

Construction Management Program

LYLES COLLEGE OF ENGINEERING

Student Outcomes Assessment Plan (Soap)

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I. Mission Statement

During the 2010-2011 Academic Year, the Construction Management Program faculty and industry advisory board members agreed upon revised versions of the program mission, vision, and core values.

Mission: “Develop character, construct leaders, sustain learning”

Vision: “Build prominent engaged leaders in the regional, national, and international construction industries”

Values: “The Construction Management Program is committed to:”

- Excellence in teaching, mentoring, and leadership
- Collegiality and strong sense of academic community
- Strong ties with alumni and industry
- Diverse, safe, family environment
- Enriched, universal learning
- Work-life balance
- Professionalism and mutual respect
- Engaged, experiential learning”

II. Goals and Student Learning Outcomes

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A. Program Goals

1. **Professional Orientation** - The degree program seeks to orient the student to and reflect the purpose, philosophy, and ethics of the construction profession as brought forth by professional organizations and institutions of higher education. The degree program also seeks to provide the student with an understanding of the developmental history of the

construction field and profession and to project into future developments included as part of the orientation information are such things as: professional organizations and societies; acknowledged leaders and innovators; noted industry, institutions, and schools; and the professional literature. Finally, the degree program seeks to demonstrate the inter-relationships between the disciplines of construction, the student's area of specialization within the field, and the related fields of architecture, engineering, business, finance, and personnel management.

- 2. Professional Contribution** - The degree program seeks or provide the student with an understanding of the developmental history of the construction field and profession and to project into future developments included as part of the orientation information are such things as: professional organizations and societies; acknowledged leaders and innovators; noted industry, institutions, and schools; and the professional literature. The degree program also seeks to demonstrate the inter-relationships between the disciplines of construction, the student's area of specialization within the field, and the related fields of architecture, engineering, business, finance, and personnel management. The degree program seeks also to provide the opportunity for the student to develop a personal philosophical stance and set of values within society and the profession of construction. The degree program seeks to provide the opportunity for the enrichment of the student's personal development through a broadening of his/her repertoire for experience, in addition to professional and technical growth. The degree program seeks to contribute to the construction profession and field through all appropriate means offered by higher education as a result of the learning process. The degree program seeks to promote and support applied research, development and administrative managerial activity in the construction field and profession. The degree program seeks to gather, structure, develop and make available a body of professional and technical knowledge pertinent to the construction field. The degree program seeks to provide the construction field and profession with knowledgeable and highly competent personnel. The degree program seeks to provide the visibility and status to compete for instructional grants and resources.
- 3. Professional Development** - The degree program seeks to provide the necessary acquisition of professional knowledge, skills, and technical competencies for advanced participation within the construction field. The degree program seeks to extend and reinforce the knowledge and skills of construction applied research and development (project, product and process), and construction management practices as used within the field. The degree program seeks to provide for the acquisition of new, and the extension of previous related managerial material and construction process knowledge and skills through both specialized professional and technical study and professional involvement in the development of significant problem solutions. The degree program seeks to provide for the acquisition of highly proficient specialized knowledge and skills within the technical areas of: architectural practice, graphics and design; building materials and systems; structures; management function, finance and personnel; estimating and bidding; scheduling and control; electrical

and mechanical systems; light and heavy structures; contracts and specifications; and legal aspects of law and regulations affecting the construction industry.

B. Program Student Learning Outcomes – “Graduates of the Construction Management Program will be able to:

- 1. Effectively communicate in graphical, oral, and written forms common in the construction industry. (Communication)**
- 2. Lead diverse teams in the completion of the design and construction of a project. (Leadership)**
- 3. Work closely with other team members that are internal and external to the construction project team. (Teamwork & Team Relations)**
- 4. Solve diverse problems in the design and construction of the project. (Problem Solving & Critical Thinking)**
- 5. Apply the principles of business and organizational management to successfully lead a construction enterprise. (Business Management)**
- 6. Efficiently plan, estimate, and prepare bids for construction projects. (Procurement & Pre-Construction Planning)**
- 7. Manage and control the schedule, cost, quality, safety, and sustainability for the project. (Project Administration & Controls)**
- 8. Demonstrate an understanding of the materials, means, and methods for various projects and sectors including buildings, utilities, infrastructure, and industrial construction. (Construction Knowledge)**
- 9. Manage a construction enterprise in an ethical manner ensuring that all legal responsibilities are withheld throughout the life of the endeavor. (Legal & Ethical Responsibilities)**
- 10. Demonstrate an understanding of the principles of the design process for a project and be able to manage a diverse team of designers on various projects. (Integrated Project Practices)**
- 11. Become literate in sustainability and apply the principles to the design and construction process. (Sustainability)**
- 12. Manage the safety of construction projects on a project and program basis. (Safety)**

