Colorado State University
Department of Construction Management

Assessment Results and Action Plans

Updated: Fall 2013

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Executive Summary

The intent of the Academic and Outcome Assessment Plan is to provide feedback on the progress of the Department in addressing Key Objective 1 and 2 of the Department Strategic Plan.

Key Objective 1: Assure excellence in academic programs.

Key Objective 2: Create distinctive undergraduate experiences.

In order to determine progress in addressing these objectives, the CM Assessment Committee designed and implemented the Academic Quality and Outcome Assessment Plan (Assessment Plan). As part of this process, the Assessment Committee collects data using a variety of assessment tools identified below and recommends actions based on the analysis of this data.

The following tools are intended to collect assessment data from a variety of sources and gain input from various CM stakeholder:

- AIC – AC (Level 1) Exam
- Alumni Survey
- ASCSU Course Survey
- Employer Survey
- Open Forum
- PADB Curriculum Review Committee
- PRISM
- Senior Capstone Course
- Senior Exit Survey

This report contains summaries of the data collected during the 2012-2013 academic year, the actions recommended by the Assessment Committee, and where appropriate, updates on actions recommend in the previous Assessment Report.

The approach used by the Assessment Committee in reviewing the data was to evaluate the feedback from each assessment tool separately and then to conduct an overall review. In some instances, the results from various assessment tools were inconsistent. For example, results from the AIC – AC (Level 1) exam indicate that CSU CM graduates are weak in Bidding and Estimating, however, feedback from industry on the employer survey indicates that Bidding and Estimating is one of the top strengths of CM students graduating from CSU. This was taken into account when making recommendations about what actions should be taken relative to the AIC results.

An overall recommendation of the Assessment Committee is to schedule an afternoon faculty planning session to review recommended changes to courses.

The following is a summary of the new recommended actions based on the data collected during the 2012 – 2013 academic year. Updates on previous recommended actions are contained within the report and not included within this summary.

AIC – AC (Level) 1 Exam:
The following recommendations and actions are based on the AIC – AC (Level 1) Exam Results for the 2012-2013 academic year and the overall trends for CSU students between Spring 2007 thru Spring 2013:

- Discuss results and present trends at a Department meeting.
- Reevaluate how students are encouraged to take the AIC exam.
- Survey employers to identify if they are aware of and/or support the AIC exam.
- Request an AIC Representative attend PADB meeting in Spring 2014 to present to PADB what AIC represents and the purpose of their certification program, which includes the AIC – AC (Level 1) Exam.
- Review AIC - AC (Level 1) exam to determine alignment of exam content with CSU CM Curriculum.
- Review material included in the following categories of the AIC exam to identify areas of content where CSU students have been below the passing score and below national average for consecutive semesters: Engineering Concepts and Construction Geomatics.
- Review material included in the following categories of the AIC exam to identify areas of content where CSU students have been below the AIC passing score but above the national average for consecutive semesters: Bidding and Estimating.
- Contact AIC about changes to the exam structure and reasons for those changes.
- Continue to discuss possible alternative certifications.
- Explore the possibility of bringing back lab component for CON 151.
- Explore possibility of using the professional fee to cover the cost of the AIC exam for students.

Employer Survey:
The following actions are recommended based on the results of the 2012-2013 Employer Survey:

- Targeting a new hire with surveying expertise to help strengthen the surveying class and project layout skills.
- Design and present CON 261 course revisions to the Curriculum Committee and Department based on feedback from PADB feedback to survey set out for CON 261.
- Revisit separating CON 367 into two courses to expand on Management Concepts.
- Revise CON 371: Mechanical Systems based on training provided by MCAA.

Senior Exit Survey:
The following actions are recommended based on the 2012 – 2013 Senior Exit Survey:

- Discuss results with faculty and instructors at a Department Meeting.
- Provide instructors with recommendations for course improvements based on senior exit survey responses/recommendations
- Evaluate how teaching assistants are being used to identify if opportunities exist to maximize the value of teaching assistants.

    - Discuss at Department Meeting how teaching assistants should be utilized in courses and how to clarify their role to students.
- Reevaluate rational for deleting "hands-on" labs to see if opportunities exist to bring some of these labs back.
- Look for ways to allow students to explore individual interests related to construction.
- Identified overlaps between AIC – AC (Level 1) Exam, the Employer Survey and Senior Exit Surveys reinforce the need to evaluate the following:
    - Engineering Concepts, Surveying and Project Layout, Graphic Communications/CAD, BIM, and Mechanical and Electrical Systems.

PADB Curriculum Review Committee:
The following recommendations are based on the Assessment Committee's discussion of the PADB Curriculum Review Process for 2012 – 2013:

- Review the feedback loop from course reviews to ensure that recommendations are getting back to the appropriate course instructors.

The following summarizes the comments, actions, and recommendations received from the PADB Curriculum Review Committee during 2012 - 2013:

- CON 461:
    - PADB members recommended keeping P6 in CON 461 Scheduling and adding an advanced scheduling class if possible.
- CON 366 and 469:
    - Add storm water management and erosion control as part of site layout to CON 366 Trucks.
    - Remove soils classification material from CON 366 Trucks since it is covered in CON 469 Soils.
    - Add focus on fixed-fee contracts.
    - Add information on geo-fabrics for stabilization.
    - Keep information related to mass diagrams.
- CON 265 and 365
    - Estimating documents for projects in the $3-$7M range have been requested from industry to support student learning.
    - Assistance with models for model-based estimating has been requested from industry.

ASCSU Course Survey:
The following recommendations are based on the 2012 - 2013 Course Surveys:

- Present summary of course objective survey items at a Department Meeting.

- Continue Curriculum Committee's review of course objectives and course content for consistency throughout the curriculum in preparation for the ACCE self-study and accreditation visit.

Specifically, based on responses to the course survey, the Curriculum committee should review the following course objectives to ensure that they are current and are being addressed:

- CON 352: Quantify and estimate all direct and indirect costs associated with fabrication of a steel structure.
- CON 459: Recognize and evaluate safety issues related to temporary support structures.
- CON 471: Possess an understanding and an awareness of project management skills to provide an effective, efficient and coordinated mechanical project.

Alumni Survey:

- The schedule for administering the Alumni Survey has been changed from every year to every five years to lessen the impact on alumni, to avoid participant fatigue, and to make better use of department resources.
- Revise and update the Alumni Survey in preparation for the next time it is administered.

Capstone Quiz:

- Revise the capstone quiz to ensure it reflects current course content.
    - Faculty provide topic-based survey items to CON 465 instructors
    - Assessment committee members (or faculty in general) review the survey prior to administration in CON 465 in Spring 14

Open Forum:

The following recommendation is based on the 2011 Open Forum:

- Continue efforts to develop and implement an appropriate mentoring program for new students.
- Curriculum committee to discuss reinstating the lab component of CON 151.
- Continue discussion underway in the Curriculum Committee about possible alternative business courses and how changes in ACCE may impact the business course requirements.

PRISM:

- Identify changes underway to PRISM and the projected timeline.
- Update PRISM (or its replacement) with recent updates to Strategic Plan.

