a high priority for an OSHA 10- or 30-hr training. Committee members thought this training is best after employment. The CEM 443 term project has been targeted as a good place for students to conduct and document a job hazard analysis. Scores from the 2013 assessment cycle remain above the target minimum score (see table below).

	Preparation	Importance	Gap (Prep.- Imp)
2012 Graduates			
2013 Graduates			
2012 Employer	5.3	6.3	-1.0
2013 Employer	5.1	6.4	-1.3
2005-2010 Alumni (57) surveyed in 2012	5.5	6.4	-0.9
2011 Alumni (08) surveyed in 2013	5.8	6.6	-0.8
2008 Alumni (15) surveyed in 2013	5.4	5.9	-0.5

12. *The relatively low scores for importance assigned to REVIT models, NAVISWORKS clash-detection, and 4-D and 5-D models by the alumni survey should not discourage CEM faculty and the CCE School from moving forward in these areas, where higher value is generally perceived by employers.* The CEM faculty was successful in adding the new course, CCE 203, Introduction to Virtual Design and Construction, and in making the course a required course for the CEM Program. To make room for the addition, the requirement for CE 202, Geographical Information Systems, was dropped. Results of the 2013 assessment cycle verify a low “importance” for knowledge of Geographical Information Systems and reinforce the wisdom of making this change.
13. *If the need arises to make space for new content in the CEM curriculum by dropping required coursework, employer and alumni surveys suggest that deleting the required hydraulics course (CEM 311) would be a good place to start.* The 2013 assessment cycle reinforces this statement, but the course is being retained for its addition of rigor to the CEM program, and its value for preparation for the FE exam for CEM students wishing to pursue it. At this point in time, there is not a compelling need to add additional coursework into the required curriculum.