

## UC Construction Management Academic Quality Plan

The UC Construction Management Academic Quality plan described in this document identifies the process used for the continuous improvement of the Construction Management Program. The plan describes methods of gathering, analyzing and using information from various sources about the CM program and measuring program outcomes in order to improve student learning.

### The CM Academic Quality Process

The CM Academic Quality plan utilizes a systematic approach to continuous improvement as illustrated in Figures 1 and 2. As shown in Figure 1, each assessment cycle utilizes the Deming's Plan-Do-Check-Act cycle of activities. We start the "Plan" activity by defining/reviewing the CM program mission, and educational objectives. Based on the mission and educational objectives, we identify expected student learning outcomes. We then define assessment method for each learning outcome. We collect data (assessment input) from the various assessment methods to assess whether we are achieving our learning outcomes. We analyze the data and provide feedback to our stakeholders. Based on the analysis of data, we implement changes (assessment output) where needed, we monitor changes, compare results and use information in the following planning cycle.

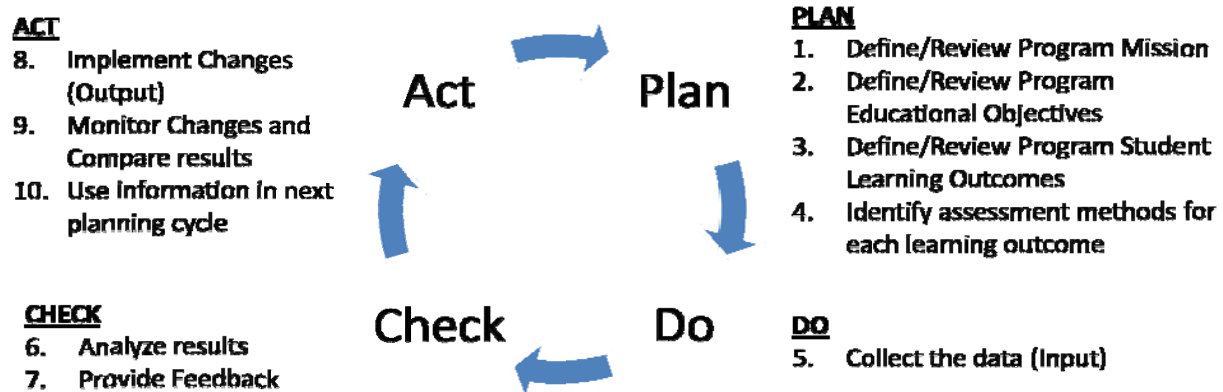


Figure 1- Academic Quality Assessment Cycle

Assessment output (outcomes) consists of conclusions and recommended changes that result from the data collected. Implementing the outputs may be as simple as the instructor implementing it in the next class. We do our major review of curriculum, program mission, educational objectives and student learning outcomes every three years. By repeating the assessment cycle every 3 years, as illustrated in Figure 2, we ensure the continuous improvement of our program.