AIC Associate Constructor (Level 1) Exam

Students in the CON 465 Capstone course (CSU Students) are strongly encouraged, but not required, to take the American Institute of Constructors (AIC) certification exam for its Associate Constructor (Level 1) certification. This exam is intended for individuals entering the construction field with four years of qualifying experience and/or education (AIC Website, 2013). The 300 question, eight-hour exam gauges academic proficiency in 10 key areas of the CM profession. The ten categories covered in the exam are:

- Communication Skills
- Engineering Concepts
- Management Concepts
- Materials, Methods, and Project Modeling and Visualization
- Bidding and Estimating
- Budgeting, Costs, and Cost Control
- Planning, Scheduling, and Schedule Control
- Construction Safety
- Construction Geomatics
- Project Administration

Results

Percentage of students passing AIC exam. Data was obtained for CSU student performance on the AIC exam from Spring 2007 to Spring 2013 and is summarized in Table 1 and Figure 1. The percentage of CSU students passing the AIC Exam has consistently outperformed the national average and the percentage passing has been as high as 93% in Fall 2009. Since then, there has been a downward trend in both the percentage of CSU students passing the AIC exam and in the national average; however, CSU students were still above the national passing average throughout this period. Specifically, in Fall 2010, 84% of CSU students passed the AIC exam compared to 66% in Fall 2012 and 57% in Spring 2013. This downward trend may be partially explained by a change in policy in CON 465 on how taking the exam can impact students' grades. Previously, students were allowed to replace their CON 465 final exam with their score on the AIC exam only if they passed it. This policy was changed in 2011. Students can now use their AIC score to replace their final exam regardless of their performance on the exam.

Table 1. Number of students taking and passing the AIC – AC (Level 1) Exam.

	Number of Candidates Tested		Number of Candidates Passed		Percentage Passed	
Semester	CSU	Nat. Avg.	CSU	Nat. Avg.	CSU	Nat. Avg.
Spring 2007	40	1040	36	671	90%	65%
Fall 2007	33	588	24	329	73%	56%
Spring 2008	47	1154	29	664	62%	58%
Fall 2008	28	554	22	323	79%	58%
Spring 2009	14	1009	12	666	86%	66%
Fall 2009	14	633	13	381	93%	60%
Spring 2010	24	1132	19	701	79%	62%
Fall 2010	37	766	31	467	84%	61%
Spring 2011	53	1259	42	768	79%	61%
Fall 2011	53	728	43	394	81%	54%
Spring 2012	63	1271	44	737	70%	58%
Fall 2012	50	604	33	333	66%	55%
Spring 2013	28	1013	16	537	57%	53%

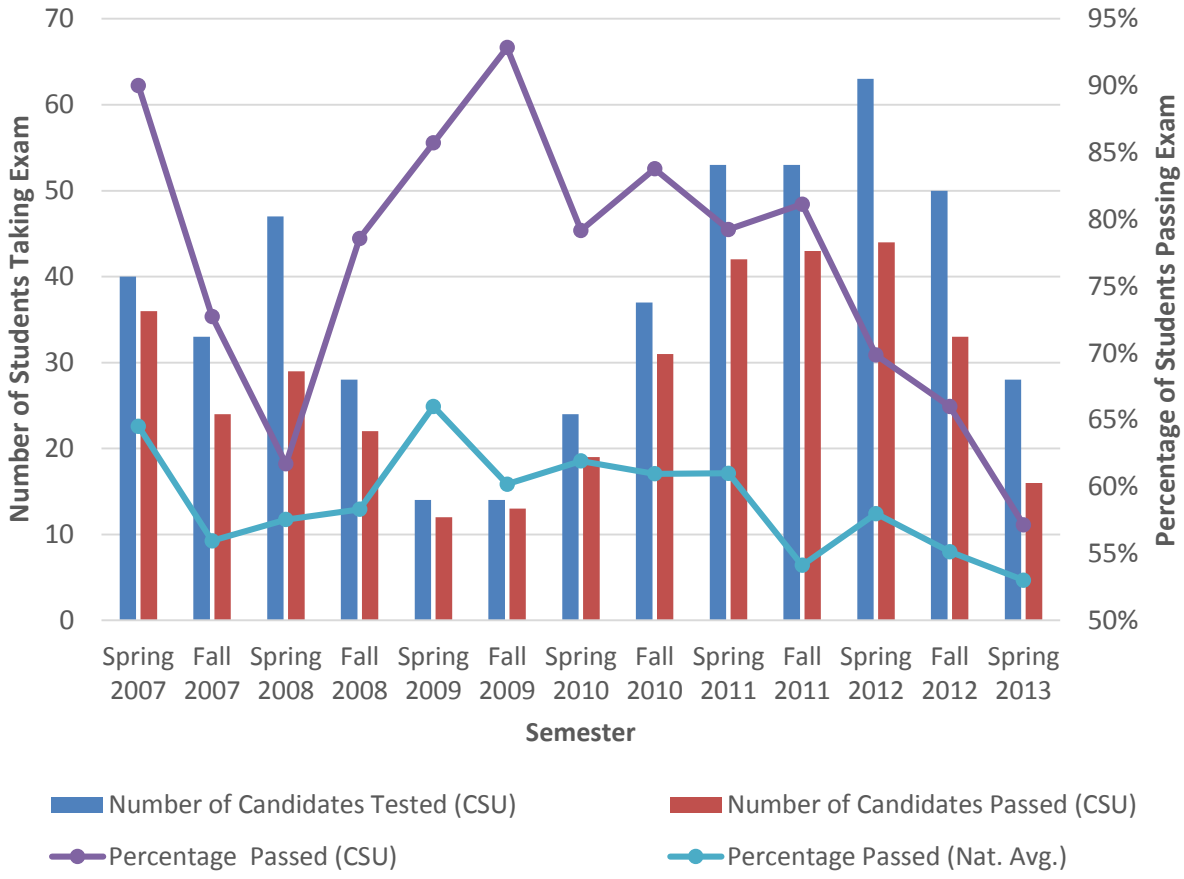

Figure 1. Number of CSU Students Taking and Passing AIC Exam.

Number of students taking AIC Exam. In addition to a decline in the percentage of CSU students passing the AIC exam, there has also been a decline in the percentage of CSU students enrolled in CON 465 electing to take the AIC exam. In Spring 2013, only 39% (*n* = 28) students enrolled in CON 465 took the exam compared to approximately 50% in previous semesters (Figure 2). This decline was discussed at the Fall 2013 Department retreat. Possible reasons were identified based on informal feedback received from students by department personnel. These included: increase in cost of AIC exam, lack of employer awareness of the AIC exam/certification, time during semester when exam is offered and general lack of student motivation to take exam. This lack of motivation on the students' behalf appears to result from feedback they are receiving from employers/industry on the lack of value added by CPC certification. Additionally, the time during the semester when the AIC exam is offered tends to fall after students have already accepted job offers, decreasing the value to them of paying for, studying for and taking the exam. It was also brought up that it might make sense to consider promoting other outside exams in addition to the AIC exam (e.g. CMAA, PMP, LEED)

