

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 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. 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 architectures, 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 architectures, engineering, business, finance, and personnel management. The degree program seeks also the 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 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)**
- 5. Apply the principles of business and organizational management to successful 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)**

13.

III. Curriculum Map (Matrix of Courses X Learning Outcomes)																		
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Outcome #	Terminal Outcome	CM 1S	CM 4	CM 7S	CM 110	CM 116	CM 20	CM 122	CM 140	CM 170	CM 180a	CM 180b	CM 181	CM 191T	GME 15/15L	CE 20	CE 121/L	CE 127
1	Effective Communication	I	R	R	E	E	E	E		E	M	M	M	E				
2	Teamwork & Team Relations	I			R	R			E	E	M	M		E	R			
3	Leadership	I		R	R				E	E	M	M	M	E	R			
4	Problem Solving & Critical Thinking					I				E	M	M			R	R	R	M
5	Project Administration & Controls		I							M								
6	Business Management						I	R		M								
7	Project Planning (Estimating & Scheduling)				I	R				E	E	M						
8	Construction Knowledge	I	R	R	E	E			E			M						
9	Legal/Ethical Responsibilities	I					R	E			M	M	M					
10	Integrated Project Delivery	I			R	R	R	R	E	E	M	M	M					
11	Sustainability	I	R	R				E	E	E	M	M	M					
12	Safety	I		R	R	R	E	E	E	E	M	M	M	E				

I	Introduced
R	Reinforced
E	Emphasized
M	Mastered
x	Assessed

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 two years (2009 – 2011) with great results. This provides another source of feedback for the

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. Academic Year 2010/2011 Annual Report

1. What Learning Outcomes did you assess?

The CM Program has begun the process of implementing an updated SOAP. This includes significant revisions in the program mission and program outcomes. As described in the updated SOAP, four program outcomes will be directly assessed each year. The following outcomes were assessed this academic year:

Outcome 9 – Legal & Ethical Responsibilities

Outcome 10 – Integrated Project Practices

Outcome 11 – Sustainability

Outcome 12 – Safety

2. What instruments did you use to assess them?

Direct measures:

1) Senior Projects

2) Course Assessment Forms

3) AIC Level I Exam

Indirect measures:

1) Alumni Survey

2) Student Exit Interviews

3) Associated Schools of Construction Student Competition

3. What did you discover from the findings?

Direct measures:

1) Senior Projects – The senior projects in the Spring 2011 CONST 144 were used to assess the students attainment of program outcomes 9 (Legal & Ethical Responsibilities) and 10 (Integrated Project Practices) this year. Teams of students were challenged with planning, designing, and creating construction plans for a new “green sports park” for the City of Clovis. Presentation rubrics were used by the instructor and an industry member to assess the students’ work in these categories. Overall the students performed well in understanding the legal and ethical responsibilities (averaging 4.2 on a scale of 5.0). Additionally, students performed extremely well in the application of integrated project practices (averaging 4.6 on a scale of 5.0).

2) Course Assessment Forms were also used in CONST 144 to assess individual students attainment of program outcomes 11 (Sustainability) this year. Students scored an average of 89% in the course learning objectives related to sustainability. As another indicator, on an extra credit survey given to 75 students in three separate classes at the completion of Fall 2011, overall 84% were able to identify the correct definition for LEED, which is the predominant sustainable design and construction rating system in the United State.

In addition to these assessment forms, students in CONST 50 were required to complete the OSHA 30-hour safety training in the course. This training is required for all students as they begin to work in the construction industry. The pass rate for this training was 46% for all students enrolled in this course.