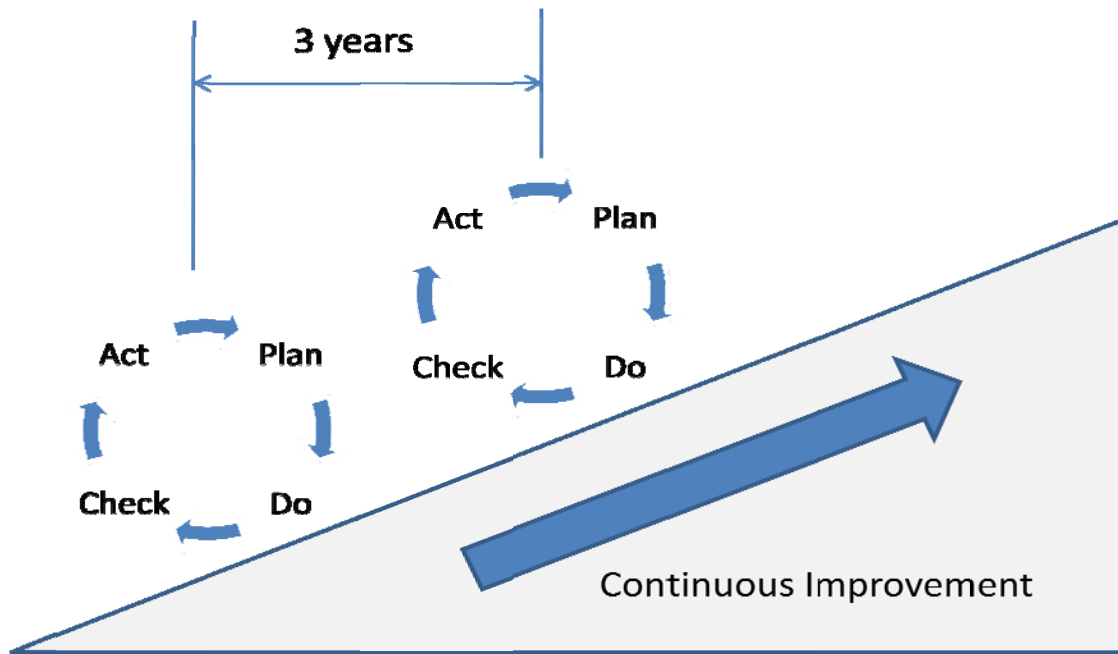


Figure 2 – Continuous Improvement Process

### 1- Program Mission

Our mission defines what our program is trying to accomplish and serves as a foundation for our Academic Quality plan. In order to improve, we need to know where we are today and where we would like to go. Our mission is aligned with the College, and University’s mission as defined below.

#### Mission of University of Cincinnati

The University of Cincinnati serves the people of Ohio, the nation, and the world as a premier, public, urban research university dedicated to undergraduate, graduate, and professional education, experience-based learning, and research. We are committed to excellence and diversity in our students, faculty, staff, and all of our activities. We provide an inclusive environment where innovation and freedom of intellectual inquiry flourish. Through scholarship, service, partnerships, and leadership, we create opportunity, develop educated and engaged citizens, enhance the economy and enrich our university, city, state and global community.

#### Mission of College of Engineering and Applied Science

The mission of the College of Engineering and Applied Science is to provide:

- Excellence in Education—provide a world-class education for our students
- Excellence in knowledge creation and transfer in support of education and community—provide the best education featuring new breakthroughs in science and technology and be able to transfer that knowledge of science technology both to our students and to our local community

- Accessibility—provide a venue where qualified students who want to come, can come; and provide the support necessary to allow them to be successful

### **Mission of the CM Program**

The CM Program is committed to excellence in construction education, research and service. We prepare men and women for productive and rewarding careers managing construction projects from conception to completion and beyond. Through our sound curricula, experienced faculty, and cooperative program, we develop our students' technical and managerial knowledge, leadership skills, ethical, social and environmental accountability required to be successful in their professional careers. Our faculty strives to use the best teaching pedagogies. Our faculty members stay current with new technical developments and are committed to advancing the construction industry by creating new knowledge through research and scholarly activities.

### **2- Program Educational Objectives**

The CM program Educational Objectives (EO) describe the career and professional accomplishments that the program is preparing graduates to achieve. Our continuous improvement based academic quality plan requires us to re-examine our program's educational objectives systematically. The following are the CM program educational objectives and they are aligned with the program's mission:

- EO 1. Immediately upon graduation, CM graduates have both the theoretical knowledge and professional practice experience that makes them more valuable to employers and increases their qualifications and opportunities for more responsible entry-level career positions.
- EO 2. CM graduates are capable of engaging and leading others to successful completion of construction projects.
- EO 3. CM graduates are capable of pursuing successful careers in construction that lead to executive and leadership positions in the construction industry.
- EO 4. CM graduates are committed to continuous learning that will enable them to adapt to changing technological and economic circumstances
- EO 5. CM graduates are devoted to their professions and committed to fulfilling their ethical, social, and environmental responsibilities

### **3- Program's Learning Outcomes**

The CM Program's Learning Outcomes (PLO) are statements that the program uses to describe what students are expected to know and able to do by the time of graduation. The learning outcomes describe the intended educational outcomes in terms of specific abilities, knowledge, values and attitudes that we want our students to possess.