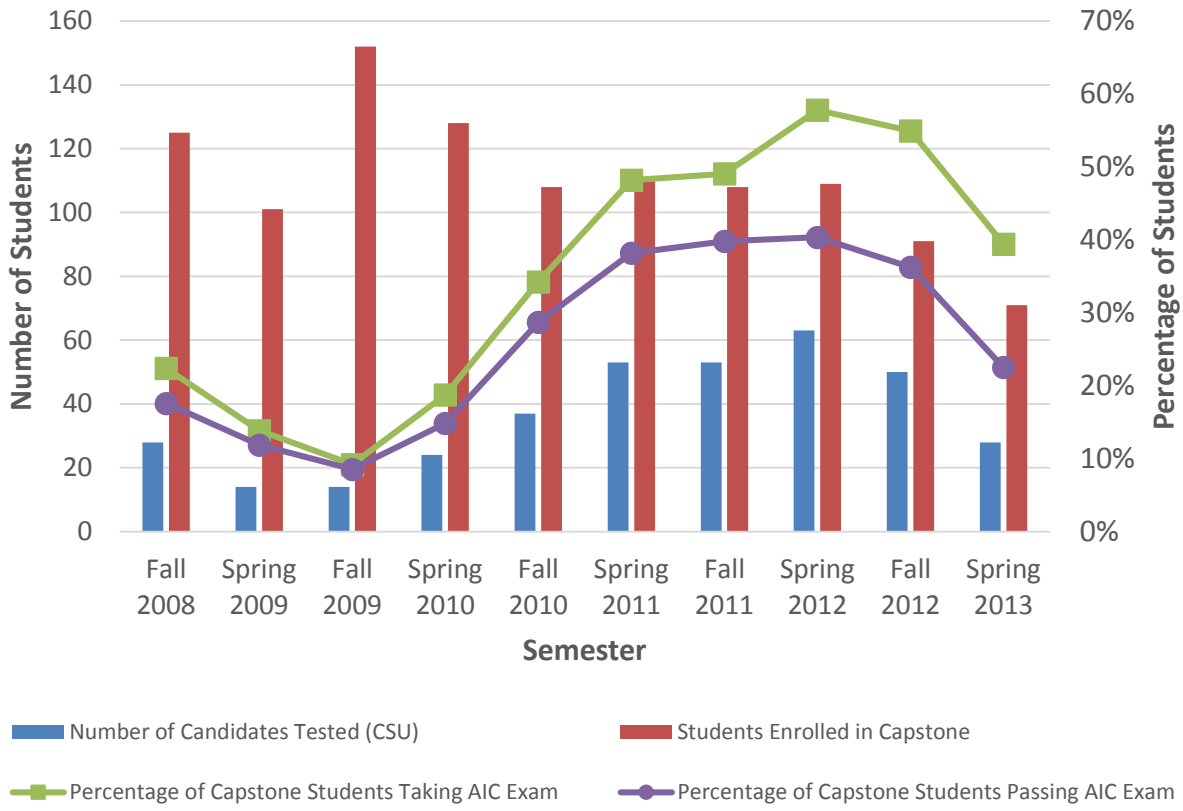

Figure 2. Capstone students taking and passing AIC Exam (Fall 2008 – Spring 2013).

Performance in specific categories of AIC exam. In several categories of the AIC exam, CSU students have consistently performed well (Table 2):

- Management Concepts
- Budgeting, Costs, and Cost Control
- Planning, Scheduling and Schedule Control
- Construction Safety
- Project Administration

In these five categories, CSU students have both exceeded the minimum passing score and the national average for the majority of the last five years. The overall trend for the Scheduling category and the Budgeting category has been positive since Spring 2007. The overall trend for Construction Safety and Project Administration has been declining both for the national average and for CSU students.

Table 2 shows the average score for CSU students and the national average for each of the 10 categories along with the minimum passing score required for each category. Below passing scores are starred. The CSU average was below passing in four categories in Fall 2012. In Spring 2013, the CSU average was below passing in seven categories (Table 2). In the majority of cases, the CSU average was less than one point below the minimum passing score. Categories where the CSU average was greater than one point below the minimum passing score were: Engineering Concepts (both semesters) and Bidding and Estimating (only Spring semester).

Table 2. AIC – Associated Constructor (Level 1) Exam scores, Fall 2012 – Spring 2013

	Fall 2012			Spring 2013		
Area Scores	CSU Average	National Average	Passing Score	CSU Average	National Average	Passing Score
Communication Skills	21.64*	20.95*	22	21.93*	21.52*	22
Engineering Concepts	8.80**	9.19**	11	8.14**	9.16**	11
Management Concepts	25.64	25.39	25	24.93*	25.39	25
Materials, Methods, and Project Modeling and Visualization[1]	22.88	20.99**	22	21.79*	20.53**	22
Bidding and Estimating	31.40*	29.39**	32	29.79**	29.21**	32
Budgeting, Costs, and Cost Control	24.94	24.39	23	25.04	24.02	23
Planning, Scheduling, and Schedule Control	34.88	33.40	32	34.86	33.45	32
Construction Safety	16.52	15.56	15	14.89*	15.35	15
Construction Geomatics[2]	4.94*	4.84*	5	4.54*	4.64*	5
Project Administration	26.28	25.53	25	25.86	25.65	25

* Less than one point below minimum passing score.

** Greater that one point below minimum passing score.

[1] Previously referred to as Materials, Methods, and Plan Reading.

[2] Previously referred to as Surveying and Project Layout.

In the case of Engineering Concepts, CSU students have historically exceeded the minimum passing score – sometimes by as much as 13% – while also outperforming the national average every semester from Spring 2007 to Spring 2012 (Figure 3). However, this significantly changed in Fall 2012 and Spring 2013 when CSU students scored below the minimum passing score and below the national average. (It should be noted, that a similar decline is evident for the national average as well.) Compared to the national average, the overall trend for CSU performance in the Engineering Concepts is declining faster than the national average. One possible reason for this decline could be recent changes in the AIC exam itself. Specifically, the maximum possible points for the engineering category changed from 29 points (with a minimum of 20 needed to pass) in Spring 2012 to 15 points (with a minimum of 11 needed to pass) in Fall 2012; this represents a 4% increase in the minimum passing score. This may suggest that this and any other significant changes in the structure of the AIC exam should be looked into further. However, due to the discrepancy between the national average trend and the CSU trend, it is recommended that the topics included on the AIC exam in the Engineering Concepts category be reviewed to see if there are topics that are not being covered in engineering related courses which may help explain the variance for CSU students.

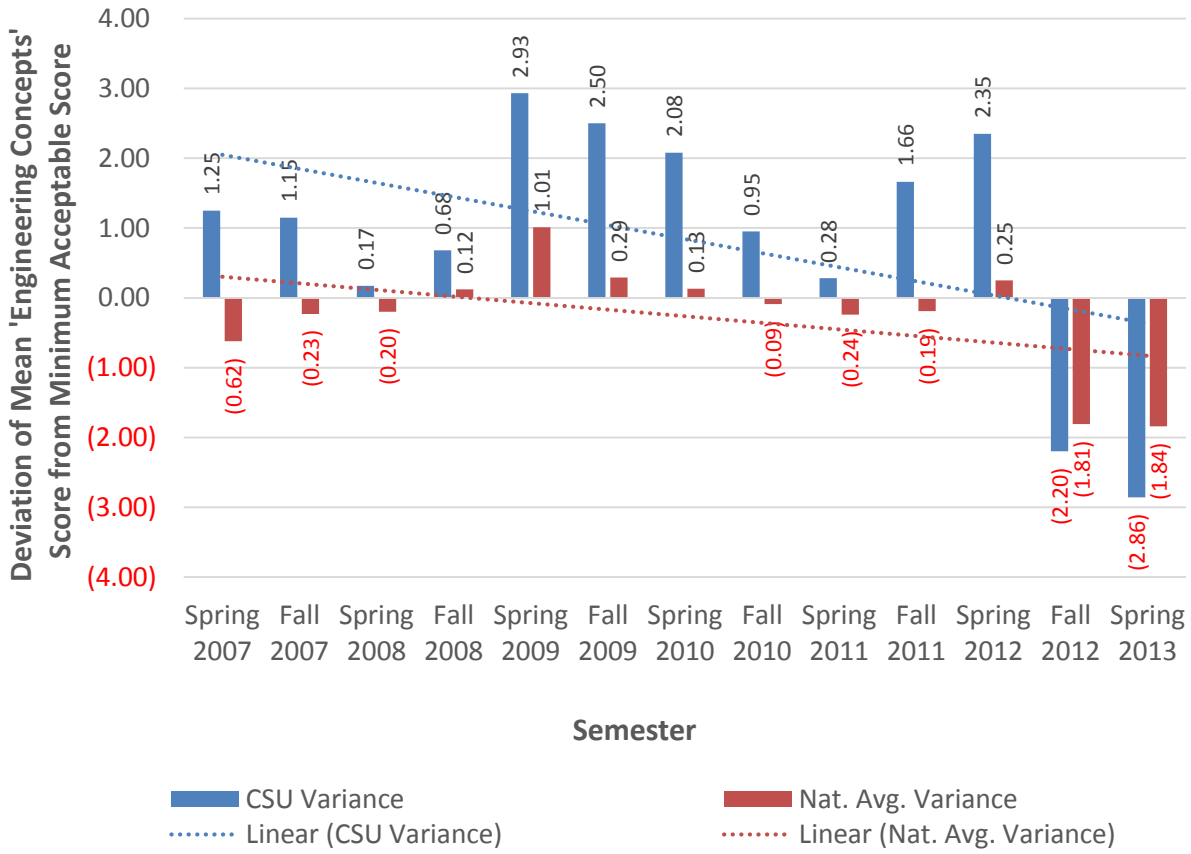

Figure 3. Student scores on the AIC exam in the category of Engineering Concepts (Spring 2007 – Spring 2013).

