II. Degree Program Assessment Plan

1.1 Mission Statement

The CAED is a premier and unique academic unit committed to educating future generations of men and women responsible for planning, designing, constructing, managing, and preserving the physical environment. By physical environment the CAED refers to the following:

- the human or built environment at all scales, from rooms and interiors, to single structure and complexes, to site planning, to urban and regional systems;
- the visual and spatial relationships among elements of the physical environment, including open space as well as built features; and
- the natural environment within which the human or built environment must function.

The five disciplines represented in the curriculum of the CAED - architectural engineering, architecture, city and regional planning, construction management, and landscape architecture - work closely together as a vital combination of environmental design fields. The organization of the CAED at the University reflects the logical affinity among these fields. The CAED is positioned to excel in providing an appropriate instructional vehicle to educate future professionals who have an appreciation and understanding of the collaborative model of professional practice and to be a leader in pursuing research and other creative work to expand the effectiveness of this form of practice.

The following is our Mission:

The Cal Poly Construction Management program builds innovative leaders in the construction industry by integrating technical knowledge, engaging in life-long learning, and solving problems as a highly effective manager through communication and collaboration.

1.2 Degree Program Objectives

As a professional program within the University, the Department is committed to upholding the comprehensive nature of the educational experience offered in the university environment. The curriculum in construction management leads to the bachelor of science degree which is accredited by the American Council for Construction Education. In support of the interdisciplinary goals of the CAED, the Department is committed to producing graduates who

1. Demonstrate a readiness and ability to perform in the construction industry, as evidenced by attainment of PLOs 4, 5, 7, 10, 11, 14, 15, 16, 19, and 20;
2. Demonstrate an ability to apply problem solving skills and integrate technical knowledge, as evidenced by attainment of PLOs 3, 8, 12, 13, 17, and 18;

3. Demonstrate an ability to participate successfully within an interdisciplinary team environment, as evidenced by attainment of PLO 9
4. Demonstrate an understanding of professional behavior, standards, and leadership attributes, as evidenced by attainment of PLO 6 and 23;
5. Demonstrate an ability to communicate effectively, both orally and written, and professionally present ideas, as evidenced by attainment of attainment PLOs 1 and 2;
6. Demonstrate a propensity for lifelong learning and service to the industry and community at large, as evidenced by attainment of PLO 21 and 22;
7. Demonstrate an understanding of construction management in the context of the larger world of the arts, sciences, and technology, as evidenced by attainment of PLO 24; and
8. Demonstrate and ability to make reasoned decisions based on a respect for diversity, as evidenced by attainment of PLO 25.

1.3 Program Learning Outcomes

1. WRITTEN COMMUNICATION - Create written communications appropriate to the construction discipline
2. ORAL PRESENTATIONS - Create oral presentations appropriate to the construction discipline
3. SAFETY PLANS - Create a construction project safety plan
4. COST ESTIMATES - Create construction project cost estimates
5. CHEDULES - Create construction project schedules
6. ETHICS = Analyze professional decisions based on ethical principles.
7. DOCUMENTS - Analyze construction documents for planning and management of construction processes.
8. MATERIALS, METHODS & EQUIPMENT - Analyze methods, materials, and equipment used to construct projects.
9. MGMT/MULTIDISCIPLINARY SKILLS - Apply construction management skills as an effective member of a multi-disciplinary team.
10. e-BASED MGMT TECHNOLOGY - Apply electronic-based technology to manage the construction process.
11. SURVEYING - Apply basic surveying techniques for construction layout and control.
12. PROJECT DELIVERY METHODS - Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. RISK MANAGEMENT - Understand construction risk management.

14. ACCOUNTING & COST CONTROL - Understand construction accounting and cost control.
15. 1QUALITY ASSURANCE & CONTROL - Understand construction quality assurance and control.
16. PROJECT CONTROL - Understand construction project control processes.
17. LAW - Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. SUSTAINABILITY - Understand the basic principles of sustainable construction.
19. STRUCTURES - Understand the basic principles of structural behavior.
20. MEP - Understand the basic principles of mechanical, electrical and plumbing systems.
21. SOCIETY = Understand the role construction managers play in enhancing the needs of society.
22. LIFELONG LEARNING - Understand the importance of creating and planning for continuing education and lifelong learning.
23. LEADERSHIP - Understand the key leadership characteristics that are successful in building and strengthening construction management teams.
24. CULTURE - Understand the importance of recognizing culture differences and role culture plays on influencing project success for a construction team.
25. DIVERSITY - Understand the benefits of respecting the unique and diverse backgrounds individuals bring to a construction team.