The following are the CM program's learning outcomes:

- PLO 1. A graduate of this program shall have demonstrated their ability to apply what they learned in the classroom to professional practice during their co-op assignments.

- PLO 2. A graduate of this program shall have acquired the ability to apply knowledge of mathematics, science, and analytic and critical thinking skills for the purpose of identifying, formulating and solving construction problems.
- PLO 3. A graduate of this program shall have acquired an understanding of the analysis and design of structural, mechanical, plumbing and electrical systems for buildings for the purpose of effectively coordinating the design and managing the installation of these systems.
- PLO 4. A graduate of this program shall have acquired an understanding of construction means and methods of and an ability to effectively manage project personnel, materials, equipment and cost.
- PLO 5. A graduate of this program shall have acquired business and management skills necessary to run construction projects and organizations.
- PLO 6. A graduate of this program shall have acquired the ability to communicate effectively.
- PLO 7. A graduate of this program shall have acquired an understanding of the constructor's role as a member of a multi-disciplinary team and an ability to function effectively on teams.
- PLO 8. A graduate of this program shall have acquired an ability to research and apply modern techniques, skills and tools for managing construction projects.
- PLO 9. A graduate of this program shall have acquired the ability to pursue life-long learning for continuous personal and career development.
- PLO 10. A graduate of this program shall have acquired an understanding of their professional, ethical, social and environmental responsibilities
- PLO 11. A graduate of this program shall have acquired a respect for diversity and knowledge of contemporary professional, environmental, societal and global issues.

The Program's learning outcomes (PLO) are derived from the program's educational objectives (EO). The following table demonstrates how our PLOs are related to our EOs.

CM Educational Objective		CM Program Learning Outcome										
		PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10	PLO 11
EO 1	Immediately upon graduation, CM graduates have both the theoretical knowledge and professional practice experience that makes them more valuable to employers and increases their qualifications and opportunities for more responsible entry-level career positions.	X	X	X	X	X	X					
EO 2	EO 2. CM graduates are capable of engaging and leading others to successful completion of construction projects.		X	X	X	X	X	X				
EO 3	CM graduates are capable of pursuing successful careers in construction that lead to executive and leadership positions in the construction industry.		X	X	X	X	X	X	X	X	X	X
EO 4	CM graduates are committed to continuous learning that will enable them to adapt to changing technological and economic circumstances						X		X	X		X
EO 5	CM graduates are devoted to their professions and committed to fulfilling their ethical, social, and environmental responsibilities						X	X	X	X	X	X

#### 4- Assessment Methods

Assessment Methods tells us how well we are currently doing. Our academic quality plan utilizes multiple assessment methods and multiple sources. We utilize assessment methods that are aligned with the outcome that we are trying to assess. We obtain assessment methods from all program constituencies (students, employers, faculty, staff, alumni, professional practice division). The following table lists the assessment methods that are used to evaluate CM program learning outcomes.