III. Curriculum Map (Matrix of Courses X Learning Outcomes)

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Outcome #	Program Terminal Outcome	CM 1S	CM 4	CM 7S	CM 20	CM 110	CM 116	CM 121/L	CM 122	CM 140	CM 170	CM 180A(S)	CM 180B	CM 181	
1	Communication	I	E	R	E	E	E		E		R	M	M	M	E
2	Leadership	I				R					E	M	M	M	
3	Teamwork & Team Relations	I		R		R					E	M	M		E
4	Problem Solving & Critical Thinking	I	R	R	R	R		E	R	E	R		M		
5	Business Management	I									R	E		M	
6	Procurement & Pre-Construction Planning	I				E	E				R	M	R		
7	Project Administration & Controls	I			R	R	R				E	R	M		
8	Construction Knowledge	I	R	E	R	R	R			R		M	M		E
9	Legal & Ethical Responsibilities	I	R	R	E	R	R		E	R	R	R	M	M	E
10	Integrated Project Practices	I	E					R		R		M	M		
11	Sustainability	I	R	E	R				R	E		R	M	M	
12	Safety	I	R	E	R			R	R	R	R	R	M	R	E
GE1	Lifelong Learning (E)	I					E							M	
GE3	Integration (ID)											E		M	

I	Introduced
R	Reinforced
E	Emphasized
M	Mastered
ital	Assesses this Outcome

IV. Assessment Methods

A. Direct Measures (at least three)

1. Senior Capstone Project (Annual) – The capstone projects by teams of senior students are assessment every spring semester by faculty and industry members.
2. Course Assessments (Every Semester) – Although course assessment forms are used every semester, each outcome is assessed every 3rd year by our “Course Assessment Forms” (Appendix A). Therefore, a maximum of four course assessment forms would be required each year to assess the four program outcomes for that cycle. The instructor for the course which assesses the program outcome identified in the Curriculum Map (Section III) is required to show how the course activity or activities directly assess that program outcome. The form provides a standard method for faculty members to show how the program outcomes are assessed at the course level.
3. American Institute of Constructors Level 1 Exam (Biannual) – This exam is administered every semester. Results are sent directly to the program from the testing agency. The results provide a comparison of all CM students that take the exam on a national basis.

B. Indirect Measures (Alumni Survey is required)

1. Alumni Survey (Every Other Year – Even Academic Years)
2. Employer Survey (Every Other Year – Odd Academic Years)
3. Student Internship Evaluations (Annual) – Results from the summer internships evaluations are assessed every fall semester.
4. Student Exit Interviews (Annual) – The CM Program will conduct exit interviews of all graduating seniors in the spring of every semester.
5. Associated Schools of Construction Student Competition (Annual) – Each year, in February, the Associated Schools of Construction hosts a student competition in Reno, Nevada. This competition includes over 1,000 students and nearly 300 industry members. Students are challenged with solving complex problems in the construction industry. The results from this competition provide a “snap shot” of how some of our students compare to the students in other CM programs on a regional and national basis.
6. Accreditation Reports (Every 6 Years) – The American Council of Construction Education has accredited the CM Program. This accreditation is valid through the 2013-2014 academic year. The re-accreditation visit will take place in the Fall 2013 semester.

7. Industry Market Survey (Every 6 Years) – This survey is scheduled for the Fall 2015 semester.

V. Student Learning Outcomes X Assessment Methods Matrix

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Outcome #	Terminal Outcome	DIRECT				INDIRECT							
		Capstone	Courses	AIC Level 1	Internships	Alumni	Employer	Exit Interviews	Entry Survey	IAB Meetings	ASC Comp.	Accreditation	Market Survey
1	Effective Communication	X	X	X	X	X	X	X		X	X	X	X
2	Teamwork & Team Relations	X	X		X	X	X			X	X	X	X
3	Leadership	X	X			X	X			X		X	X
4	Problem Solving & Critical Thinking	X	X	X	X	X	X	X			X	X	X
5	Project Administration & Controls	X	X	X		X	X	X		X	X	X	X
6	Business Management	X	X	X		X	X	X		X		X	X
7	Project Planning (Estimating & Scheduling)	X	X	X		X	X	X			X	X	X
8	Construction Knowledge	X	X	X	X	X	X		X	X	X	X	X
9	Legal/Ethical Responsibilities	X	X	X	X	X	X		X	X	X	X	X
10	Integrated Project Delivery	X	X	X		X	X	X				X	X
11	Sustainability	X	X		X	X	X		X		X	X	X
12	Safety	X	X	X	X	X	X		X		X	X	X

