

2017 Annual Assessment Report and Action Plan

Construction Engineering Management Program

Results of surveys from 33 graduating seniors, 31 alumni from the class of 2015, 10 alumni from the class of 2012, and 185 employers were reviewed by CEM faculty and the CEM Industry Advisory Committee of the CCE Industry Advisory Board during Fall 2017. The surveys of graduating seniors were conducted by the OSU College of Engineering for June 2017 graduates. Data for the “customer satisfaction” questions for graduates was not collected. The surveys of alumni and employers were conducted by the School of CCE in June and July of 2017 using the Qualtrics platform. The following strengths and weaknesses were noted:

Strengths:

1. Overall customer satisfaction remains high:
 - a. Alumni 2015:
 - 28 of 31 graduates indicated that the CEM Program either “extremely” or “moderately” fulfilled their expectations. The average score was 6.2 out of 7.0, exceeding the target minimum of 4.9.
 - All 31 graduates indicated they would “probably” or “definitely” recommend the CEM Program to a close friend, with an average score of 6.9 out of 7.0.
 - b. Alumni 2012:
 - The ten alumni responding to the survey had an average score was 5.2 out of 7.0 for the question about satisfaction with the educational preparation received in the OSU CEM Program.
 - All ten respondents indicated they would “probably” or “definitely” recommend to others the CEM Program at OSU, for an average score of 6.9 out of 7.0.
 - c. Employers:
 - 108 of 132 employers indicated they were “moderately” satisfied or “very” satisfied with OSU CEM graduates educational preparation. Average score was 6.0 on the 7-point scale.
 - 118 of 134 respondents rated the professionalism, in terms of attitude and work ethic, of OSU CEM graduates to be “moderately” or “extremely” professional, with an average score of 6.1 out of 7.0.
 - 127 of 134 respondents indicated they would “probably” or “definitely” hire another OSU CEM graduate, for an average score of 6.6 out of 7.0.
2. Achievement of CEM Program Student Learning Outcomes (SLO) remains high:
 - a. Graduates 2017: Average scores for graduating seniors for all 20 Student Outcomes exceeded the target minimum of 4.9 on the 7.0 scale when graduates indicated their belief that their education prepared them to meet the particular SLO. The lowest score was a 5.3, with the average score being 5.7. Note, a 5-point scale was used by

the College of Engineering for this survey, and the scores was converted to a 7-point equivalent for this analysis.

- b. Alumni 2015: Average scores for “quality of preparation” for 19 out of 20 Student Learning Outcomes met or exceeded the target minimum of 4.9 out of 7.0, with the remaining SLO scoring a 4.8.
- c. Alumni 2012: Average scores for “quality of preparation” for 14 out of 20 Student Learning Outcomes met or exceeded the target minimum of 4.9 out of 7.0.
- d. Employers: Only 6 out of 20 SLO’s achieved the target score of 4.9 or greater for “quality of preparation,” though all of the remaining 14 SLO’s scored no lower than 4.3.