Assessment Method	When?	Who?	Action
Course Evaluations	Every Quarter	CM Faculty per course; Assessment Committee	Modifications to course delivery, content and outcome.
Coop Employer Survey	Every Quarter	Employer evaluation conducted by professional practice, reviewed by Assessment Committee	Suggestions for modifications to professional practice advisors, curriculum modifications as needed
Coop Student Survey Assessment	Every Quarter	Student Survey conducted by professional practice, reviewed by Assessment Committee	Suggestions for modifications to professional practice advisors, curriculum modifications as needed
Alumni Survey	Every Two Years	By College, Analyzed by Program	Modifications to curriculum as needed
CM Capstone Project	Every Winter and Spring Quarters	CM Faculty and Industry evaluators	Modifications to curriculum as needed
Livertext e-portfolios	Several classes throughout the curriculum	CM Faculty	Modifications to curriculum as needed
CM graduate Employment Information Survey	Every Spring Quarter	Professional Development Division	Modifications to curriculum as needed
Industrial Advisory Board Feedback	Every Year during Advisory Board Meetings	Advisory Board, Analyzed by Program	Modifications to curriculum as needed
Tech Expo Projects	Every Winter and Spring Quarters	CM Faculty and Industry evaluators	Modifications to teaching research methods to senior students
Faculty/ Staff Feedback through faculty meetings	Monthly Faculty/Staff Meetings	CM Faculty and staff	Modifications to curriculum, CM program processes, and facilities
Curriculum Mapping	Every 3 years	CM Faculty	Modifications to curriculum as needed
Syllabus Analysis	Every time a new instructor is assigned to a course	CM Faculty	Modifications to Syllabus content
Students Competitions	Every year	CM Students	Benchmark our program against other programs

## Course Evaluations

For every course taught, we conduct a course evaluation survey towards the end of the quarter. We survey students about what they learned, the course objectives, class assignments, instructor delivery, textbook, teacher's attitude towards students and grading. The School of Advanced Structures director reviews the results of the evaluation to ensure that the course content and delivery is appropriate.

## Professional Practice (Co-op) Surveys

The Professional Practice Program of the University of Cincinnati is designed to provide students an extension of classroom and laboratory teaching by practice in the field. Professional practice assignments require students to apply and demonstrate knowledge, attitudes, judgment and techniques they learned in the classroom. These assignments assist the student in developing an understanding of human relationships and in learning to work with others as a member of a team. Individual growth is enhanced by the realization that, in addition to demonstrating theoretical knowledge, one is also learning to become an integral part of the working community and developing an awareness of the interrelationship between the academic and professional worlds. The division of professional practice conducts two different types of surveys each year: (1) student survey and (2) employer survey. The questions in both surveys are used to evaluate several CM learning outcomes as is illustrated in a following section. By conducting the survey every year, we collect longitudinal data to gauge growth of our students' knowledge, communication skills, teamwork skills, learning, work habits and analytical ability.

## Alumni Survey

The College of Engineering and Applied Science administer an alumni survey biannually to Construction Management alumni. The survey solicits information on careers as well as views on the curriculum, department and faculty. The CM program chair and faculty review the results of the survey.

## CM Capstone Project

In the CM capstone senior project we work closely with seniors and have a chance to assess their discipline-specific knowledge, competency skills, technology skills, critical thinking skills, communication skills, and attitudes. The CM capstone project provides our students an opportunity to demonstrate the ability of absorbing, applying and integrating experiences and knowledge. We use this assessment method to evaluate students' abilities to analyze, synthesize, and/or evaluate information that has been taught throughout their academic careers. Projects are generally judged by a panel of faculty and construction professionals for the purpose of identifying where to improve the program. In addition to the final capstone project, the following assessment methods are used during the capstone class:

- Case studies and hypothetical situation responses on ethics
- Expert evaluation of final report and presentations. The panel includes members of the faculty, advisory board members, and construction professionals.
- Peer evaluation of research presentations. Students evaluate the work produced by classmates.

## Livertext Electronic Portfolio

Electronic portfolios provide powerful tools to enhance learning. Students develop their personal portfolios to summarize and reflect on their college and personal experiences. They also develop portfolios for selected courses to document their learning and archive materials they receive in various

classes. E-portfolios allow faculty to readily access information on the progress of the students to improve their learning and provide a feedback loop to improve their experience. Faculty use rubrics evaluate a collection of students' work (e.g., writing, homework, etc.) over a period of time. This method of assessment provides longitudinal data to gauge growth of particular skills or understandings. The portfolios exhibit the maturity and growth of the students through their years in college. A committee or a designated group of faculty members review portfolios in a program for the purpose of identifying where improvements in the program are needed.