VI. Timeline for Implementation of Assessment Methods and Summary Evaluations

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Year 2011 to 2012

Method 1. Senior Capstone Projects (Spring Semester) – Outcomes 1-4 Assessed

Method 2. Course Assessments (Every Semester) – Outcomes 1-4 Assessed

Method 3. AIC Level 1 Exam – All related outcomes assessed

Method 4. Employer Survey

Method 5. Student Exit Interviews

Method 6. Student Internship Evaluations – All related outcomes assessed

Method 7. ASC Student Competition

Year 2012 to 2013

Method 1. Senior Capstone Projects (Spring Semester) – Outcomes 5-8 Assessed

Method 2. Course Assessments (Every Semester) – Outcomes 5-8 Assessed

Method 3. AIC Level 1 Exam – All related outcomes assessed

Method 4. Alumni Survey

Method 5. Student Exit Interviews

Method 6. Student Internship Evaluations – All related outcomes assessed

Method 7. ASC Student Competition

Year 2013 to 2014

Method 1. Senior Capstone Projects (Spring Semester) – Outcomes 9-12 Assessed

Method 2. Course Assessments (Every Semester) – Outcomes 9-12 Assessed

Method 3. AIC Level 1 Exam – All related outcomes assessed

Method 4. Employer Survey

Method 5. Student Exit Interviews

Method 6. Student Internship Evaluations – All related outcomes assessed

Method 7. ASC Student Competition

Method 8. Accreditation Report (Re-accreditation)

VII. Closing the Loop - Summary Evaluation, Curriculum Adjustment, and Reporting

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The results from the assessment methods will be summarized on an annual basis and presented to faculty members at an annual retreat. This will provide the faculty members a forum to discuss all of the results in an open forum. It will also allow the faculty member to collaborate on any areas of weakness or concern.

In addition to sharing the results with faculty members, these results will also be shared with the industry advisory board. This has taken place over the last three years (2009 – 2012) with great results. This provides another source of feedback from an external course.

The program established the following process to evaluate both programmatic goals and student outcomes:

1. Reevaluation of the mission statement, program objectives, and student learning outcomes.
2. Reevaluation of surveys and scoring rubrics will be done by faculty during scheduled faculty retreat sessions.
3. Data is collected using the assessment tools and according to the established time schedule.
4. Data is analyzed by faculty members and industry advisory board members according to the established time schedule.
5. The action items are determined to close the loop of the assessment process.
6. Progress is monitored based on the action items.

Standards:

The program has established the following standards for direct assessment of program outcomes:

- Faculty will establish a level of achievement (typically 70%) for the outcome assessed with the course assessment form (Appendix A). All outcomes not achieving this level will be noted as requiring immediate attention and listed for further study.
- Program outcomes assessed with established rubrics will consider a rating of 70% (3.5 out of 5 OR 2.8 out of 4) or higher as satisfactory. Program rubrics (Appendix B) will be utilized for the following outcomes:
 1. Communication (5 points scale)
 2. Leadership (5 points scale)
 3. Teamwork & Team Relations (5 points scale)
 4. Problem Solving (4 points scale)

Appendix B provides the most recent annual assessment report that was discussed during the most recent annual retreat.

Appendix A. Blank Course Assessment Form

California State University, Fresno
Lyles College of Engineering
Construction Management Program
Course Assessment Report

Course Name: _____ Prefix and Number: _____
Semester: _____ Year: _____
Taught by: _____ First time teaching the course? Yes: ___ No: ___
Number of students in class: _____
Is this a required course? Yes: ___ No: ___
Assessment method: Direct: _____ Indirect: _____

Did the students meet the minimum standards for all of the course objectives?
Yes: ___ No: ___

Were there any action items from the previous semester? Yes: ___ No: ___

Please answer the following questions if applicable in a **separate sheet** and in the order listed. Use this page as a cover page.