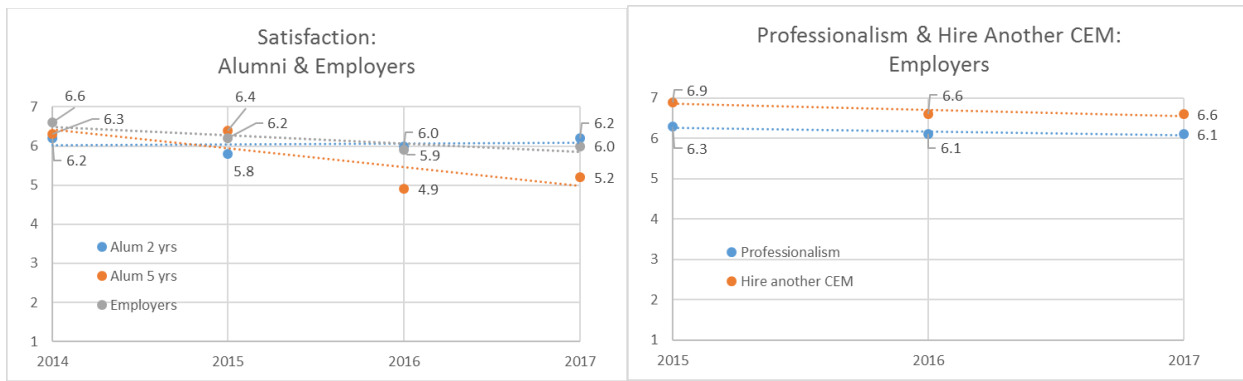
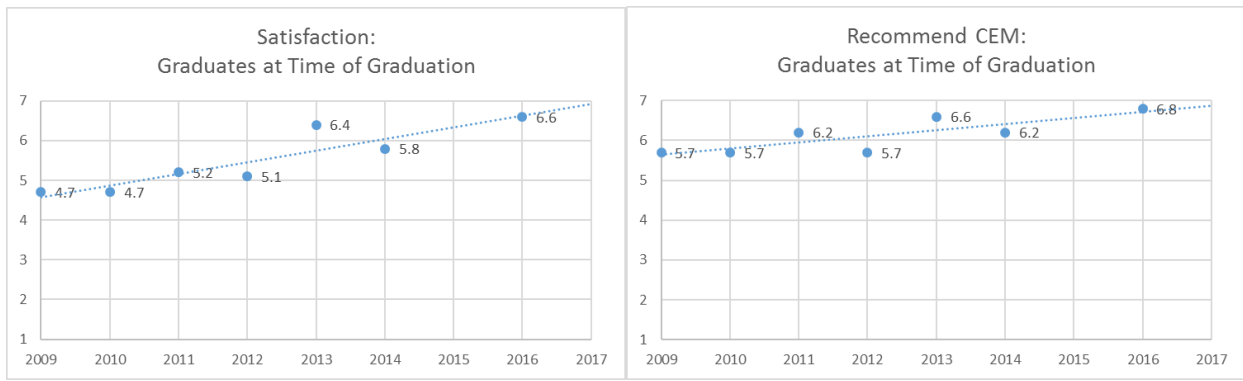
Weaknesses:

1. Analysis of the “Importance minus Gap” metric for each SLO was conducted to identify the top few SLO’s which most combine a high importance with a large gap in student preparation. The following SLO’s ranked among the highest “Importance minus Gap” values for more than one of the surveyed groups. It is worth noting that the exact same three SLO’s appear on this list in the 2016 Annual Assessment.
 - SLO 4 “Create construction project cost estimates.”
 - SLO 7 “Analyze construction documents for planning and management of construction processes.”
 - SLO 14 “Understand construction accounting and cost control.”
2. The following SLO’s were rated by two or more surveyed groups as being below the target minimum score of 4.9 for “quality of preparation.” While these scores are only slightly below the target, they can be considered weaknesses. It is noted that the 20 SLO’s were instituted only in 2014 and that they are being used retroactively to assess a program that was not designed to achieve these specific outcomes.
 - SLO 3 “Create a construction project safety plan.”
 - 4.8 by Alumni 2015, 3.7 by Alumni 2012, 4.5 by Employers
 - SLO 11 “Apply basic surveying techniques for construction layout of control.”
 - 4.7 by Alumni 2012, 4.4 by Employers
 - SLO 14 “Understand construction accounting and cost control.”
 - 4.4 by Alumni 2012, 4.5 by Employers
 - SLO 15 “Understand construction quality assurance and control.”
 - 4.3 by Alumni 2012, 4.6 by Employers
 - SLO 16 “Understand construction project control processes.”
 - 4.3 by Alumni 2012, 4.7 by Employers

- SLO 18 “Understand the basic principles of sustainable construction.”
 - 4.3 by Alumni 2012, 4.6 by Employers

Trends

Historical data from survey questions regarding Satisfaction, Professionalism, Hiring of other CEM graduates, and Recommending the CEM major were analyzed to determine if any trends are present. A slight upward trend in Graduating Seniors’ “Satisfaction” may be seen. Slight downward or flat trends from Alumni and Employers can be identified, though the number of years assessed may be too small to draw meaningful conclusions. No Action Items were identified based on this data.



Focus Areas

In order to most efficiently apply resources to program improvement, the CEM faculty identified a few SLO's on which to focus based on analysis of survey results. Priority is given to SLO's which meet the following criteria:

- high "Importance minus Gap" factor
- score below 4.9 for "quality of preparation" on multiple surveyed group results
- high "Importance" factor on multiple surveyed group results
- having one or more of the three above criteria for multiple years consecutively

The following SLO's are identified as Focus Areas for this year.