In the case of Bidding and Estimating, CSU students have historically exceeded the minimum passing score while significantly outperforming the national average for every semester from Spring 2007 to Spring 2012 (Figure 4). However, this significantly changed in Fall 2012 and Spring 2013 when CSU students scored below the minimum passing score, for similar reasons as noted earlier in 'Engineering Concepts'. A similar decline is evident for the national average as well. It is also important to note that the average score of CSU students has been declining since Fall 2011. Compared to the national average, the overall trend for CSU students' performance in the Bidding and Estimating is declining slightly faster than the national average but is still well above the national average.

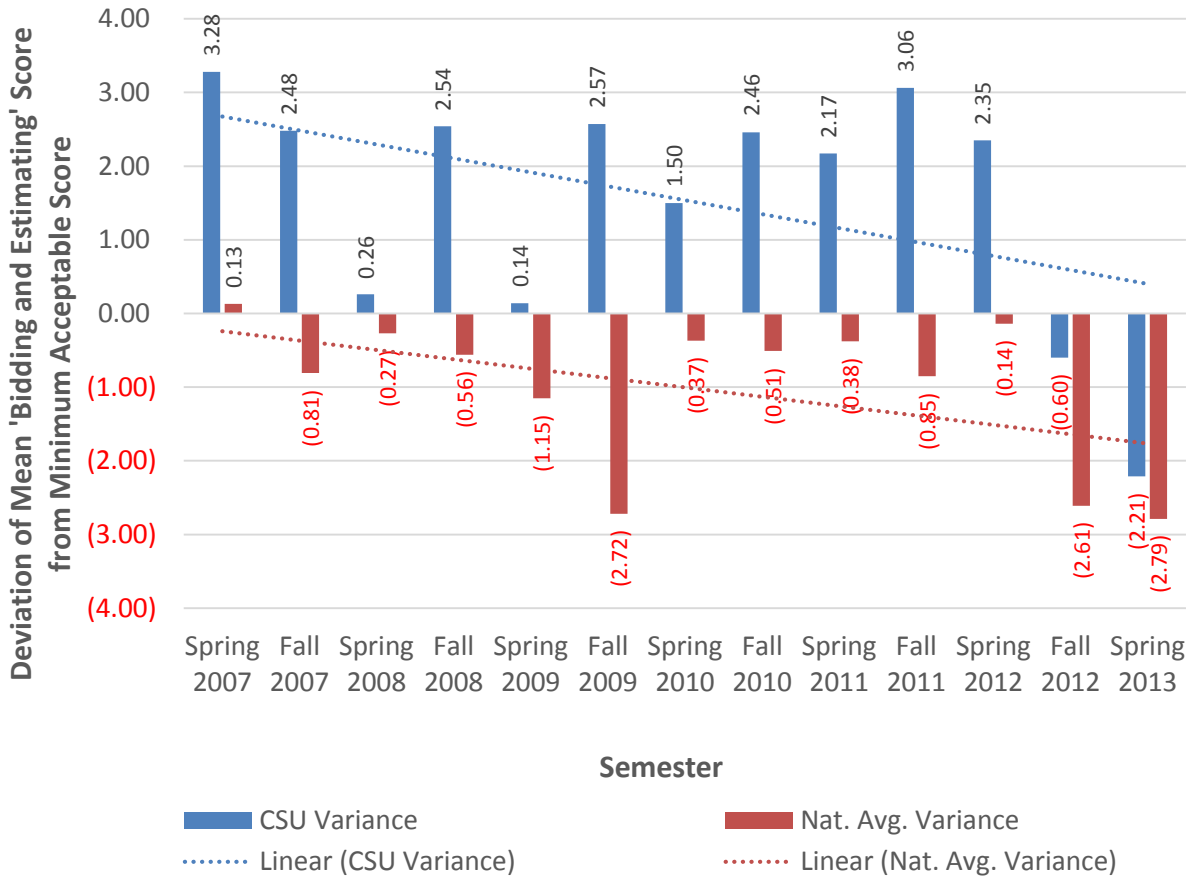

Figure 4. Student scores on the AIC exam in the category of Bidding and Estimating (Spring 2007 – Spring 2013).

Update on previous recommended actions. In the Communication category of the AIC exam, the average score for CSU students has either exceeded the minimum passing score or been less than one point below (Figure 5). Performance of CSU students is increasing slightly faster

than the national average. It is recommended that measures put into place over the last few years to improve communication remain in place and be updated as needed.

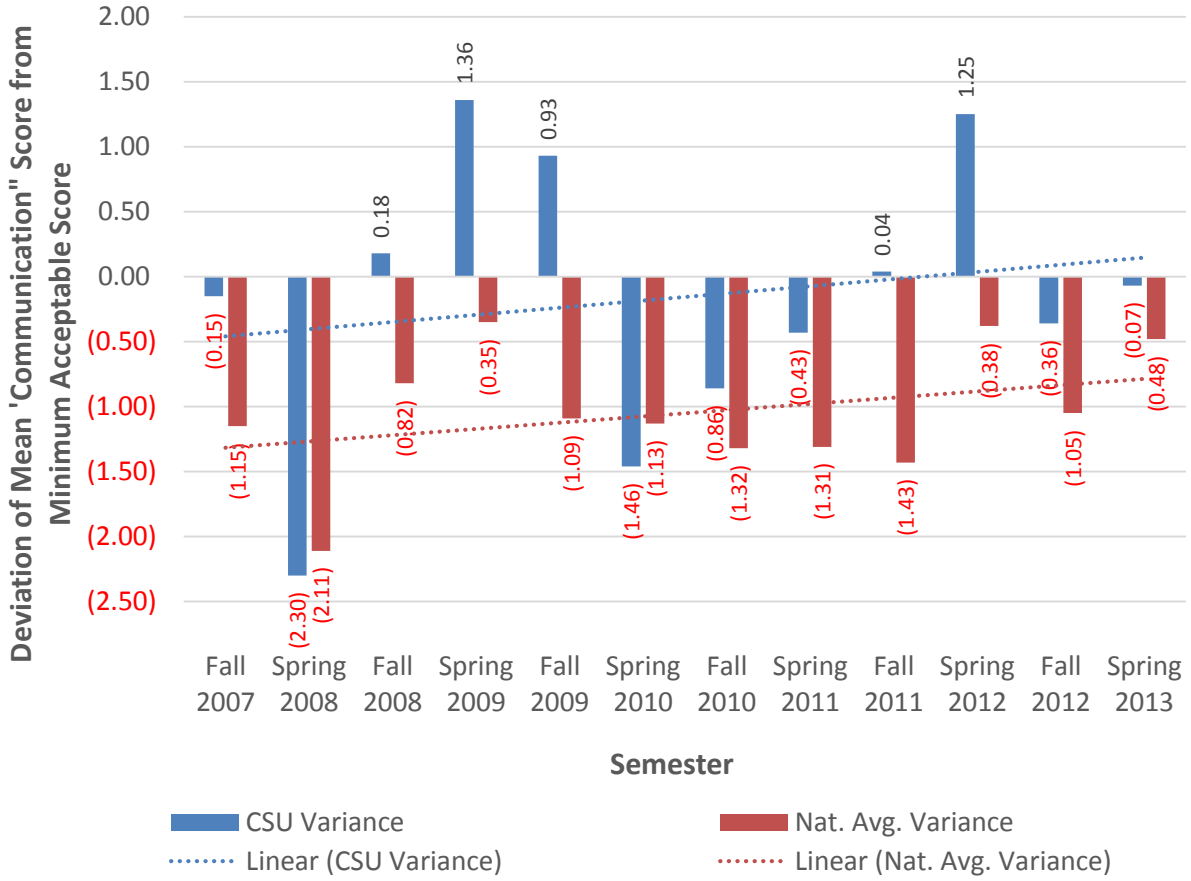

Figure 5. Student scores on the AIC exam in the category of Communication (Spring 2007 – Spring 2013).