1. If the minimum standards for some of the course objectives were not met, please list course objective, your comments, and action to be taken to improve the student performance.

Course Objective:

Comment:

Action:

2. If there were action items from the previous semester, please list the item(s) and briefly discuss the impact of these items on the student performance.

Observations and Recommendations:

3. Were students well prepared for this course? If not, in what area(s) did you notice weaknesses and what action item do you suggest?
4. Do you have any recommendations to improve the quality of the course including content and method of instruction?

Prepared by: _____

Date: _____

Reviewed by: _____

Date: _____

Rev. 2 – 11/24/2009

California State University, Fresno
 Lyles College of Engineering
 Construction Management Program
 Course Assessment Chart

Course Name: _____

Course Number _____

Semester and Year: _____

Course Objectives (or Learning Outcomes) (1)	Program Outcomes (2)	Assessment Methods (3)	Minimum Standards (4)	Average Scores (5)	Student Survey (6)	Actions Summary (7)
1.						
2.						
3.						
4.						
5.						
6.						
7.						

- (1) Course objectives or course learning outcomes if directly mapped to the Program Outcomes.
- (2) List any of the program outcomes related to the course learning objectives.
- (3) List assessment method(s) used to measure course objectives.
- (4) Percent minimum standard for each of the course learning objectives set forth by the instructor.
- (5) Percent average score for the class.
- (6) Student survey of course outcomes (percent).
- (7) Summary of action items if the student performance falls below minimum standards.

Appendix B. Program Rubrics

Outcome 1. Communication

INDIVIDUAL REPORT RUBRIC

CRITERIA	1	2	3	4	5	SCORE	WEIGHT	TOTAL
CORRECT FORMAT	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Excellent		3	
LITERATURE REVIEW / RESEARCH	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Excellent		1	
EXAMPLES OF IMPLEMENTATION ON OTHER PROJECTS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Excellent		2	
RESOURCES REQUIRED TO IMPLEMENT ON THIS PROJECT	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Excellent		1	
EVALUATION OF IMPLEMENTATION ON THIS PROJECT	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Excellent		3	
GRAND TOTAL								

Outcome 2. Leadership

LEADERSHIP RUBRIC

NAME: _____

TEAM LEADER: _____

TEAM: _____

Instructions: Fill in the "Score" column for each criteria. The Total will automatically calculate. The overall Team Leader score will be the average of the Rubrics provided by each team member.

CRITERIA	1	2	3	4	5	SCORE	WEIGHT	TOTAL
WELL PREPARED TO LEAD ALL MEETINGS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Top Outstanding		3	0
EFFECTIVELY FOLLOWED UP ON ALL TASKS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Top Outstanding		5	0
PROVIDED CLEAR GUIDANCE FOR ALL TASKS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Top Outstanding		5	0
MENTORED TEAM MEMBERS IN COMPLETION OF DIFFICULT TASKS WHEN NEEDED	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Top Outstanding		4	0
CONSISTENTLY AVAILABLE TO TEAM MEMBERS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Top Outstanding		3	0
GRAND TOTAL								0

Outcome 3. Teamwork & Team Relations

TEAMWORK RUBRIC

CRITERIA	1	2	3	4	5	SCORE	WEIGHT	TOTAL
PROMPTLY ATTENDED ALL MEETINGS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Outstanding	4	6	24
ACTIVELY PARTICIPATED IN ALL PHASES OF PROJECT	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Outstanding	4	5	20
ACCURATELY COMPLETED ALL TASKS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Outstanding	4	6	24
ASSISTED OTHER TEAM MEMBERS IN COMPLETING THEIR TASKS	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Outstanding	4	4	16
OVERALL QUALITY OF WORK	Fail Not Meeting Expectations Unsatisfactory Needs Improvement	Pass Progressing Adequate Satisfactory Needs Work	Credit Proficient Above Average Good	Distinction Exemplary Best Excellent	High Distinction Exemplary Best Outstanding	4	4	16
GRAND TOTAL								100

Outcome 4. Problem Solving & Critical Thinking

Problem Solving Rubric

	4	3	2	1	0
Recognition and understanding the problem	Understands the problem and recognizes its implications.		Vague and not very clear.		No evidence of understanding the problem.
Problem Formulation	Right formulas, factors and correct mathematical model or theories.	Good line of thought, but wrong mathematical model or theories.	A serious attempt is made but wrong mathematical model or theories.		No meaningful formulas or theories.
Problem Solution	Correct solution and proper analysis of results.	Correct solution but no analysis of results.	Proper approach but incorrect solution.		No meaningful attempt.