These PLOs were adopted by the Department to meet or exceed the ACCE Student Learning Outcomes; to complete the Degree Program Objectives; to align with the University Learning Objectives; and to align with the Western Association of Schools and Colleges [WASC] Core Competencies (See Appendix 1.3. – Learning Objective Alignment) They were formulated by an Outcomes Assessment Committee formed of Regular Faculty. This committee solicited input from internal and external faculty; the curriculum and outcomes assessment committees of the Construction Management Advisory Committee [CMAC]; student focus groups; and others.

1.3.1 Evaluation Methodology

Fig 1 maps the evaluation sub-process. Evaluators have the central role in the evaluation methodology. For every evaluation, there is a report, containing comparative and descriptive information, distributed to a pre-determined list of recipients. The evaluator(s) is charged with recommending changes to the program's curricula or to the outcomes assessment process itself. Recommendations are in the form of written documents submitted to the appropriate committee.

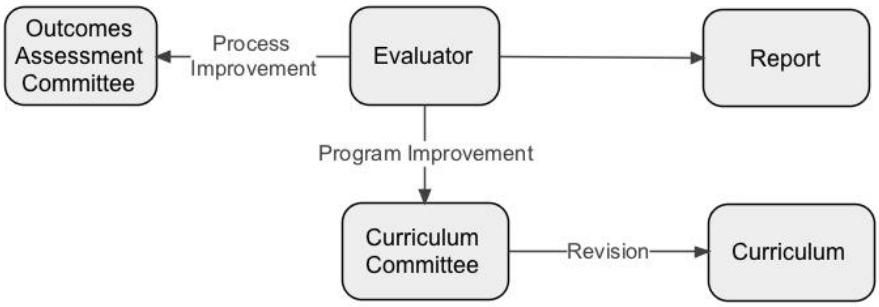


Fig. 1: Evaluation Sub-Process

1.3.2 Program Improvements

A program improvement is a documented recommendation made by the evaluator(s) for change in a particular area of the curriculum. Program improvements arise from evaluating the learning outcomes for each assessment method against its goals and educational objectives to determine if those goals and educational objectives were achieved and if there is a validated need for improvement in any area of the curricula

Evaluators may employ Pareto charts, fishbone diagrams, histograms and other tools in order to formulate their recommendations. It is not uncommon for such recommendations to lead to additional analytical assessments such as interviews and focus groups.

1.3.3 Process Improvements

A process improvement is a documented recommendation made by the evaluator(s) for change in the outcomes assessment process. Process improvements arise from evaluating the learning outcomes for each assessment method against its goals and educational objectives to determine if the assessment method is valid. There should be two assessment methods intersecting with each educational objective. By having two intersecting methods, evaluators are better able to assess the validity and reliability of test results. On those evaluations, recommendations for changes to the process may be made.

1.4 Assessment Tools

Assessments are embedded in courses to the maximum practical extent. Time is taken to explain to faculty members who are hosting assessments in their course, the purpose of the assessment for the assessment to be successful. Host faculty are prepared for their role by being informed if they expected to score, evaluate or otherwise analyze the assessment instrument or if their role is just to proctor the assessment and turn the

result over to others to evaluate. Proxies such as web sites and testing centers have also been identified and procured.

Faculty sub-teams where chartered to review available assessment methods for fit, for the purpose of choosing the most appropriate assessment instrument(s) for each PLO. The available assessment methods are listed in Appendix 1.4A – Assessment Methods List. These assessment methods were then screened by these faculty teams for attributes such as content validity, reliability, opportunity cost and cost to administer. (See Appendix 1.4B – Typical Assessment Screen & Narrative)

In the end, external survey instruments were chosen as an indirect assessment methods for all 25 PLOs; the AIC Level I exam was chosen as a direct assessment method for 12 PLOs; the AIC Level I exam was chosen as a redundant, indirect assessment method for 8 PLOs; and specific assessment instruments where chosen for 13 PLOs. This group of 13 was allocated among three (3) teams: a "Create" team, and "Apply team," the identify specific, direct assessment instruments; and a "CalPoly" team to identify indirect assessment methods for PLO's 21 through 25. (See Appendix 1.4C – Assessment Method Map)

1.4.1 Frequency of Use and Procedures for Data Collection

External survey data is collected once every year. The AIC Level 1 exam is administered in both fall and spring quarters with data collection occurring concurrently with the exams. All other assessments are administered every quarter in each section of every class in which the embedded assessment is hosted with data is collected concurrently.

