

## Quality Assessment Plan

Quality Assessment Plan serves as the basis for the continuous improvement at the Department of Construction Management. The improvement plan has three major components:

1. Mission statement
2. Program objectives
3. Student learning outcomes
4. Assessment tools

### 1. Mission Statement

#### **University of Houston Mission**

The mission of the University of Houston is to offer nationally competitive and internationally recognized opportunities for learning, discovery and engagement to a diverse population of students in a real-world setting.

#### **College of Technology Mission**

Preparing the leaders of tomorrow for global industry and commerce.

#### **Construction Management Department Mission**

Provide students with skills and knowledge that are valued by the commercial, industrial and heavy civil construction industry and result in increasing the students' marketability and potential for success.

### 2. Program Objectives

The following educational program objectives identify accomplishments in support of the CM department mission.

#### ***Goal 1 – Attract a diverse student body***

Objective #1: Recruitment of Minority Groups

Objective #2: Recruitment of female students

#### ***Goal 2 – Provide an environment in which students excel and grow***

Objective #3: Provide Proper Advising and Career Guidance

Objective #4: Offer Financial Assistance

Objective #5: Assist in Students Placement and Career Preparation

#### ***Goal 3 – Prepare competitive graduates who are valued by employers***

Objective #6: Offer a Well-designed Curriculum

Objective #7: Engagement with the Construction Industry

#### ***Goal 1 – Attract a diverse student body***

Our objective is to be a friendly program that welcomes diversity. This goal is achieved by succeeding in encouraging women and minority ethnic groups to join our program and mentor them to ensure their success.

**Objective #1: Recruitment of Minority Groups:** Because of its broad/diverse nature, the CM profession is well-suited for the inclusion of individuals of diverse talents, backgrounds, cultures, and interests. The Department Chair is actively involved in minority students' recruitment through personal visits to high schools and community colleges with large minority populations of both Hispanic Americans and African Americans. Also, the department emphasizes mentoring of our minority students by our diverse faculty members.

The Department Chair (Dr. Eldin) has served on the Board of Directors and served as Vice-Chair for the ACE National Mentoring Program (a national organization that focuses on attracting and recruiting minority students to the professions of Architecture, Construction, and Engineering).

**Objective #2: Recruitment of female students:** Our objective is to encourage women to enter our program and to mentor them to ensure their success. Measurable efforts are placed in attracting female students to the construction management profession. This is accomplished through presentations on campus, at community colleges, and high schools that address female students' concerns and through mentoring of female students by our diverse faculty members and selected industry professionals. The program engages great female role models to encourage female students to join our CM program. Examples of these role models include Karen Moony (Manager of Engineering & Construction, MD Anderson), Jayme Connors (Project Manager, Fluor), Raylena Browning (Sr. Project Manager, Skanska), Anna Farokhi (Manager Commissioning & Turnover, Fluor), Lisa Burns (Development Director, UH, and Lana Coble (Director Project Controls, Tellepsen. These ladies are engaged with our students as academic advisors, course instructors, guest speakers, and extracurricular activity coordinators.

Female students are especially encouraged to take leading roles in CM extracurricular activities and student organizations. As a result, many female students joined the Student-Chapters as members and officers including the position of Presidents, Vice-Presidents, and Committee Chairs of Sigma Lambda Chi (SLC- International Honorary Society), ABC, AGC, and WCA Student Chapters. The student teams that present UH at National Construction Management Competitions (ABC, AGC, etc.) always include female students.

The Women Contractor Association (WCA) UH chapter was established by our CM students. WCA is a non-profit organization composed of women owners and decision-making executives within the construction industry. In spring 2013, the Women in Construction Scholarship was spearheaded by Sandra Clunn, president of Enviro-San and Clunn Acoustical Systems.

***Goal 2 – Provide an environment in which students excel and grow***

Our goal is to create an environment to encourage student success. This is achieved by providing proper advising, financial assistance, and career preparation.

**Objective #3: Provide Proper Advising and Career Guidance:** Once admitted to the College, students receive advising and counseling from the CM Department as well as from fulltime staff of the College's Academic Service Center (ASC). Throughout their program, students periodically receive formal advising and counseling from the Department Chair and fulltime CM faculty and the ASC office.

**Objective #4: Offer Financial Assistance:** Students are offered many opportunities to help students with the financial burden of college education. The Department is active in placing students in well-paying jobs/internships as they attend school. In addition, a number of students receive scholarships and/or summer jobs to participate in undergraduate-research activities under the supervision of CM faculty.

**Objective #5: Assist in Students Placement and Career Preparation:** The Department continues to send information to the students regarding opportunities for internships, part-time, and fulltime positions. The Department Chair and the ASC office assist students in resume writing and interview skills. Every year, the CM student chapters arrange for 4-6 professional presentations by prominent guests from the industry to address issues/questions regarding the students' field of interest. In addition, the college schedules two career fairs each year for our students.

***Goal 3 – Prepare competitive graduates who are valued by employers***

Our goal is to prepare graduates that can make a difference for the construction industry. We want our students to be highly sought after by national and international employers. This is achieved by implementing the proper curriculum and engaging with the construction industry.