Problem Solving Rubric

	4	3	2	1	0
Recognition and understanding the problem	Understands the problem and recognizes its implications.		Vague and not very clear.		No evidence of understanding the problem.
Problem Formulation	Right formulas, factors and correct mathematical model or theories.	Good line of thought, but wrong mathematical model or theories.	A serious attempt is made but wrong mathematical model or theories.		No meaningful formulas or theories.
Problem Solution	Correct solution and proper analysis of results.	Correct solution but no analysis of results.	Proper approach but incorrect solution.		No meaningful attempt.

Appendix C. Academic Year 2011/2012 Annual Report

1. What Learning Outcomes did you assess?

The CM Program is in the second year of implementing an updated SOAP. This update included significant revisions in the program mission and program outcomes and aligns with the newly revised curriculum plan. As described in the updated SOAP, four program outcomes will be directly assessed each year. The following outcomes were assessed this academic year:

1. Effectively communication in graphical, oral, and written forms common in the construction industry. (Communication)
2. Lead diverse teams in the completion of the design and construction of a project. (Leadership)
3. Work closely with other team members that are internal and external to the construction project team. (Teamwork & Team Relations)
4. Solve diverse problems in the design and construction of the project. (Problem Solving & Critical Thinking)

2. What instruments did you use to assess them?

Direct measures:

- 1) Senior Capstone Project (Annual) – Capstone projects are completed by teams of senior students and are assessed every spring semester by faculty and industry members. The capstone projects are incorporated into CM 180B in the revised curriculum. This course was offered for the first time in the 2011-2012 academic year. In future years, this course will be offered as the second course in a two course capstone series.
- 2) Course Assessments (Every Semester) – Course assessment forms and/or other tools for assessing program outcomes in the courses are used every semester. The instructor for the course assesses the program outcome identified in the Curriculum Map (Section III of the SOAP) and shows how a course activity or activities directly assesses that program outcome. The course assessment form provides a standard method for faculty members to show how the program outcomes are assessed at the course level. Other measures may also be used to effectively demonstrate how the program outcome is measured.
- 3) American Institute of Constructors Level 1 Exam (Biannual) – This national exam is administered every semester. Results are sent directly to the program from the testing agency. The results provide a comparison of all CM students that take the exam on a national basis.

Indirect measures:

- 1) Employer Survey (Every Other Year – Odd Academic Years)
- 2) Student Internship Evaluations (Annual) – Results from the summer internships evaluations are assessed every fall semester.
- 3) Student Exit Interviews (Annual) – The CM Program will conduct exit interviews of all graduating seniors in the spring of every semester.

- 4) Associated Schools of Construction Student Competition (Annual) – Each year, in February, the Associated Schools of Construction hosts a student competition in Reno, Nevada. This competition includes over 1,000 students and nearly 300 industry members. Students are challenged with solving complex problems in the construction industry. The results from this competition provide a “snap shot” of how some of our students compare to the students in other CM programs on a regional and national basis.

Additional measures not listed in SOAP:

- 1) Direct: CSU Fresno Program Review Visitation – A team of three reviews (two internal and one external) conducted a site visit as part of the Program Review by the Division of Undergraduate Studies. This team provided a detailed report with their initial review of the program.
- 2) Indirect: Industry Advisory Board (IAB)/Student Forum – In the Fall semester, a group of IAB members met with a group of students to gather feedback on the overall program.

3. What did you discover from the findings?

Findings:

Direct measures:

1) Senior Capstone Projects – The senior projects in the Spring 2012 offering of focused on two distinct programs. The first was the interdisciplinary project work in the Northern California Community Loan Fund (NCCLF) program. The other was the design, and some times construction, of service learning projects. The NCCLF projects were undertaken with students from the Real Estate (RE) Program out of the Craig School of Business. CM students conducted the service learning projects. Here are some notes from these projects:

- All teams either presented to a team of industry members (NCCLF) and/or created a poster for the LCOE Senior Projects Day. This provided a means for gaining valuable feedback from industry members.
- All teams were successful in completing the required deliverables for all of these projects.
- The overall presentations for the NCCLF were very impressive. Anecdotally, many of the industry members commented that the CM programs presented much better than the RE students.
- The technical content of the projects lacked some detail and depth. This can be attributed to the short time frame (less than a full semester for most projects) for the projects.