Frequency of evaluation is as follows:

ORDER	PLO #	SHORT TITLE	BLOOM'S LEVEL	FREQUENCY
1	14	ACCOUNTING & COST CONTROL	Understand	
2	4	COST ESTIMATES	Create	
3	24	CULTURE	Understand	
4	25	DIVERSITY	Understand	
5	7	DOCUMENTS	Analyze	1st Year
6	10	e-BASED MGMT TECHNOLOGY	Apply	
7	6	ETHICS	Analyze	
8	17	LAW	Understand	
9	23	LEADERSHIP	Understand	
10	22	LIFELONG LEARNING	Understand	
11	8	MATERIALS, METHODS & EQUIPMENT	Analyze	
12	20	MEP	Understand	
13	9	MGMT/MULTIDISCIPLINARY SKILLS	Apply	2nd Year
14	2	ORAL PRESENTATIONS	Create	
15	16	PROJECT CONTROL	Understand	
16	12	PROJECT DELIVERY METHODS	Understand	
17	15	QUALITY ASSURANCE & CONTROL	Understand	
18	13	RISK MANAGEMENT	Understand	3rd Year
19	3	SAFETY PLANS	Create	

20	5	SCHEDULES	Create
21	21	SOCIETY	Understand
22	19	STRUCTURES	Understand
23	11	SURVEYING	Apply
24	18	SUSTAINABILITY	Understand
25	1	WRITTEN COMMUNICATION	Create

1.5 Performance Criteria

Performance criteria are established for each PLO. (See Appendix 1.5 – Allocation of Outcomes Assessment Instruments)

1.6 Evaluation Methodology

Evaluation sub-processes will conform with Article 1.3.1 – Evaluation Methodology.

1.6.1 Report formats

The individuals who will receive assessment reports and the formats for those reports has been established.

Reports describe the population of surveys, how that population represents the key characteristics that are being measured, how many are in the sample size, and home many there are in the overall group that is being assessed. If there is a rating scale, the report described the criteria (e.g. “satisfied,” “dissatisfied”) and how many selected each criteria.

Different groups are compared such as previous groups vs. current groups, and causes for different results among different groups. Students may be compared by gender, socio-economic status, transfer vs. regular status. Class attendance and study behaviors in college often differ among students grouped according to their high school class ranks. Test results may be compared for entering freshmen and upper-class students. Results among recruiters, employers, and professionals may be compared. Responses of employers about the types of knowledge and skills they consider important on the job may also be compared with responses from students to these same questions.

1.6.2 Training faculty and other proctors to assess

Critical thinking value rubrics, writing rubrics, and presentation rubrics, to be effective, require training of faculty. Students, mentors and evaluators have been so trained. Faculty have developed learning outcomes, adopted a system for collecting and organizing materials, formulated scoring protocols, adopted common evaluation methods and determined how to whom results will be communicated. Particular attention is being paid to maintaining anonymity to personal identifiers in the data.

1.6.3 Identifying, recruiting and training evaluators

An evaluator is a designated individual or a committee to whom is assigned the accountability for applying judgment to the analysis of data that are gathered and interpreted through assessment. The evaluator's judgment turns data it into useful information that can initiate change. The evaluator is a key element in our outcomes assessment process.

There are three types of evaluators: external consultants, seconders, and committees. External consultants must be hired and paid. A seconder is a faculty or staff member who is released from a regularly assigned position to serve as an evaluator. A committee consists of two or more external consultants and/or seconders.

For those assessments were training of the evaluator is indicted, experts from outside of the department may be recruited. Relationships with department faculty, faculty from outside the department, advisory board members and student-employment-recruiters are all being leveraged to create the widest possible pool of potential evaluators.

APPENDIX 1.3 – LEARNING OBJECTIVE ALIGNMENT

PLO #	SHORT TITLE	PLO DESCRIPTION	WASC CORE COMPETENCY	UNIVERSITY LEARNING OBJECTIVE	DEGREE PROGRAM OBJECTIVE
1	WRITTEN COMMUNICATION	Create written communications appropriate to the construction discipline	Written Communication	Communicate effectively	Demonstrate an ability to communicate effectively, both orally and written, and professionally present ideas
2	ORAL PRESENTATIONS	Create oral presentations appropriate to the construction discipline	Oral Communication		
4	COST ESTIMATES	Create construction project cost estimates	Quantitative Reasoning	Demonstrate expertise in a scholarly discipline	Demonstrate a readiness and ability to perform in the construction industry
5	SCHEDULES	Create construction project schedules			
11	SURVEYING	Apply basic surveying techniques for construction layout and control.			
14	ACCOUNTING & COST CONTROL	Understand construction accounting and cost control.			
15	QUALITY ASSURANCE & CONTROL	Understand construction quality assurance and control.			