### **CM Graduates Employment Information Survey**

We administer a yearly graduating CM senior employment survey. The survey gathers information on employment positions taken by students upon graduation, employers' information, job descriptions, and salary ranges. The CM program chair and faculty review the results of the survey.

### **Industrial Advisory Board Feedback**

Through its committee structure and regular meetings, the CM advisory board help in the design of new courses in terms of rationalizing the need for that new course and its positioning in the curriculum. Additionally, the advisory board feedback assists faculty in developing assignments that include the intended knowledge, abilities, values and attitudes of the CM program. This method of assessment provides a current and relevant level of analysis which is beneficial to the development of the curriculum as well as the assessment of students' knowledge, skills and attitudes. In addition, the Industrial Advisory Board members hire our students for co-op and after they graduate and provide us with feedback on the quality of their performance.

### **Tech Expo Projects**

The objective of the TECH EXPO project is to introduce students to the concepts of research, innovation and implementation of latest research findings in construction. Student teams investigate new technologies and innovations that can help solve some of the current construction industry problems. Each team must demonstrate that their proposed technology or innovation is functional. The team should also develop a plan for implementation, and identify any implementation constraints. We use this assessment method to evaluate students' abilities to research and apply modern techniques, skills and tools for managing construction projects. We believe such abilities will help our students in pursuing successful careers in construction that lead to executive and leadership positions in the construction industry.

### **Faculty/ Staff Feedback through faculty meetings**

In our faculty meetings, the faculty and staff members voice opinions, suggestions to improve the quality of the CM program. The faculty provides feedback after program changes are implemented.

### **Curriculum Mapping**

We use this assessment method to monitor the alignment of the curriculum with intended learning outcomes and ACCE requirements (course matrix). ACCE mandates that all accredited programs must meet certain requirements for broad course topic areas such as: general education, mathematics, science, business, construction and construction science. ACCE has also established certain topical contents, which must be covered within the program. Curriculum mapping ensures that the program's



content is actually relevant to the specified intended learning outcomes. The faculty reviews the curriculum matrix bi-annually or with any curriculum change. The CM Faculty also monitors changes in ACCE requirements and modify curriculum accordingly.

### **Syllabus Analysis**

We use syllabus analysis to track courses that include program level student learning outcomes. We examine each syllabus to determine which student learning outcomes are taught and assessed in an individual course. Syllabus analysis is an especially useful technique when multiple sections of a department's course are offered by a variety of instructors. The analysis is a method used to ensure that each section covers agreed upon course material related to specific program level student learning outcomes. The Construction Management Program Chair, with the advice of the faculty, is responsible for seeing that course content as defined in the syllabus is appropriate.

### **Students Competitions**

Our CM students are heavily involved in regional and national CM student competitions. They compete every year in all categories of the Associated Schools of Construction Student Competitions (commercial, design/build, heavy/civil). They also compete in the annual Ohio Contractors Association (OCA) Estimating Competition and in the annual Associated Builders and Contractors (ABC)'s Student Construction Management Competition. Although a large percentage of students participate in these competitions, we do not consider student competitions as a complete assessment method since not all students participate in them. We use the competition to benchmark our programs against other CM programs.

## **5- Data Collection**

We collect data required for all our assessment methods discussed above. The forms used in data collection are included in the appendix.

## **6- Analysis of Results**

In this phase, we analyze the results and determine what actions need to be taken to improve the program. We summarize the results in a meaningful way so that the faculty can review them and determine what actions are needed to improve the program.

## **7- Provide Feedback**

After presenting the collected data and summary results to our stakeholders, we seek their feedback and recommendations on how to improve our program. These changes could be to the content of the curriculum, staffing, facilities, among others.

## **8- Implement Changes**

In this phase, we implement improvements to the program. In some cases, the changes are easy to implement, while in other instances the proposed changes will have to be implemented over a period of time or through a series of steps.

## **9- Monitor Changes and Compare Results**

We monitor implemented improvements to determine whether or not they had the desired effect.