- 1) SLO 3 "Create a construction project safety plan."
 - Below 4.9 on all surveys, multiple years
 - Addressed in Action Item 1 below
- 2) SLO 4 "Create construction project cost estimates."
 - High "Importance minus Gap," high "Importance," multiple years
 - Previously addressed by 2016 Action Items (see Appendix A, Item 3)
- 3) SLO 7 "Analyze construction documents for planning and management of construction processes."
 - High "Importance minus Gap," multiple years
 - Previously addressed by 2016 Action Items (see Appendix A, Item 3)
- 4) SLO 14 "Understand construction accounting and cost control."
 - High "Importance minus Gap," below 4.9 on multiple surveys, multiple years
 - Addressed in Action Item 2 below
- 5) SLO 15 "Understand construction quality assurance and control."
 - Below 4.9 on multiple surveys, multiple years
 - Addressed in Action Item 2 below

Summary and Action Plan: (After Discussion with CEM Faculty on September 19, 2017 and with IAB on October 13, 2017)

1. Pursue changing H385 Safety and Health Standards and Laws, which is a required course for CEM students taught in another School, to a CEM course taught by a CEM faculty member. This change would allow the course to be more construction-focused and would allow students to “Create a construction safety plan,” which is one of the Focus Areas identified in this year’s Annual Assessment Report. Additionally, students completing the CEM safety course would receive their OSHA 30 cards, since the planned instructor is an OSHA Authorized Construction Outreach Trainer. The IAB was supportive of this initiative as a way of improving coverage of construction safety, which is of paramount importance to the industry.
2. Encourage CEM students to take the graduate-level “Design for Safety,” “Project Controls,” or “Lean Construction” courses to fulfill their technical elective requirement. Taking one of these three courses would likely help to improve some of the SLO’s identified as Weaknesses.
3. The CEM Faculty supports the CCE plan to incrementally increase the CEM Pro-School GPA requirement to the same level as the CE GPA.

Appendix A: Summary of 4 Surveys from 2017

Scale of 1 – 7 with a target minimum score of 4.9 for first four questions and for SLO “Preparation.”

	Graduates 2017	Alumni 2015				Alumni 2012				Employers			
Satisfaction	-	6.2				5.2				6.0			
Professionalism (attitude & work ethic)	-	-				-				6.1			
Hire another CEM?	-	-				-				6.6			
Recommend CEM?	-	6.9				6.9				-			
Number of respondents	n=33	n=31				n=10				n=185			
20 Student Learning Outcomes (SLO's)	Preparation	Import ance	Prepara tion	Gap = Prep-Imp	Import - Gap	Import ance	Prepara tion	Gap = Prep-Imp	Import - Gap	Import ance	Prepara tion	Gap = Prep-Imp	Import - Gap
1. Create written communications appropriate to the construction discipline.	5.6	6.2	5.7	(0.5)	6.7	6.2	5.6	(0.6)	6.8	6.0	5.1	(0.9)	6.9
2. Create oral presentations appropriate to the construction discipline.	5.6	5.4	5.6	0.2	5.2	5.1	5.0	(0.1)	5.2	5.3	5.0	(0.3)	5.6
3. Create a construction project safety plan.	5.3	5.5	4.8	(0.6)	6.1	4.5	3.7	(0.8)	5.3	5.3	4.5	(0.8)	6.1
4. Create construction project cost estimates.	5.9	6.4	5.7	(0.7)	7.1	6.2	4.9	(1.3)	7.5	6.1	4.8	(1.4)	7.5
5. Create construction project schedules.	5.7	5.9	5.5	(0.4)	6.3	5.7	5.1	(0.6)	6.3	5.8	4.8	(1.0)	6.8
6. Analyze professional decisions based on ethical principles.	5.9	6.2	6.5	0.2	6.0	5.8	5.5	(0.3)	6.1	6.1	5.6	(0.5)	6.5
7. Analyze construction documents for planning and management of construction processes.	5.9	6.6	6.1	(0.5)	7.1	6.5	5.1	(1.4)	7.9	6.3	5.2	(1.1)	7.4
8. Analyze methods, materials, and equipment used to construct projects.	5.8	6.0	5.6	(0.4)	6.4	5.6	5.2	(0.4)	6.0	5.7	4.7	(0.9)	6.6
9. Apply construction management skills as an effective member of a multi-disciplinary team.	5.7	6.4	6.0	(0.3)	6.7	5.8	5.6	(0.2)	6.0	6.0	5.3	(0.7)	6.7
10. Apply electronic-based technology to manage the construction process.	5.9	6.4	5.8	(0.6)	7.0	5.8	5.4	(0.4)	6.2	5.8	5.8	0.0	5.7
11. Apply basic surveying techniques for construction layout of control.	5.3	4.5	5.0	0.5	4.1	3.1	4.7	1.6	1.5	3.9	4.4	0.5	3.4
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.	5.9	5.7	5.6	(0.1)	5.8	4.9	5.4	0.5	4.4	5.1	4.6	(0.5)	5.7
13. Understand construction risk management.	5.6	6.0	5.6	(0.4)	6.4	5.2	5.1	(0.1)	5.3	5.7	4.4	(1.3)	6.9
14. Understand construction accounting and cost control.	5.3	6.0	5.1	(0.9)	6.9	5.7	4.4	(1.3)	7.0	5.8	4.5	(1.3)	7.1
15. Understand construction quality assurance and control.	5.6	6.1	5.1	(1.0)	7.1	5.5	4.3	(1.2)	6.7	5.5	4.6	(0.9)	6.4
16. Understand construction project control processes.	5.5	5.8	5.0	(0.8)	6.6	4.9	4.3	(0.6)	5.5	5.4	4.7	(0.7)	6.1
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.	5.6	5.9	5.6	(0.3)	6.2	5.7	5.3	(0.4)	6.1	5.3	4.3	(1.0)	6.4
18. Understand the basic principles of sustainable construction.	5.7	4.9	5.1	0.1	4.8	4.2	4.3	0.1	4.1	4.2	4.6	0.5	3.7
19. Understand the basic principles of structural behavior.	5.9	5.3	5.9	0.5	4.8	5.4	5.4	0.0	5.4	4.4	4.7	0.3	4.2
20. Understand the basic principles of mechanical, electrical, and plumbing systems.	6.0	5.2	5.6	0.4	4.8	5.0	5.5	0.5	4.5	4.9	4.3	(0.7)	5.6