16	PROJECT CONTROL	Understand construction project control processes.			
19	STRUCTURES	Understand the basic principles of structural behavior.			
20	MEP	Understand the basic principles of mechanical, electrical and plumbing systems.			
7	DOCUMENTS	Analyze construction documents for planning and management of construction processes.	Information Literacy		
10	e-BASED MGMT TECHNOLOGY	Apply electronic-based technology to manage the construction process.			
3	SAFETY PLANS	Create a construction project safety plan	Critical Thinking	Think critically and creatively	Demonstrate an ability to apply problem-solving skills and integrate technical knowledge
8	MATERIALS, METHODS & EQUIPMENT	Analyze methods, materials, and equipment used to construct projects.			
12	PROJECT DELIVERY METHODS	Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.			
13	RISK MANAGEMENT	Understand construction risk management.			

17	LAW	Understand the legal implications of contract, common, and regulatory law to manage a construction project.			
18	SUSTAINABILITY	Understand the basic principles of sustainable construction.		Make reasoned decisions based on an awareness of issues related to sustainability	
6	ETHICS	Analyze professional decisions based on ethical principles.		Make reasoned decisions based on an understanding of ethics	Demonstrate an understanding of professional behavior and standards
9	MGMT/MULTIDISCIPLINARY SKILLS	Apply construction management skills as an effective member of a multi-disciplinary team.		Work productively as individuals and in groups	Demonstrate an ability to participate successfully within an interdisciplinary team environment
21	SOCIETY	Understand the role construction managers play in enhancing the needs of society.		Use their knowledge and skills to make a positive contribution to society	Demonstrate a propensity for service to the industry and community at large
22	LIFELONG LEARNING	Understand the importance of creating and planning for continuing education and lifelong learning.		Engage in lifelong learning	Demonstrate a propensity for life-long learning
23	LEADERSHIP	Understand the key leadership characteristics that are successful in building and strengthening construction management teams.			Demonstrate leadership attributes
24	CULTURE	Understand the importance of recognizing culture differences and role culture plays on influencing project success for a construction team.		Understand [Construction Management] in the context of the larger world of the arts, sciences, and technology	

25	DIVERSITY	Understand the benefits of respecting the unique and diverse backgrounds individuals bring to a construction team.	Make reasoned decisions based on a respect for diversity

APPENDIX 1.4A – ASSESSMENT METHODS LIST

Assessment Centers
Capstone Courses
Case Studies
Classroom Assessment
Collective Portfolios
Content Analysis
Embedded Questions and Assignments
Exit Interviews
Focus Groups
Interviews
Locally-Developed Exams: Essay Questions
Locally-Developed Exams: Objective Questions
Matrices
Observations
On-Line Data Collection
Phone Surveys/Interviews
Portfolios
Primary Trait Analysis
Rating Scales
Reflective Essays
Scoring Rubrics
Standardized Achievement Tests
Standardized Self-Report Tests
Surveys
Transcript Analysis

APPENDIX 1.4B – TYPICAL ASSESSMENT SCREEN & NARRATIVE

PLO 17 Law		*Understand the key leadership characteristics that are successful in building and strengthening construction management teams.*		
Focus	**Assessment Types**	**Detriments** Minor / Major	**Benefits** Minor / Major	**Findings** indicate "DIRECT" or "INDIRECT"
Current	N/A			
Best Avail.	Embedded Questions and Assignments	X	X	**DIRECT: Shortlist**
Outsourced	Standardized Achievement Test	X	X	DIRECT
Alumni	Phone Surveys & Interviews: Alumni Employers	X	X	INDIRECT (Identification, cooperation & sample size issues.)
Industry	Phone Surveys & Interviews: Interning Supervisors	X	X	INDIRECT
Student	Senior Survey	X	X	**INDIRECT: Shortlist**
	Exit Interviews	X	X	**INDIRECT: Shortlist**
Technology	N/A			
Other	Locally-Developed Exam: Essay Questions	X	X	DIRECT
	Observations	X	X	INDIRECT

NARRATIVE

Embedded Questions and Answers

Description: Embed questions that assess the achievement of this PLO within final or midterm exams of selected courses.

Detriments: It will be difficult or impossible to compare results against national standards. Writing good, relevant questions, validating them, and maintaining them over time has a high opportunity cost.

Benefits: Students are motivated to do well when course grade is at stake. Easy to embed and to collect data. Questions can be targeted to leadership if leadership is part of the course content. Analysis of students learning over time can be assessed.

Findings: Shortlist this as a direct measure of understanding.

Standardized Achievement Test

Description: Obtain a leadership exam from an appropriate outside organization

Detriments: Content may not align with our learning objectives. Students need to be motivated to perform well on exam. There will be some money costs.