In the Materials, Methods and Project Modeling and Visualization category, there has continued to be a slight downward trend; however, the average score for CSU students continues to be above the national average and above the minimum passing score for this category (Figure 6). The Department has recently undertaken an initiative to improve the visualization skills of students through the informal incorporation of BIM technology throughout the curriculum. This initiative has been further facilitated by the recent addition of a dedicated computer lab for students designed specifically around BIM technology. However, there is concern that the discontinuation of the "hands-on" labs associated with CON 151 have resulted in a decline in fundamental knowledge needed for students to be successful in CM courses requiring sequencing and visualization skills (e.g. estimating, scheduling, drafting/design) and that the feasibility of bring these labs back should be considered.

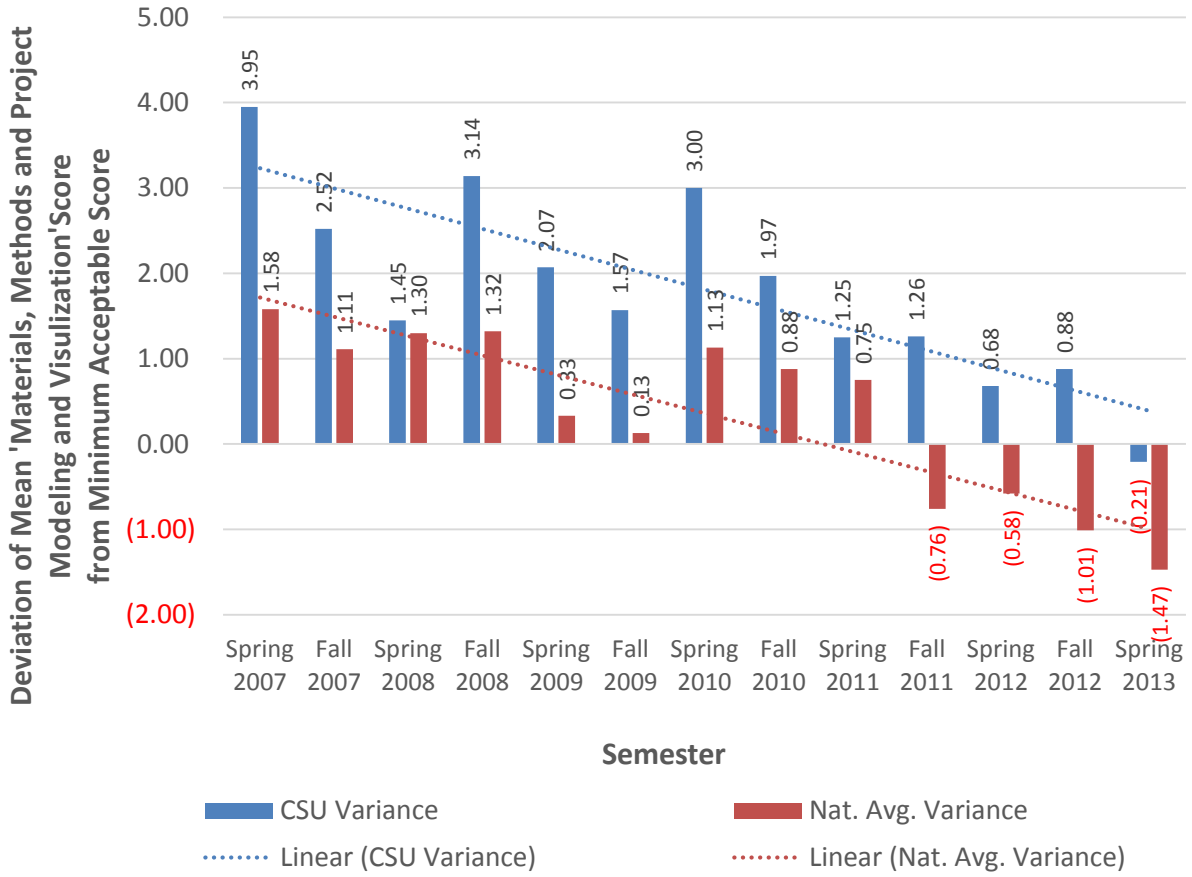

Figure 6. Student scores on the AIC exam in the category of Materials, Methods and Project Modeling and Visualization (Spring 2007 – Spring 2013).

In the Construction Geomatics category, average scores for CSU students fell below the national average and the minimum passing score for this category in Spring 2013 (Figure 7). In prior semesters, the average for CSU students either met or exceeded the minimum passing score from Spring 2007 until Fall 2012. Compared to the national trend, the performance of CSU students is declining slightly faster than the national average suggesting that a review of this course may need to be conducted by the curriculum committee.