2) Course Assessments were conducted in the following courses to address program outcomes:

CM 116 – Communication

- Several of the assignments in CM 116 (Construction Scheduling) required students to create visual graphics and written reports. This is a junior level course. One such assignment required students to create a bar chart schedule and to write a memorandum on this report. A rubric in Blackboard was used to grade this assignment. “Visual Display” was one category in the rubric. Average score for the students in this category was 2.81 out of 3.75 points (75%).

- Most students did well in this aspect. There were a few, however, that struggled to follow directions and ultimately think of the person that was going to view the bar chart at the end of the assignment. So even though the overall was above passing, most students either did very well (over 80%) or very poorly (under 60%) in this category.

CM 1'S' – Teamwork

- The CM Orientation course includes a team assignment. This assignment requires each team of students to research, report, and present a failure case study. A survey in Blackboard was used to have students grade their team members. The average of these 'peer evaluations' was then used for 10% of the overall course grade. All but 2 students (out of 24) received higher than 70% on this peer evaluation. Most students fared very well, averaging over 90% in their team. One reason for this success may be attributed to continuous in-class team assignments that occurred throughout the entire semester.

CM 162 & CM 164 – Problem Solving

- These courses provide students with the opportunity to demonstrate their problem solving skills. A majority of the grade for each class (90%) is based upon a problem-solving rubric that was created for a college-wide research project to determine if grades could be effectively used as an assessment tool. Here are some of the results from the spring course (CM 164):
 - A higher percentage of students passed the course this semester versus the students that took CM 162 (the prior course in this case study) last semester. [It should be noted that 2 of the 7 students that failed the course did not take any of the assessments.] In Fall 2011, 79% of the students passed the course compared to 89% in this semester.
 - 3 students that failed CM 162 in the fall also took CM 174 in the spring. Two of the three passed CM 164 this semester. The other only completed a portion of the class.
 - Nearly all of the students that took the course felt that they had greatly improved their problem solving abilities (88% positive response rate).
 - *Outcome:* Using the problem-solving rubric for assessing the program outcome for this course worked extremely well. I would highly recommend continued use of this system as long as a grader is available to the instructor in large class settings (i.e., more than 30 students).

3) AIC Level I Exam – This exam is administered to graduating seniors of construction management programs throughout the United States. Less than 5% of our graduating seniors (2 of 45) took the exam this year. Neither of the two that took the exam passed it this year. Our students scored higher than the national average and the minimum acceptable score in two of the ten exam categories. Though it is tough to read too much into this data since there were only two students that took the exam, there was some data from the exam results. The following categories showed the greatest difference between our students scores and the passing score and the national average: Engineering Concepts (i.e., engineering design), Management Concepts, Materials/Methods/Modeling, Bidding/Estimating, Budgeting/Cost Control, Planning/Scheduling/Control, Construction Safety, and Construction Geomatics. It is noted that Engineering Concepts and Materials/Methods/Modeling continue to be weak areas from last year.

Indirect measures:

1) Employer Survey – The employer survey was sent to over 35 companies with the request to have the survey forwarded to all supervisors and/or other companies with our alumni. As of this report, only 12 had completed the survey for an estimated response rate of twenty percent.

There were some interesting findings from this year's survey. First, the following program outcomes were ranked lower than previous years: Leadership (22%-‘somewhat important’), Legal and Ethical Responsibilities (12%-‘somewhat important’), Business Management (36%-‘somewhat important’), Construction Knowledge (36%-‘somewhat important’), Project Planning (12%-‘somewhat important’), Construction Safety (22%-‘somewhat important’), Integrated Project Practices (22%-‘somewhat important’), and Sustainability (36%-‘somewhat important’).

When comparing the importance of the outcomes to the perceived proficiency of our students, the following information was found:

- There was a significant difference in Effective Communication. Although all respondents ranked this as significant, half of them ranked our students as ‘disagree’ as being proficient.
- The other significant difference was in the Problem Solving outcomes. Half of the respondents ranked our students as ‘neutral’ or ‘disagree’ with this proficiency.
- Though Sustainability averaged the lowest perceived proficiency (‘neutral’ or lower), this was also one of the lowest categories of importance from the respondents.

2) Student Internship Evaluations – The internship evaluation form was recently revised and placed into an online survey tool in order to automate the process. This greatly increased the quality of the response from employers. There were 6 responses from the Spring 2012 semester out of 8 internships (75% response rate).