Benefits: Tests are likely already developed and administered by industry partners (Skanska?), business schools (Orfalea?), and the ROTC (on campus)

Findings: It may be difficult to identify a leadership exam that is appropriate for our curricula. Test should be embedded in a course so that test grade impacts course grade.

Phone Surveys / Interviews (Alumni Employers & Interning Supervisors)

Description: These are highly scripted and structured phone interviews with employers of recent graduates who have observed graduates' leadership skills.

Detriments: Identification & Cooperation – It will be difficult to identify and gain the cooperation of sufficient numbers of employers.

Sample Size – There will likely be a very small sample size.

Money Cost – We would likely have to hire somebody to perform the phone interviews.

Opportunity Cost – Creating the survey questions will take time to create and more time to refine, revise and maintain over time.

Reliability – This is an indirect assessment that will require significant effort to evaluate in a uniform manner.

	Validity – The interviewee will not likely have 1st hand knowledge of an alumni's leadership. They might also be reluctant to share too much of what they know.
Benefits:	Insight – Conversations with a person who has observed student performance 1st hand can reveal far more than the examination of a work product can reveal.
	Scope – A conversation can move in many directions and explore areas that we might not have thought about beforehand.
	Feedback – Through a conversation we could gain invaluable feedback about the strengths and weaknesses of our program.
Findings:	Indirect measure with identification, cooperation and small sample size issues.
Senior Survey	
Description:	Students are surveyed to self-report their understanding of leadership. In this survey, comprised of Likert scales and text blocks for comments, students respond to queries about leadership
Detriments:	Opportunity Costs – It will take time to create, revise, refine and maintain the survey questions..
	Content Validity – A single, end-of-program survey may leave us unable to establish a causal connection between survey results and particular courses.
	Reliability – Meaningful interpretation of results is enhanced by qualitative information (i.e. written comments). Not all respondents will provide qualitative information, however.
Benefits:	Relevance – Experts report that students are apt to reflect truthfully on whether they feel that they understand something or not.
	Efficiency – Surveys are very easy to administer
	Peripheral Benefits – Written comments may provide us with new insights
Findings:	Shortlist. Suitable indirect assessment. Better if coupled with direct assessment.
Exit Interviews	
Description:	Ask a sample of graduating seniors a series of structured questions relating to program outcomes. Their comments are captured.
Detriments:	Content Validity – It may be difficult to establish a causal connection between comments in a single, end-of-program interview and particular courses.
Benefits:	Relevance – Experts report that students are apt to reflect truthfully on whether they feel that they understand something or not.
	Efficiency – Interviews are moderately easy to administer
	Peripheral Benefits – Dialogue may provide us with new insights

Findings:	Shortlist. Suitable indirect assessment. Better if coupled with direct assessment.

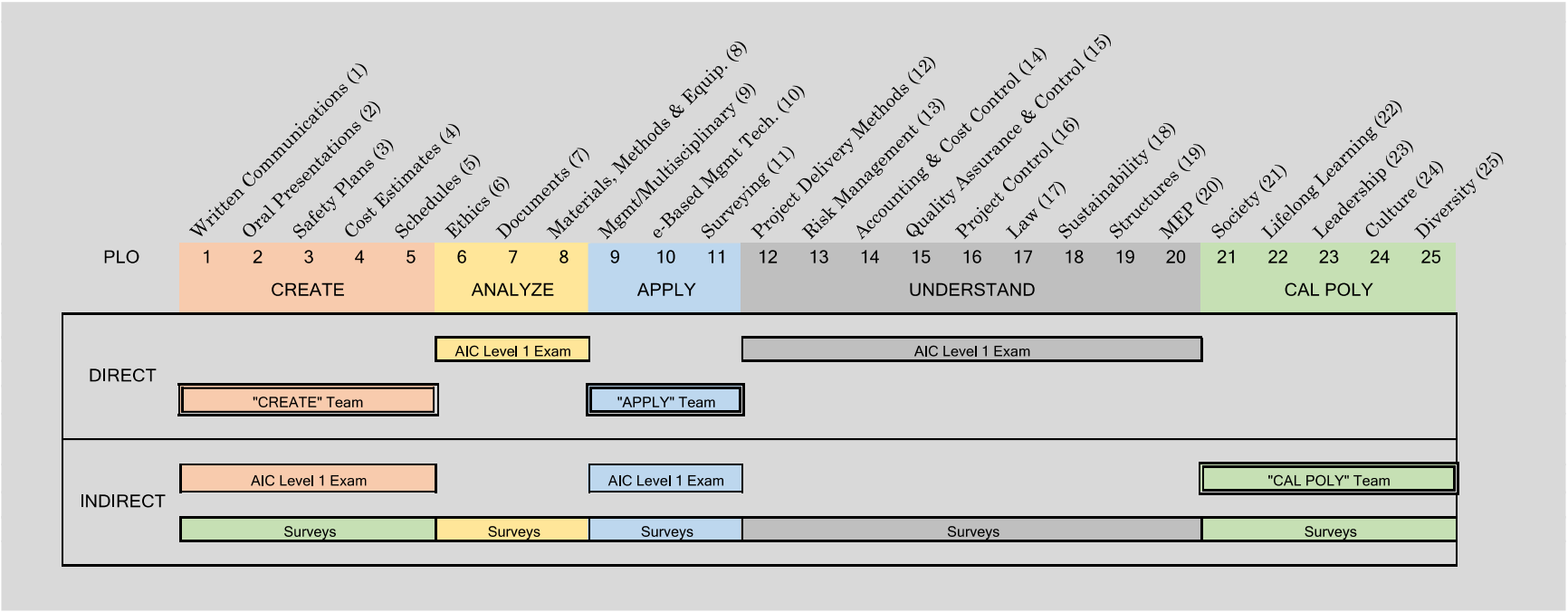
Locally-Developed Exam: Essay or Objective Questions