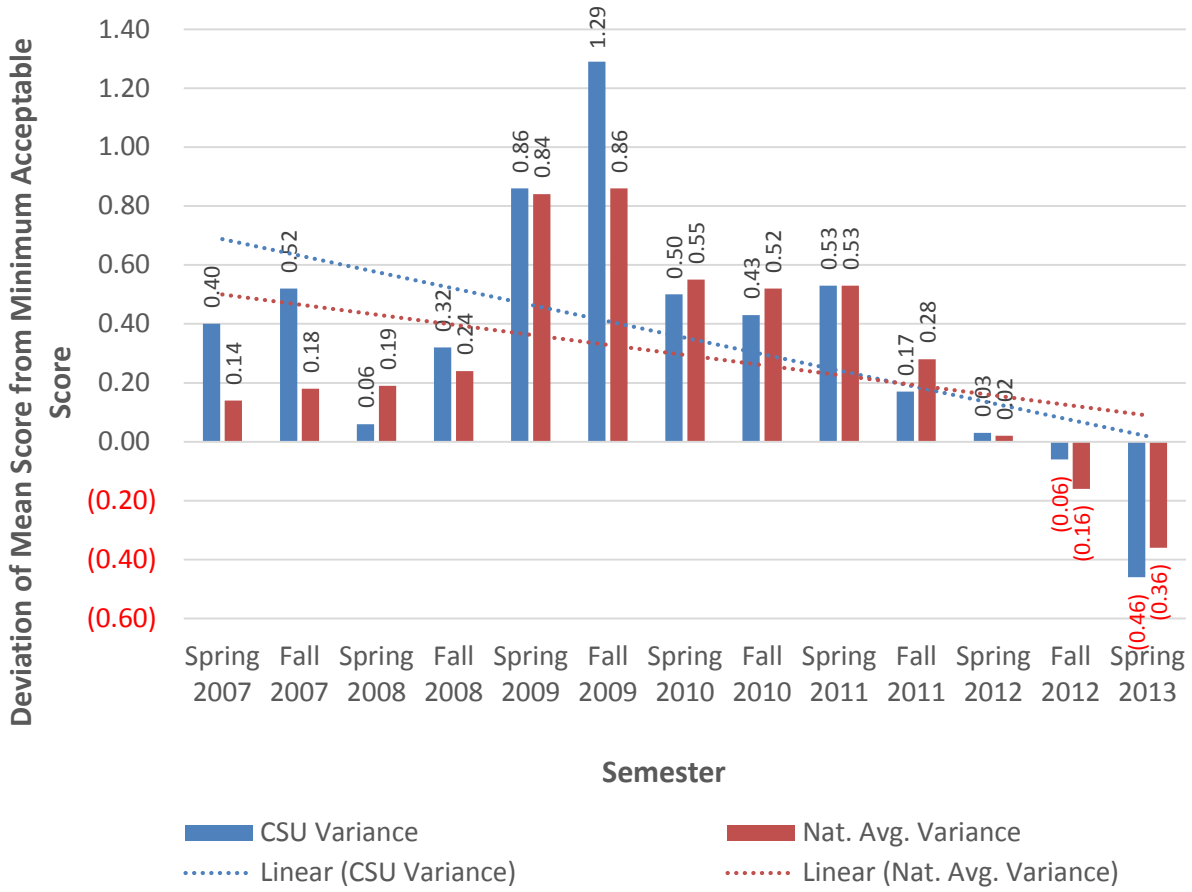

Figure 7. Student scores on the AIC exam in the category of Construction Geomatics (Spring 2007 – Spring 2013).

Action Plan

The following recommendations and actions are based on the AIC – AC (Level 1) Exam Results and Trends:

- An analysis of the AIC – AC (Level 1) Exam results has been conducted and reviewed by the Assessment Committee. Preliminary results will also be shared and discussed with all faculty and staff at a department meeting.
- Present AIC trend results at a Department meeting.
- Reevaluate how students are encouraged to take the AIC exam.
- Survey employers to identify if they are aware of and/or support the AIC exam.
- Request an AIC Representative attend PADB meeting in Spring 2014 to present to PADB what AIC represents and the purpose of their certification program, which includes the AIC – AC (Level 1) Exam.
- Review AIC - AC (Level 1) exam to determine alignment of exam content with CSU CM Curriculum.

- Review material included in the following categories of the AIC exam to identify areas of content where CSU students have been below the passing score and below national average: Engineering Concepts and Construction Geomatics.
- Review material included in the following categories of the AIC exam to identify areas of content where CSU students have been below the AIC passing score for consecutive semester: Bidding and Estimating.
    - It should be noted that 'Bidding and Estimating' has been identified as a strength of CSU students in other Assessment tools.
- Contact AIC about changes to the exam structure and reasons for those changes.
- In the Fall 2013 Department Retreat, the possibility of providing alternative exams to the AIC exam was raised. Continue to discuss possible alternative exams.
- Explore the possibility of bringing back lab component for CON 151.
    - It was discussed that fundamental knowledge could be gained by students through "hands-on" experiences that enhances their learning in multiple courses and increase faculty's ability to fully cover the required curriculum in CON 151.
- Explore possibility of using a portion of the professional fee to cover the cost of the AIC exam for students.

Employer Survey

The companies that attend the CM Career Fair represent the majority of recruiting/employers hiring CSU CM graduates. Employers attending a career fair are formally surveyed to evaluate the strengths and weaknesses of graduates from the CSU CM Department.

Results

As part of the Fall 2012 and Spring 2013 employer survey, companies were asked to identify the top 5 areas of strength and 5 areas of needed improvement for graduates based on their past experience hiring graduates of the CM program at CSU (Table 3). The link to the on-line survey was sent to lead recruiter for each company attending the career fair. A total of 23 companies out of 73 companies (32%) completed the surveys in Fall 2012 and 11 of 68 companies (16%) in Spring 2013.

Table 3. Top 5 Strengths and Improvement Areas from Employer Survey (Fall 2012/Spring 2013)

Fall 2012		Spring 2013	
Top 5 Strength Areas	Top 5 Improvement Areas	Top 5 Strength Areas	Top 5 Improvement Areas
1. Project Administration (56.52%)	1. BIM 3D Technology (52.17%)	1. Communication Skills - verbal and presentation (72.73%)	1. BIM 3D Technology (36.36%)
2. Communication Skills - verbal and presentation (52.17%)	2. Communication Skills – written (30.43%)	2. Communication Skills - written (45.45%)	2. Management Concepts (18.18%)
3. Plan Reading (52.17%)	3. Communication Skills - verbal and presentation (26.09%)	3. Plan Reading (45.45%)	3. Budgeting, Costs and Cost Control (18.18%)
4. Communication Skills – written (43.48%)	4. Mechanical and Electrical Systems (21.74%)	4. Business Ethics (45.45%)	4. Surveying and Project Layout (18.18%)
5. Planning, Scheduling and Control (43.48%)	5. NOTE: There was a 3-way tie for the fifth area.	5. Bidding and Estimating (36.36%)	5. NOTE: There was a 7-way tie for the fifth area.

Communication skills were identified both semesters as areas of strength for CSU CM students; however it appears there is still room for improvement in communication skills – especially

related to written communication. The fact that industry identifies communication as both a strength and area of needed improvement conveys the importance industry places on communication skill sets. These results are consistent with the AIC scores of CSU CM students, which were above the national average, but were still below passing.

Plan reading was also noted as a Top 5 Area of Strength of CSU CM students both semesters; however, BIM 3D Technology was noted as the top area of needed improvement both semesters. These results appear to support the Senior Exit survey results and the AIC results. As noted earlier, graduating seniors rated their confidence in BIM 3D Technology very low with only 9% indicating that they were 'extremely to very' confident in this area. With respect to Graphic Communication /CAD, 42% indicated they were 'extremely to very' confident of their skills in this area. Graphic Communication/CAD was also identified as a Top 5 Improvement Area by Fall 2012 and Spring 2013 Graduating Seniors. These results suggest that low scores in the Materials, Methods, and Project Modeling and Visualization section of the AIC Exam may be related to the visualization portion of that section.

Two other areas identified as needing improvement were Management Concepts and Budgeting, Costs and Cost Control. This is not consistent with AIC results in these categories. Additionally, graduating seniors indicated a high level of confidence on the Senior Exit survey. As a result, performance and confidence of students in these areas should be watched – but no immediate action will be recommended.

The other area identified for needed improvement was Surveying and Project layout. This recommendation is also supported by AIC Exam results and the Senior Exit Survey. Graduating seniors both identified a low level of confidence in this area and identified surveying as an area of needed improvement.

Action Plan

The following actions are recommended based on the results of the Employer Survey:

- Targeting a new hire with surveying expertise to help strengthen the surveying class and project layout skills.
- A survey was sent out to PADB members requesting feedback on what skills they are looking for in our graduates related to surveying. This information is being incorporated into upcoming course revisions. Proposed course revisions should be approved by the Curriculum Committee and presented to the Department.
- Discuss separating CON 367 back into two courses to expand on Management Concepts.
- CON 371: Mechanical Systems is undergoing course revisions in Fall 2013 based on training provided by MCAA.

Senior Exit Survey

Each semester, an on-line survey is sent out to graduating seniors. The purpose of this survey is to gather information from graduates related to:

- job placement, salary and benefits of recent graduates
- internship experience
- quality of course design and instruction
- quality of teaching facilities, computer labs and availability of software
- student involvement in and the impact of extra-curricular activities related to construction management on student educational experience and job placement

Preliminary material related to students' perceptions of course quality was presented at the Fall 2013 Department Retreat. Specific comments related to individual courses will be distributed to faculty for consideration in future course revisions.