The employers unanimously listed the following outcomes as ‘essential’ (100%): Effective Communication, Leadership, Legal and Ethical Responsibilities, Construction Knowledge, Project Planning and Preconstruction Activities, Project Administration and Controls, and Construction Safety. The only outcome that was not listed as ‘essential’ or ‘very important’ was sustainability, which one respondent ranked as somewhat important.

Respondents listed that students were least proficient in the following program outcomes: Effective Communication (2-“Neutral”), Leadership (1-“Neutral”), Problem Solving (1-“Neutral”), and Integrated Project Practices (3-“ Neutral”).

Additionally, half or less than half of the students were ranked as ‘excellent’ or ‘outstanding’ in the following questions:

Please rate the student in the following areas

	Poor	Fair	Good	Excellent	Outstanding	Responses
The work product of the student was:	0.0% 0	16.7% 1	33.3% 2	0.0% 0	50.0% 3	6
The written communication skill of the student was:	0.0% 0	16.7% 1	50.0% 3	33.3% 2	0.0% 0	6
The graphical communication skill of the student was:	0.0% 0	0.0% 0	66.7% 4	33.3% 2	0.0% 0	6
The oral communication skill of the student was:	0.0% 0	16.7% 1	33.3% 2	16.7% 1	33.3% 2	6
The general attitude of the student was:	0.0% 0	16.7% 1	33.3% 2	0.0% 0	50.0% 3	6
The punctuality of the student was:	0.0% 0	0.0% 0	33.3% 2	33.3% 2	33.3% 2	6
The work ethic of the student was:	0.0% 0	16.7% 1	33.3% 2	0.0% 0	50.0% 3	6

Table 1: Student Rankings

Overall, the comments were positive on the students' performance and willingness to activity participates in the projects.

3) Student Exit Interviews – A total of fourteen (14) students completed the exit interview survey form. This constitutes a response rate of 31% of the graduating class (45 students) for the semester. The responses were consistent with many of the responses from previous years. The only program outcomes that were at or below a 4.00 ranking were “Planning/Scheduling/Monitoring” (4.00 out of 5.00), “Design Theory” (4.00 out of 5.00), “Computer Software” (3.92 out of 5.00), and “Safety Standards and Practices” (3.92 out of 5.00). It should be noted the ranking of advising services did improve greatly over the past year, improving by nearly a full point on a 5.0 scale. One key side note is that all but two of the respondents worked part or full time during school. ***These students worked for an average of over 25 hours per week.*** This is a significant workload in addition to school.

4) Associated Schools of Construction Student Competition – Thirty-six (36) students competed in five separate student competitions this year. Here is a brief summary of each competition:

Commercial Construction – Teams were tasked with creating a construction bid and plan for a large building in California. This team took a step back from the previous years. They struggled with the complexity of the project and some of the simple CM skills (estimating, scheduling, etc). All of the team members were new and had little to no actual work experience.

Design/Build Solution – The team was tasked with designing and creating a construction plan for a science building at another CSU campus. This team performed much better than the previous years. However, the lack of good BIM and design skills still put this team behind the other teams in the competition.

Heavy Civil Construction – The problem in this competition was to create a bid and construction plan for a replacement bridge in the state of Washington. The team continues to improve year-to-year, but has not been able to break into the top teams. This year's team lacked some key

organizational skills, which hurt their performance. The team does continue to improve in the technical areas.

Leadership in Energy & Environment Design (LEED) – This team was tasked with calculating various design and construction “credits” for the LEED rating system. This **team finished in 2nd place in this national problem statement**. (This team beat out teams from Cal Poly, Sac. State, Chico State, Virginia Tech, and other national schools.) This team has continued to outperform the other teams from Fresno State. Some of the reasons attributed to this are the consistent coaches and team leadership year-to-year.

Mixed Use Construction – These students were tasked with solving various problems associated with ‘A Day in the Life of a Project Engineer’ and were hosted by Morley Builders. This team did poorly throughout the competition. This was primarily attributed to the lack of a coach for the team and the fact that all students were new to the team and to the competition.