Description:	Multiple-choice, fill-in-the blanks, matching or short essay questions developed and maintained by the department's faculty and embedded in a course or courses.
Detriments:	Opportunity Cost – There is a very high opportunity cost in faculty time to develop a useful and effective exam and additional time to refine, revise and otherwise maintain the exam over time. Error and Consistency – Errors can arise through inaccurate measurement, administration or inconsistent scoring. There are concerns about unclear, ambiguous questions, insufficient time for taking an exam and inconsistent scoring as between different graders.
Benefits:	Relevance - Multiple-choice, fill-in-the blanks or matching questions can reliably demonstrate that a student understands leadership concepts. Content Validity – Questions can precisely match what we teach. Motivation – Easily embedded into our courses. Attaching a portion of course grade to the exam improves motivation.
Findings:	Non-Starter: Even if we could write and maintain an exam with adequate consistency and minimal errors it would come at a high opportunity cost.

Observations

Description:	Collect faculty assessment of the leadership traits of students from classroom observations.
Detriments:	Incomplete assessment. Observations tend to be used to pick student team leaders. Assessment of leadership traits of all students may be lacking. Very difficult and time-consuming to do this in a meaningful way with all students.
Benefits:	Observation by an impartial 3rd party may be more valid than a person's self-reporting or even an objective test.
Findings:	An indirect measure and likely not a representative sample of students.

APPENDIX 1.4C – ASSESSMENT METHOD MAP



APPENDIX 1.4C – ASSESSMENT METHOD MAP
(Updated: 3/8/21)

Outcomes Assessment Matrix

					Assessment Measure				Assessment Measure			Assessment Measure			Assessment Measure		
			Review Years	Current Status	Type	Course No.	Measure Description	Goal	Type	Measure Description	Goal	Type	Measure Description	Goal	Type	Measure Description	Goal
CREATE	1	WRITTEN COMMUNICATION	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 462	Senior Project Abstract Review with Rubric	75% of students achieve 80% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	2	ORAL PRESENTATIONS	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 413	Student presentation (Tool Box Talk) with rubric	80% of students achieve 50% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	3	SAFETY PLANS	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 413	Individual assignment with rubric	Class average is 70% or better each quarter	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	4	COST ESTIMATES	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 314	Individual assignment with rubric	80% of students achieve an estimate within 15% of known costs	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	5	SCHEDULES	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 313	Embedded activity question in exam with rubric	80% of students achieve 80% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
ANALYZE	6	ETHICS	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 334	Essay question embedded in final exam	100% of students identify one primary trait; 80% of students score 60 or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	7	DOCUMENTS	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 313	Assignment with rubric	80% of students achieve 80% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	8	MATERIALS, METHODS & EQUIPMENT	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 313	Embedded question in exam with rubric	80% of students achieve 80% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
APPLY	9	MGMT/MULTIDISCIPLINARY SKILLS	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 450	Embedded question in exam with rubric Assignment with rubric	80% of students achieve 80% or better 80% of students achieve 80% or better	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above	Indirect	AIC Exam	School average is better than the national average
	10	e-BASED MGMT TECHNOLOGY	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 280	Embedded activity question in exam with rubric	80% of students achieve 80% or better	Indirect	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	11	SURVEYING	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 314	Assignment with rubric	90% or students get a 70 or better	Indirect	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	12	PROJECT DELIVERY METHODS	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 450	Essay question embedded in module exam	80% of students achieve 80% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	13	RISK MANAGEMENT	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 413	Embedded questions in exam	70% of students answer each question correctly AND 70% of students get at least 70% of the answers correct	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	14	ACCOUNTING & COST CONTROL	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 335	Embedded questions in exam	80% of students achieve 80% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	15	QUALITY ASSURANCE & CONTROL	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 413	Embedded questions in exam	70% of students answer 70% of the questions correctly	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above