Results

Table 4 summarizes graduating seniors' perceptions of the quality of their education. The top five quality statements that graduating seniors agreed with the strongest are starred with a single asterisk. Those statements that less than 75% of graduating seniors agreed with are starred with a double asterisk. The lowest rated areas were: opportunities for "hands-on" experiences (73%), faculty and instructor concern about student performance (72%), opportunities to explore individual interest areas in construction (60%), and use of teaching assistants (58%).

Table 5 provides a summary of self-reported student confidence. It is important to note that all students completing this survey have completed at least one internship, if not multiple internships. Areas that scored 75% or above were considered acceptable. Areas scoring below 75% were noted and compared to feedback received from the AIC Level 1 Exam and the Employer Survey. There were seven categories which fell below 75%. Of these topic areas, the areas that were identified for needed improvement are those areas that overlap with the AIC Level 1 Exam results and the Employer Survey. Specifically, the recommended areas for improvement are: Engineering Concepts (Structures) (71%), Surveying and Project Layout (56%), Graphic Communication/CAD (42%), Mechanical and Electrical systems (40%), and BIM 3D Technology (9%).

Table 4. Senior Exit Survey – Students' Perceptions of Education Quality (Fall 2012/Spring 2013)

	Fall 2012/Spring 2013	
Statement	% Total Responses	Strongly to Moderately Agree[1]
Excellent education that I am proud of.	96%*	147
Faculty and instructors for CM courses were knowledgeable about their course material.	96%*	147
Faculty and instructors were concerned about my progress in their class.	72%**	110
Faculty and instructors were accessible for consultation.	88%*	135
The academic rigor of the construction courses was appropriate	90%*	137
Teaching Assistants were used effectively in my courses	58%**	88
There were ample opportunities for "hands-on" experiences in my construction courses	73%**	111
The overall quality of lab and classroom facilities was high.	86%	132
My construction courses utilized current software and technology.	90%*	138
The level of technology utilized in construction courses was appropriate.	84%	129
There were ample opportunities for exploration of individual construction interest areas.	60%**	92

[1] Total number of responses received was 153.

* Top five qualities statements.

** Quality statements agreed to by less than 75% of graduating seniors.

Table 5. Senior Exit Survey – Student Confidence and Knowledge in CM Course Areas (Fall 2012/Spring 2013)

CM Course Areas	Fall 2012/Spring 2013	
Question: How confident are you in the knowledge/ability in each of the following areas:	% Total Responses	Extremely to Very Confident[1]
Communication Skills (oral)	94%	144
Communication Skills (written)	88%	135
Engineering Concepts (Structures)	71%**	109
Management Concepts	92%	140
Material and Methods	86%	131
Plan Reading	93%	143
Bidding and Estimating	87%	133
Budgeting, Costs, and Cost Control	78%	119
Planning, Scheduling and Control (Lean)	69%**	106
Communication Safety Management	83%	127
Surveying and Project Layout	56%**	85

Table 5. Senior Exit Survey – Student Confidence and Knowledge in CM Course Areas (Fall 2012/Spring 2013)

CM Course Areas	Fall 2012/Spring 2013	
Project Administration and Contracts	64%**	98
Construction Equipment	71%**	109
Graphic Communication / CAD	42%**	64
Mechanical and Electrical Systems	40%**	61
Business Ethics	88%	135
Sustainable / Green Building	43%**	66
BIM 3D Technology	9%**	14

[1] Total number of responses received was 153.

** Course areas in which less than 75% of graduating seniors rated their confidence in as 'extremely to very' confident.

Action Plan

The following actions are recommended based on the senior exit survey:

- Discuss results with faculty and instructors at Department Meeting.
- Provide instructors with recommendations for course improvements based on senior exit survey responses/recommendations
- Evaluate how teaching assistants are being used to identify if opportunities exist to maximize the value of teaching assistants.
    - Discuss at Department meeting how to clarify the role of teaching assistants to students.
- Reevaluate rational for deleting "hands-on" labs to see if opportunities exist to bring some of these labs back.
- Look for ways to allow students to explore individual interests related to construction.
- Identified overlaps between AIC – AC (Level 1) Exam, Employer Survey and Senior Exit Surveys reinforce the need to evaluate the following:
    - Engineering Concepts, Surveying and Project Layout, Graphic Communications/CAD, BIM, and Mechanical and Electrical Systems.

PADB Curriculum Review Committee

During Fall 2012 and Spring 2013, the following courses were reviewed by the PADB Curriculum Committee:

Fall 2012:

CON 366 – Construction Equipment and Methods

CON 359 – Structures I

CON 459 – Structures II

CON 469 – Soils in Engineering for Construction Managers

Spring 2013:

CON 265 – Construction Estimating I

CON 365 – Construction Estimating II

CON 367 – Construction Contracts and Project Administration

CON 461 – Construction Project Scheduling and Cost Control

- The results of the PADB Curriculum Review Committee were presented at Department meetings throughout the Fall and Spring Semesters.

Action Plan

The following recommendations are based on the Assessment Committee's discussion of the PADB Curriculum Review Process:

- Review the feedback loop from course reviews to ensure that recommendations are getting back to the appropriate course instructors.

The following actions are recommended by the PADB Curriculum Review Committee:

- CON 461:
    - PADB members recommended keeping P6 in CON 461 Scheduling and adding an advanced scheduling class if possible.
- CON 366 and 469:

    - Add storm water management and erosion control as part of site layout to CON 366 Trucks.
    - Remove soils classification material from CON 366 Trucks since it is covered in CON 469 Soils.
    - Add focus on fixed-fee contracts.
    - Add information on geo-fabrics for stabilization.
    - Keep information related to mass diagrams.
- CON 265 and 365
    - Estimating documents for projects in the $3-$7M range have been requested from industry to support student learning.
    - Assistance with models for model-based estimating has been requested from industry.

ASCSU Course Survey

The standard ASCSU Course Survey administered each semester provides the opportunity for instructors to add additional questions. As part of the Quality Assessment plan, the CM Department began requesting faculty to include course objectives as additional questions in Spring 2011. As a result, students are asked to evaluate how well they feel the course objectives were met during the course of the semester using a 5-point rating scale (5 = Excellent, 3 = Average, 1 = Poor, 0 = N/A). This data is provided directly to the CM Department and is summarized in a sheet. The number of course objectives per course ranges from a low of two (CON 360: Electrical and Control Systems, 3 credit hours) to a high of nine (CON 370: Asphalt Pavement Materials and Construction, 3 credit hours).

Results

Overall, students indicated that all course objectives were being met; all course objectives were rated at 3.00 or above for the Fall 2012/Spring 2013 academic year. It is recommended that those course objectives that scored between 3.0 and 3.5 be reviewed by the curriculum committee and the faculty teaching those courses to ensure that course objectives are current, clearly communicated to students and are being covered.

Action Plan

The following recommendations are based on the Fall 2012 and Spring 2013 Course Surveys:

1. Present summary information at Department Meeting.

2. Curriculum committee is currently reviewing course objectives and course content for consistency throughout the curriculum in preparation for the ACCE self-study and accreditation visit.

Specifically, based on responses to the course survey the Curriculum committee should review the following course objectives to ensure that they are current and are being addressed:

- CON 352: Quantify and estimate all direct and indirect costs associated with fabrication of a steel structure.
- CON 459: Recognize and evaluate safety issues related to temporary support structures.
- CON 471: Possess an understanding and an awareness of project management skills to provide an effective, efficient and coordinated mechanical project.

Alumni Survey

The schedule for administering the Alumni Survey has been changed from every year to every five years by the Assessment Committee. This change was made to lessen the impact on alumni, to avoid participant fatigue, and to make better use of department resources.