Appendix B. Follow-up from 2016 Summary and Action Plan

The 2016 Summary and Action Plan comprised the following four items. Follow-up to each item is included in boldface.

1. The Weaknesses identified in the survey data for SLO 14, SLO 15, SLO 16 generally relate to the topic of “controls.” Since many of the currently-offered CEM graduate classes deal with controls-related topics, CEM faculty decided to review the CEM curriculum to determine if elective credits can be made available to students who may wish to take a controls-based or other graduate level course which can count towards their undergraduate degree. **Follow-up: Effective Winter 2017, CEM students must take an upper-division or graduate-level 3 or 4 credit College of Engineering elective in place of the three credits of “Free Electives” that were previously part of the CEM curriculum. It is anticipated that many CEM students will take one of the graduate-level controls courses to fulfill this requirement.**
2. The Weakness in SLO 3 “create a project safety plan” has been addressed by adding an exercise to CEM 443 requiring students to create such a plan, which as of this year, will be a requirement for all CEM students. CEM Faculty have no further action planned. **Follow-up: The project safety plan continues to be a requirement in CEM 443.**
3. Many of the Weakness cited in this year’s and in previous years’ surveys appear to be addressed in the CEM 431 Obtaining Construction Contracts course (aka, the Reno class). Of particular note are SLO 4 “cost estimates” from this year’ survey and SLO 1 “written communications” and SLO 2 “oral presentations” from previous years’ surveys. CEM Faculty decided to pursue the creation of a new course – CEM 432 – which would have many of the same course learning outcomes as CEM 431, which is not a required course. The Faculty would like to replace the existing Communications elective in the CEM curriculum with a requirement that students take either CEM 431 or CEM 432. CEM 431 currently counts as the Communications elective for students who choose to take it. It is anticipated that this requirement will improve the quality of educational preparation for students who cannot take CEM 431. The IAC was generally receptive to this proposal and would like for industry to be involved by sitting on the presentation panels for CEM 432. **Follow-up: The new course CEM 432 Construction Project Planning has been added as a requirement for CEM students who do not take CEM 431 starting in Spring 2018. Course Learning Outcomes for CEM 432 will mirror those of CEM 431.**

4. Given the large number of Weaknesses that are barely below the Weakness threshold of 4.9, CEM Faculty decided to introduce a new metric which determines the “Importance minus Gap” for each Student Learning Outcome. This new metric is a way to identify those SLO’s which most combine a high importance with a large gap in student preparation. Focused attention can then be directed to a smaller number of SLO’s with the highest “Importance minus Gap” values. The results of this analysis are summarized in Appendix C. **Follow-up: The “Importance minus Gap” metric continues to be used in the 2017 Annual Assessment.**