Outcomes Assessment Matrix

					Assessment Measure				Assessment Measure			Assessment Measure			Assessment Measure		
			Review Years	Current Status	Type	Course No.	Measure Description	Goal	Type	Measure Description	Goal	Type	Measure Description	Goal	Type	Measure Description	Goal
UNDERSTAND	16	PROJECT CONTROL	AY 2020/21 AY 2023/24 AY 2026/27		Direct	CM 413	Embedded questions in exam	80% of the students achieve 80% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	17	LAW	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 334	Embedded questions in exam	80% of the students achieve 80% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	18	SUSTAINABILITY	AY 2022/23 AY 2025/26 AY 2028/29		Direct	CM 317	Final exam	80% of the students achieve 80% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	19	STRUCTURES	AY 2020/21 AY 2023/24 AY 2026/27		Direct	ARCE 212	Final exam	80% of students achieve 70% or better	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	20	MEP	AY 2021/22 AY 2024/25 AY 2027/28		Direct	CM 411	Embedded questions in exam	100% of students answer 70% of the questions correctly	Direct	AIC Exam	School average is better than the national average	Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above
	21	SOCIETY	AY 2022/23 AY 2025/26 AY 2028/29						Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above			
	22	LIFELONG LEARNING	AY 2020/21 AY 2023/24 AY 2026/27						Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above			
	23	LEADERSHIP	AY 2021/22 AY 2024/25 AY 2027/28						Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above			
	24	CULTURE	AY 2022/23 AY 2025/26 AY 2028/29						Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above			
	25	DIVERSITY	AY 2022/23 AY 2025/26 AY 2028/29						Indirect	Survey to Industry Employers asking about students' abilities on a 5-point Likert scale	50% of employers answer good or above	Indirect	Survey to graduating seniors asking about students' abilities on a 5-point Likert scale	65% answer good or above			

Date of last update: March 8, 2021

APPENDIX 1.5 - ALLOCATION OF PROGRAM OUTCOME ASSESSMENT INSTRUMENTS

PLO#	Short Title	Course or Assessment	Responsible Faculty
1	Written Communication	CLA +	Greg
2	Oral Presentations	443	Lonny
3	Safety Plans	413	Phil
4	Cost Estimates	314	Barry & TBD
5	Schedules	313	Jason
6	Ethics	334	Dan
7	Documents	313 314	Jason Barry/TBA
8	Materials, Methods & Equipment	313	Jason
9	Mgmt/Multidisciplinary Skills	415	Greg
10	e-Based Mgmt Technology	280 413	Elbert Phil
11	Surveying	314	Paul R.
12	Project Delivery Methods	102 480	Paul W. Greg
13	Risk Management	413	Phil
14	Accounting & Cost Control	335	Stacy
15	Quality Assurance & Control	413	Phil
16	Project Control	313	Jason
17	Law	334	Dan
18	Sustainability	317	Scott
19	Structures	115 ARCE	Paul W. Al
20	MEP	411 115	Lonnie Paul W.

DELIVERABLES

A. Map Course Learning Outcomes [CLOs] to Program Learning Outcomes [PLOs] *

A Course Learning Outcome [CLO] is what we refer to in our syllabi as a "Learning Outcome." One or more CLOs should be mapped to each PLO.

B. Embed an assessment Instrument or instrument for each PLO.

APPENDIX 1.5 - ALLOCATION OF PROGRAM OUTCOME ASSESSMENT INSTRUMENTS (Updated: 9/6/20)