## **10- Use Information in Next Planning Cycle**

In this phase we review all of the information obtained from the assessment process and determine if it will affect our next assessment plan. This provides the starting point for the next iteration of the plan-do-check-act cycle to continuous improvement of the academic program as illustrated in Figure 2 above.

## **Assessment Matrix**

We have developed an assessment matrix to link our current assessment efforts to program learning outcomes. The matrix ensure that each program learning outcome is being assessed. The matrix is shown below.

Program Learning outcomes	Assessment Method (s)
<p>PLO 1 A graduate of this program shall have demonstrated their ability to apply what they learned in the classroom to professional practice during their co-op assignments.</p>	<p>Co-op Student Survey - Questions JA1- JA16  Co-op Employer Survey  Industrial Advisory Board Feedback  CM Graduate Employment Information Survey</p>
<p>PLO 2 A graduate of this program shall have acquired the ability to apply knowledge of mathematics, science, and analytic and critical thinking skills for the purpose of identifying, formulating and solving construction problems</p>	<p>Co-op Student Survey - Question SA2  Co-op Employer Survey - Questions B1-B4  Course Evaluations  Alumni Survey Question 1e and 2e</p>
<p>PLO 3 A graduate of this program shall have acquired an understanding of the analysis and design of structural, mechanical, plumbing and electrical systems for buildings for the purpose of effectively coordinating the design and managing the installation of these systems</p>	<p>Co-op Student Survey - Question SA3, SA7  Co-op Employer Survey - Questions C1-C3, H1-H3  Course Evaluations  Alumni Survey Question 1g, 2g, 1i, 2i  Curriculum Mapping  Syllabus Analysis  CM Capstone Project</p>
<p>PLO 4 A graduate of this program shall have acquired an understanding of construction means and methods of and an ability to effectively manage project personnel, materials, equipment and cost</p>	<p>Co-op Student Survey - Question SA3, SA7  Co-op Employer Survey - Questions C1-C3, G1-G3  Course Evaluations  Alumni Survey Question 1g, 2g, 1f, 2f  Curriculum Mapping  Syllabus Analysis  CM Capstone Project</p>
<p>PLO 5 A graduate of this program shall have acquired business and management skills necessary to run construction projects and organizations</p>	<p>Co-op Student Survey - Question SA6, SA9  Co-op Employer Survey - Questions F1-F3, J1-J4  Course Evaluations  Alumni Survey Question 1d, 2d  Curriculum Mapping  Syllabus Analysis  CM Capstone Project</p>
<p>PLO 6 A graduate of this program shall have acquired the ability to communicate effectively</p>	<p>Co-op Student Survey - Question SA1  Co-op Employer Survey - Questions A1-A4  Livetext Electronic Portfolio  Alumni Survey Question 1b,2b  CM Capstone Project  Tech Expo Projects</p>
<p>PLO 7 A graduate of this program shall have acquired an understanding of the constructor's role as a member of a multi-disciplinary team and an</p>	<p>Co-op Student Survey - Question SA5  Co-op Employer Survey - Questions E1-E4  Alumni Survey Question 1c,2c</p>

	ability to function effectively on teams	CM Capstone Project Tech Expo Projects
PLO 8	A graduate of this program shall have acquired an ability to research and apply modern techniques, skills and tools for managing construction projects	Tech Expo Projects CM Capstone Project
PLO 9	A graduate of this program shall have acquired the ability to pursue life-long learning for continuous personal and career development	Alumni Survey Question 1a, 2a
PLO 10	A graduate of this program shall have acquired an understanding of their professional, ethical, social and environmental responsibilities	Co-op Student Survey - Question SA4 Co-op Employer Survey - Questions D1-D5, K1-K5 Alumni Survey Question 1h,2h
PLO 11	A graduate of this program shall have acquired a respect for diversity and knowledge of contemporary professional, environmental, societal and global issues	Co-op Student Survey - Question SA8 Co-op Employer Survey - Questions I1-I3 Alumni Survey Question 1i,2i