Additional measures not listed in SOAP:

- 1) Direct: CSU Fresno Program Review Visitation – A team of three reviews (two from Fresno State and one from Cal Poly) conducted a program review visit in October. The results of the program review validated the ongoing improvement and growth within the CM Program. There several key constructive comments in the initial report. Two of these comments are relevant for this report. The first is that the program needs to establish and continue to implement a comprehensive assessment program. The second is the need to ‘raise the bar’ and make the curriculum more rigorous.
- 2) Indirect: Industry Advisory Board/Student Forum – The Industry Advisory Board conducted a ‘Student Town Hall’ meeting in November. The IAB members met with over 30 students and asked them questions about the program. There was a lot of great feedback. Interestingly, many of the students commented that they saw the program greatly improving the curriculum and had only wished that it had happened sooner so that they could participate in the changes. In addition, students stated that they would like more field trip opportunities and site visits so that they could readily see the construction field.

4. What changes did you make as a result of these findings?

The newly revised curriculum started this academic year and will be officially in the General Catalog in the 2012-2013 Academic Year. However, the integration of the curriculum will take place of the next two years to allow for students in the old curriculum to see minimal interruptions in their degree path. As was stated last year, it is anticipated that many of the issues and concerns noted in this year’s activities will continue to be addressed with these curriculum changes.

The following general areas of concern have been identified from the assessment activities will be addressed in the following ways:

1. Effectively communication in graphical, oral, and written forms common in the construction industry. (Communication)

- a. Discussion: Communication is another area that continues to show weakness in surveys. Up until a few years ago, there were minimal opportunities to write reports and present in class. This has changed the last several years and the seniors participating in the capstone projects are starting to greatly improve in oral communication skills. The written and graphical communication skills are also improving, but not as quickly as the oral skills.
 - b. Updates/Changes/Revisions:
 - (i) This area will continue to be integrated throughout the curriculum in CM and GE courses.
 - (ii) The new curriculum now requires students to now take BA 105W (Business Writing).
2. Lead diverse teams in the completion of the design and construction of a project. (Leadership)
- a. Discussion: Alumni and employers are increasing responding that leadership is an extremely important aspect in their jobs. Despite this level of importance, employers do not perceive this as an area of strength for our students. There could be many reasons for this perception.
 - b. Updates/Changes/Revisions:
 - (i) Leadership is being integrated throughout the revised curriculum. Additionally, this is the second year of a pilot leadership initiative within the program. These aspects will be improved from normal feedback, but no major changes will occur next year.
 - (ii) The leadership initiative will continue to grow through next year. Improvements will be made according to the feedback from the previous two pilot years.
3. Work closely with other team members that are internal and external to the construction project team. (Teamwork & Team Relations)
- a. Discussion: Teamwork is a critical aspect in the construction industry. This is always one of the highest ranked areas of importance all constituencies. The direct assessment results demonstrate that most students understand this importance and actively engage in teamwork. The results also showed that students generally worked well in teams. One significant impact to all students is that the seniors that worked during school, which is most of them, averaged over 25 hours per week. This is something to keep in mind when developing team assignments.
 - b. Updates/Changes/Revisions:
 - (i) Team assignments continue to be a large part of the CM program. Especially in the upper division courses. This will continue to be the case because of the perceived importance of this outcome. No changes or updates to this approach for next year.

4. Solve diverse problems in the design and construction of the project. (Problem Solving & Critical Thinking)
 - a. Discussion: It is evident that the curriculum needs to be more rigorous in the areas of engineering concepts and business management. These areas continue to be noted in courses, surveys, and other indirect measures.
 - b. Updates/Changes/Revisions:
 - (i) The new curriculum incorporates additional math, science, and engineering design courses (statics and strengths of materials) are anticipated to greatly improve these areas.
 - (ii) The problem-solving format and grading schema used in CM 162 and CM 164 this year seemed to be highly successful. This format will continue through next year.

Additional Program Items:

- Construction modeling and visualization is a significant weakness of students in the program. Specifically, students struggle with plan reading and 3D visualization. This has been addressed with the addition of BIM in the CM 4 course. This course began last semester and will continue to be improved upon next year. The course will continue to strengthen both plan reading and 3D visualization by adding more in class activities with actual construction documents and BIM platforms (Autodesk Revit).
- The program lacks adequate lab facilities for ‘hands-on’ experiences and updated computer systems and programs. These need to be addressed as soon as possible. It should be noted that the computer assets are now shared with the college. New computers are being purchased and will be installed over the summer. Additionally, funding has been made available to build a new “CM Outdoor Lab” which is currently in design.
- Many students also identified the need to have more field trips in courses. The program is working with IAB members to make site visits more available. The only issue is the increase in class sizes. Large groups (more than 15-20 students) become a safety hazard on most construction sites.