Course Mapping Matrix

		102	113	114	115	214	232	280	313	314	317	318	334	335	411	413	443	450	460/1/2
		Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M	Level I/R/M
	Quarter hours:	2	2	2	6	5	3	2	5	5	4	4	2	2	5	5	3	5	2/1/1
CREATE	1 WRITTEN COMMUNICATION			I	R	R			R	R	R	R			R	R	M		M
CREATE	2 ORAL PRESENTATIONS					I			R	R			R	R	R	M	M		R
CREATE	3 SAFETY PLANS							R	I						R	M			
CREATE	4 COST ESTIMATES	I			I	R	R	R	R	R					R				
CREATE	5 SCHEDULES	I			I	R		R	R	R					R				
ANALYZE	6 ETHICS					I			I		I		R	R		R	R		
ANALYZE	7 DOCUMENTS	I			I	R		R	M	R		I	I			R			
ANALYZE	8 MATERIALS, METHODS & EQUIPMENT		I	I	I	R		R	R/M	R	R				R				
APPLY	9 MGMT/MULTIDISCIPLINARY SKILLS	I							I				I				R	M?	
APPLY	10 e-BASED MGMT TECHNOLOGY				I	R		I	R					R		M			
APPLY	11 SURVEYING									R									
UNDERSTAND	12 PROJECT DELIVERY METHODS	I	I						R	R	I		I			R		M?	
UNDERSTAND	13 RISK MANAGEMENT	I				I	I		I				I	I		M	M		
UNDERSTAND	14 ACCOUNTING & COST CONTROL				I				I					M					
UNDERSTAND	15 QUALITY ASSURANCE & CONTROL					I		R	R				I			M			
UNDERSTAND	16 PROJECT CONTROL								I				I	I		M			
UNDERSTAND	17 LAW												M						
UNDERSTAND	18 SUSTAINABILITY					I	I	R	I	R	M	I			R				
UNDERSTAND	19 STRUCTURES		I		I	I			R										
UNDERSTAND	20 MEP		I		I	I		R	R						M				
UNDERSTAND	21 SOCIETY					I			I		R	R		R					
UNDERSTAND	22 LIFELONG LEARNING								I								R		M
UNDERSTAND	23 LEADERSHIP					I			I								R		
UNDERSTAND	24 CULTURE					I			I			I					R		
UNDERSTAND	25 DIVERSITY					I			I		R	R					I		

I Students introduced to the outcome
R Students receive reinforcment of outcome
M Students demonstrate level f mastery (competency)
Outcome assessed in this course

An assessment instrument is a tool for measuring a program learning outcome. The instrument must be appropriate for the "verb" of the PLO: a multiple-choice exam for an "understand" or "analyze" PLO; a rubric for assessing a written paper, report or project for an "apply" or "create" PLO. We prefer that you embed in some assignment or exam that you are already administering. However, some PLOs (i.e. cost estimating, scheduling, quality plans) are such that you'll have to create the project or assignment in which to embed the assessment instrument.

C. Establish measurement standards

Measurement standards for multiple-choice exams are pretty easy: the student answers the questions correctly or not and you grade the results. Measurement standards for rubrics are not so easy. After listing the elements in the rubric, you have to create a measurement standards for each element. So, for example, if your rubric has the element "writing mechanics" your measurements might be spelling, punctuation, capitalization, and paragraphs; and your measurement standards might be a 1-point deduct for each spelling, punctuation, capitalization or paragraph error. Then you have to weight each element in order to grade the rubric.

D. Establish scoring criteria

The scoring criteria sets the standard for the assessment. This may be the most difficult task. What defines success? 100% of the entire tested population achieving a grade of 70% or better? The entire tested population achieving an average grade of 85% or better with 95% achieving a grade of 60% or better? Don't be afraid to set a criterion now and revise it later after you acquire some testing results. Remember, our goal here is continuous improvement, which requires that we establish a reasonable baseline.

III. Degree Program Assessment Implementation Plan

1.1 Comprehensive Assessment of Objectives and Learning Outcomes

The Department conducts comprehensive assessments of all program objectives and Learning Outcomes. External survey data is collected once every year. The AIC Level 1 exam is administered in both fall and spring quarters with data collection occurring concurrently with the exams. All other assessments are administered every quarter in each section of every class in which the embedded assessment is hosted with data is collected concurrently.

1.2 Assessment Cycle

The results of each assessment cycle are systematically documented. All ACCE Student Learning Outcomes are assessed on a three-year cycle. (See Article 1.4.1)

1.3 Evaluation Against Performance Criteria

All degree program objectives and Learning Outcomes are compared to stated performance criteria. Evaluators have the central role in the evaluation methodology. For every evaluation, there is a report, containing comparative and descriptive information, distributed to a pre-determined list of recipients. The evaluator(s) is charged with recommending changes to the program's curricula or to the outcomes assessment process itself. Recommendations are in the form of written documents submitted to the appropriate committee. (See Article 1.3.1).

1.4 Process Review and Continuous Improvement

For each PLO, process evaluators are tasked with, for every evaluation, composing a report containing comparative and descriptive information, and distributed to a pre-determined list of recipients. The evaluator(s) is charged with recommending changes to the program's curricula or to the outcomes assessment process itself. Recommendations are in the form of written documents submitted to the appropriate committee.