Action Plans

Following are the recommendations and actions resulting from the 2011 Alumni Survey.

1. Revisions to incorporate into the next survey:
    a. Survey questions related to Drafting need to be revised to better reflect current practices. The term drafting conveys that the work is done by hand and does not accurately reflect the incorporation of CAD, 3-D and BIM technologies. As a result, the survey results related to Drafting are inconclusive.
    b. Revise Q24 about rigor to allow respondents to indicate if the rigor was too low or too high.
    c. Re-administer the survey annually to graduates who have reached the 5-year mark.
        1. **Update:** The schedule has been changed to every 5 years as noted above. The next time the Alumni Survey will go out will be Spring 2016. During the year prior to that, the survey will need to be updated to ensure it is current and in line with other assessment tools.
2. Course Revisions:
    a. Based on the survey responses, the following courses will be evaluated to make them more reflective of the skills and knowledge needed by graduates to be successful and to ensure that they are well prepared in these areas.
        i. Construction Equipment: This course curriculum will be reviewed by the PADB Curriculum Review Committee in Fall 2012.
            1. **Update:** This course was reviewed and recommendations were made to improve the course. These are covered in the PADB Curriculum Review Section of this report.
        ii. Drafting: The department has been working with industry to educate students about the advances in drafting. These include 3-D modeling, CAD, and integration of BIM technologies. Additionally, students have the opportunity to learn more about the application of these technologies through workshops organized by department faculty and industry experts for CM students.

1. **Update:** A dedicated BIM computer lab has been funded and installed in Guggenheim. This lab is dedicated for use by CM students.
2. Three, one credit hour, industry taught boot camps have been implemented utilizing the BIM Computer Lab in the areas of BIM, estimating and scheduling.
    a. Students attending boot camps are surveyed mid-point and at end of class to provide feedback on teaching and facilities.
3. The Department is continuing to discuss ways to utilize the BIM computer lab in current courses and activities**.**

iii. Mechanical and Electrical: This course was revised and a new curriculum implemented in 2006. It was also reviewed by the PADB Curriculum Committee in Fall 2011.

1. **Update:** The course is undergoing a complete revamp in Fall 2013 based on training provided by MCAA.

iv. Surveying: New total stations were purchased and incorporated into this course in 2011. The course activities will be revised in Fall 2012 to better reflect surveying activities graduates will encounter on a construction site.

1. **Update:** Additional attention is still needed in this course. A survey was sent out to PADB members requesting feedback on what skills they are looking for in our graduates related to surveying. This information is being incorporated into upcoming course revisions. These changes will also be reviewed with the curriculum committee.

Senior Capstone Course

Each semester, students entering the Senior Capstone course (CON 465: Construction Management Professional Practice) are required to take a quiz at the beginning of the semester. The purpose of this quiz is to provide a quick assessment of their knowledge in various areas of construction. There are 30 questions covering eleven areas. Students are given this unannounced quiz the second week of class. It is important to note that no reviews are given to prep students for this quiz. The percentage of students correctly answering each question is tracked and averaged across topical areas to determine the Average Percentage Correct (APC) score. Student understanding in each topic area is assessed using 1 to 3 questions. APC scores above 75% are categorized as acceptable. APC scores below 60% are seen as deficient and APC score between 60% and 75% are considered marginal.

Results

The results of previous capstone quizzes were presented at the Fall 2013 Department Retreat. Faculty requested that the CON 465 Quiz be sent out for their review. Faculty will be asked to comment on the appropriateness of questions relative to their course objectives and to suggest alternatives if needed. There was some discussion about linking the CON 465 Quiz to the AIC Exam. There were significant concerns about this and it was decided to use course objectives as the basis of the content included on this exam. This discussion was continued during Assessment Committee meeting (10/11/2013 and 10/25/2013) and a plan was outlined for updating the Capstone Quiz.

Action Plan

Following are the recommendations and actions resulting from the 2012 Capstone (CON 465) Quiz:

1. Course revisions:
    a. **Update:** CON 371: Mechanical and Plumbing Systems is undergoing course redesign in Fall 2013 partially as a result of student performance in prior semesters on this portion of the Capstone quiz.
2. Capstone (CON 465) Survey Revisions:
    a. The capstone quiz results were presented at the Fall 2013 Department retreat and it was agreed that it is time to update the quiz. The Assessment Committee has begun working with the faculty for CON 465 to revise the quiz materials. A pool of questions will be solicited from each required CM course for use in this quiz. The resulting quiz will be piloted with CM faculty.

Open Forum

The responsibility for the CM Open Forum has been handed over to the Construction Management Board of Directors (CMBoD). The CMBoD is comprised of officers from the various student CM Clubs within the department. The CMBoD is responsible for scheduling and advertising the open forum if they feel there is a need to hold one. In the last few semesters the students have not requested an open forum; therefore, there is no information available for the Assessment Report.

The next scheduled open forum is December 4, 2013.

Action Plan Update

The following updates are based on student recommendations received at the 2011 Open Forum meeting:

1. Identify faculty to develop a proposal to formally create a mentoring program for incoming students.

   Update: CM Mentor Summary:

   a. **In Fall 2011,** CM participated in the all-campus 'First Year Mentoring Program' (http://www.otp.colostate.edu/fy-fymp-mentoring.aspx). This group was mentored by the CM Advising office who created the syllabus and facilitated the weekly meetings. Participation was low and university requirements about content restricted our ability to customize meetings and events.

   b. **In Fall 2012,** after meeting with different mentor program advisors within the engineering program, CM developed and instituted a customized CM Program in partnership with the SLX student honor society. While it was a much better format and started with strong participation from CM freshmen, it quickly dissolved. It was decided not to continue the program based on the lack of continued student participation.

   c. **In Fall 2013,** In response to hearing that Pre-CM students thought they were not permitted to participate in clubs and other extracurricular activities, SLX officers requested 5-minutes at the beginning of CON101 (Intro to CM) each week to make announcements about upcoming activities and generally emphasize the importance of getting involved and express that not only is Pre-CM welcome to participate but is highly encouraged to get involved early. This is also reinforced by the course instructors.

   d. **Also in 2013,** the Recruitment and Retention Committee created a 'CM Ambassador' role which plays a dual role in recruitment and retention. Example

responsibilities of the CM Ambassador include: answering prospective student and Pre-CM student questions, providing tours of CM facilities, and functioning as the 'go-to' pool for on-campus visits.

2. Set aside peer mentoring time in CON 101. This time will be used for:
    a. CMBoD members to present information about the value of club involvement and CM Cares in ensuring they receive a quality education.
        i. **Update:** CM Club officers make announcements about club activities in CON 101 courses as appropriate.
    b. Provide an initial connection between the incoming students in CON 101 and those students who are further along in the program.
        a. Update: CM Club officers make announcements about club activities in CON 101 courses as appropriate.
3. Look into allowing alumni to attend special course being taught by industry.
    a. As a committee we recommend that we close this item due to current implementation of industry taught boot camps. These are one-credit hours industry taught topic specific elective courses.
4. Review the structure of CON 151 and CON 251 to see if there can be a better coordination between these two courses.
    a. The assessment committee discussed this and recommends that the curriculum committee discuss reinstating the lab component of CON 151.
5. Review the Labor Relations course and possibly look for an alternative course in the Business School.
    a. This is being discussed by the Curriculum Committee as a result of changes in ACCE Business course requirements.

PRISM

Action Plan

The Strategic Plan for the CM Department was updated over the course of the Fall 2012/Spring 2013 academic year. During the Fall 2013/Spring 2014 academic year, the information in PRISM will be updated to reflect the recent updates to the Strategic Plan.

We are seeking information with Kim Bender, Vice President of Academic Assessment, if PRISM is being replaced and the projected timeline.