3) AIC Level I Exam – This exam is administered to graduating seniors of construction management programs throughout the United States. Approximately 15% of our graduating seniors (8 of 57) took the exam this year. Three-quarters (6 of 8) passed the exam this year. Our students scored higher than the national average and the minimum acceptable score in six of the ten exam categories. Here is a summary of the four areas in which our students scored lower than the national average or minimum passing score:

- a) Engineering Concepts – Min. Passing Score 19 – National Average 18.8 – CSUF Average 17.6 – ***Below passing and national average***
- b) Management Concepts – Min. Passing Score 9 – National Average 9.5 – CSUF Average 9.4 – *Passing, but below national average*
- c) Materials, Methods, and Plan Reading – Min. Passing Score 22 – National Average 22.8 – CSUF Average 21.1 – ***Below passing and national average***
- d) Planning, Scheduling, and Control – Min. Passing Score 34 – National Average 35.4 – CSUF Average 34.5 – *Passing, but below national average*

Indirect measures:

1) Alumni Survey – The alumni survey was emailed to over 50 alumni and the web-link was also placed on Facebook in order to encourage maximum participation. Currently, there were 14 respondents to this survey. All respondents are currently employed, with 12 of the 14 working in the construction industry. Most of the respondents (9 of 14) graduated within the last 5 years. Moving this survey to an online format greatly increased the overall response in a short amount of time.

Additionally, respondents listed that they were least proficient in the following program outcomes: Business Management (5 “Neutral”), Leadership (3 “Neutral”), and Sustainability (3 “Neutral”).

The most notable finds were that the responses to the following questions:

How would you rate your overall satisfaction with the CM Program?

Only 8 of 14 were “Satisfied” (2-“Neutral”; 3-“Dissatisfied”; 2-“Very”)

How would you rate your satisfaction with your overall education at Fresno State?

Only 7 of 14 were “Satisfied” (5-“Neutral”; 2-“Very Dissatisfied”)

The Fresno State CM Program adequately prepared me for my current profession.

Only 3 of 14 “Agree” (5-“Neutral”; 3-“Disagree”; 3-“Strongly Disagree”)

2) Student Exit Interviews –A total of nine (9) students completed the exit interview survey form. This constitutes a response rate of 45% of the graduating class (20 students) for the semester. The students provided many constructive comments about the courses that they thought need to be revised and/or removed. The only program outcomes that the students highlighted as weaker than other were “Design Theory” (3.89 out of 5.00) and “Computer Software” (3.44 out of 5.00). Perhaps the most notable finding was the overall weakness in advising in the program (averaging less than 3.5 out of 5.0 in all categories).

3) Associated Schools of Construction Student Competition – Twenty-nine (29) students competed in four separate student competition this year. Here is a brief summary of each competition:

Commercial Construction – Teams were tasked with creating a construction bid and plan for a healthcare facility in a state prison. Overall the Fresno State team improved in many of the “soft skill” areas this year. Particularly, the judges noted that this was the best presentation by the team in over 5 years. However, many of the construction related skills (estimating, scheduling, etc) continued to be much weaker than other schools.

Design/Build Solution – The team was tasked with designing and creating a construction plan for a science building at another CSU campus. This team struggled with the challenging content and performed poorly compared to other teams.

Heavy Civil Construction – The problem in this competition was to create a bid and construction plan for 7-miles of rework along I-80 in California. The team completed all work and was second closest to the actual bid price, but missed many of the key aspects of the project. Overall, the team greatly improved over previous years, but was still not close to the top teams.

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 3rd place overall behind University of Washington and Weber State University. (This team beat out teams from Cal Poly, Sac. State, Chico State, Virginia Tech, and other national schools.)

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

The results of these assessments have been addressed throughout the year primarily through the implementation of a revised curriculum that will go into effect next academic year (2011/2012). The following issues identified above will be addressed in the following ways:

- The OSHA 30-hour training certificate will be more closely monitored in the new CM 7’S’ course, which will be offered for the first time next fall. It is critical that students complete this training since the ‘S’ designation of this course will require students to complete construction related service learning opportunities as part of the course.
- Several methods identified a weakness in engineering and design concepts. The new curriculum will require students to take civil engineering design related courses (20, 121, and 127) in order to strengthen this knowledge throughout the curriculum.
- Business management was also identified as weakness for our students. The revised curriculum includes three additional business courses for all students.

- Sustainability was identified as a weak area for recently graduated students. This has been addressed by the inclusion of this content in many courses in the curriculum (CM 144 being one example). It is anticipated that this will change in future years.
- Finally, the advising process has been addressed by keeping the advisors more consistent throughout the student's career. Faculty advisor are now assigned and maintained within the "My Fresno State" system so that students and advisors can easily see the assignment.