**Objective #6: Offer a Well-designed Curriculum:** the Department utilized the ACCE guidelines in developing a well-balanced curriculum. In addition, we engaged our industry advisory board member companies in enhancing and periodically reviewing our curriculum.

**Objective #7: Engagement with the Construction Industry:** The CM program engages the construction industry through many venues. This includes hiring industry professionals to teach regular forces, inviting industry professionals to mentor students' chapters, and involving the industry advisory board members in student extracurricular activities and periodical reviews of the curriculum. In addition, our students are engaged in extended internship experience (1-3 years).

### 3. Student Learning Outcomes

The following represents the list of knowledge areas expected upon completion of the Construction Management (CM) degree:

- A. Communication skills, i.e. written and oral communication
- B. Engineering concepts, e.g. design concepts and analysis of structural systems
- C. Management concepts, e.g. project financing, economics, and law
- D. Materials, methods, and project Modeling and visualization
- E. Bidding and estimating, including blueprint reading and quantity take-offs
- F. Budgeting, costs, and cost control
- G. Planning, scheduling, and schedule control
- H. Construction safety
- I. Construction geomatics, e.g. site development and layout
- J. Project administration

The CM curriculum is designed to fulfil student learning outcomes identified above. The matrix in Table 1 below shows how each degree course in the curriculum contributes to the achievement of each student learning outcome.

**Table 1: Course Outcomes Matrix**

<b>Course Outcomes Matrix</b>		Communication skills	Engineering concepts	Management concepts	Materials, methods, & graphics	Bidding and estimating	Budgeting, costs, and control	Planning, scheduling & control	Construction safety	Construction Geomatics	Project administration
<b>CNST courses</b>											
CNST 1301/1325	Constr. Materials & Methods				X						
CNST 1330/1315	Graphics				X						
CNST 1361	Construction Management I			X							X
CNST 2321/2325	Mech. & Elect. System/MEP		X		X						
CNST 2341/2345	Construction Documents			X							X
CNST 2351	Construction Estimating I					X					
CNST 3155	Constr. Materials & Testing		X		X						
CNST 3185	Construction Experience	X							X		
CNST 3205/3210	Constr. Safety Management								X		
CNST 3301	Constr. Equipment & Methods		X		X						
CNST 3331	Planning & Scheduling							X			
CNST 3351/3365	Construction Estimating II					X					
CNST 3355	Strength of Constr. Materials		X		X						
CNST 3372	Soil Mechanics & Foundation		X		X						
CNST 4265	Constr. Layout & Site Dev.									X	
CNST 4302	Constr. Law & Ethics			X							
CNST 4311/4315	Structural Steel & Timber		X		X						
CNST 4331/4335	Construction Management II	X		X	X	X		X	X	X	X
CNST 4341/4385	Project Controls	X		X	X		X	X	X	X	X
CNST 4381/4345	Reinf. Concrete & Bldg. Codes		X		X						
<b>Non-CNST Courses</b>											
ACCT 2331	Acct. Principles I-Financial			X							
ACCT 2332	Acct. Principles II-Managerial			X							
COMM 1332	Fund. of Public Speaking	X									
ECON 2304/2305	Micro/Macro Economics			X							
ENGL 1303	Freshman Composition I	X									
ENGL 1304	Freshman Composition II	X									
FINA 3332	Principles of Financial Manag.			X							
GENB 4350	Business Law & Ethics	X		X							
MANA 3335	Intro. Org. Behavior & Manag.			X							
MARK 3336	Elements of Marketing Admin.			X							
SCM 3301	Service & Manufacturing Ops.			X							

#### 4. Assessment Tools

Outcomes assessment is a systematic process of gathering and interpreting information to measure the CM department progress in achieving our program objectives and student learning outcomes. Evaluation of the programs objectives and learning outcomes are compared to the stated performance criteria to determine whether stated objectives and learning outcomes are achieved and whether improvement action is needed. The results of each assessment cycle are documented in a systematic manner and reviewed by the Department Chair to identify a validated need for improvement. After each comprehensive assessment cycle, the entire process is reviewed and updated with plans for implementation for improvement recorded including any revisions to the CM department's assessment plan.

To evaluate the achievement of **Student Learning Outcomes**, the CM Department places particularly high value on the National Certification Exam offered by The American Institute of Constructors (AIC) as it is an unbiased third-party assessment that targets all the skills and knowledge areas required for accreditation. This exam is also an excellent benchmarking tool. The AIC Exam is viewed as a quantitative, externally controlled, validating tool and an important foundation for our program assessment process. The aforementioned student learning outcomes addresses the knowledge areas required to maintain our ACCE accreditation and to prepare our students for AIC Exam. The AIC Certification Exam is an 8-hour test that is nationally recognized as a measure of competency. Since 2011, **passing** the AIC (Level1–Associate Constructor) national certification exam has become a **graduation requirement** for our CM students. This requirement distinguishes our graduates and makes them highly employable.

In addition to the AIC exam, other tools are also used to evaluate the achievement of **Program Objectives** and offer a more well-rounded continuous improvement process. The following offers the full list of assessment tools:

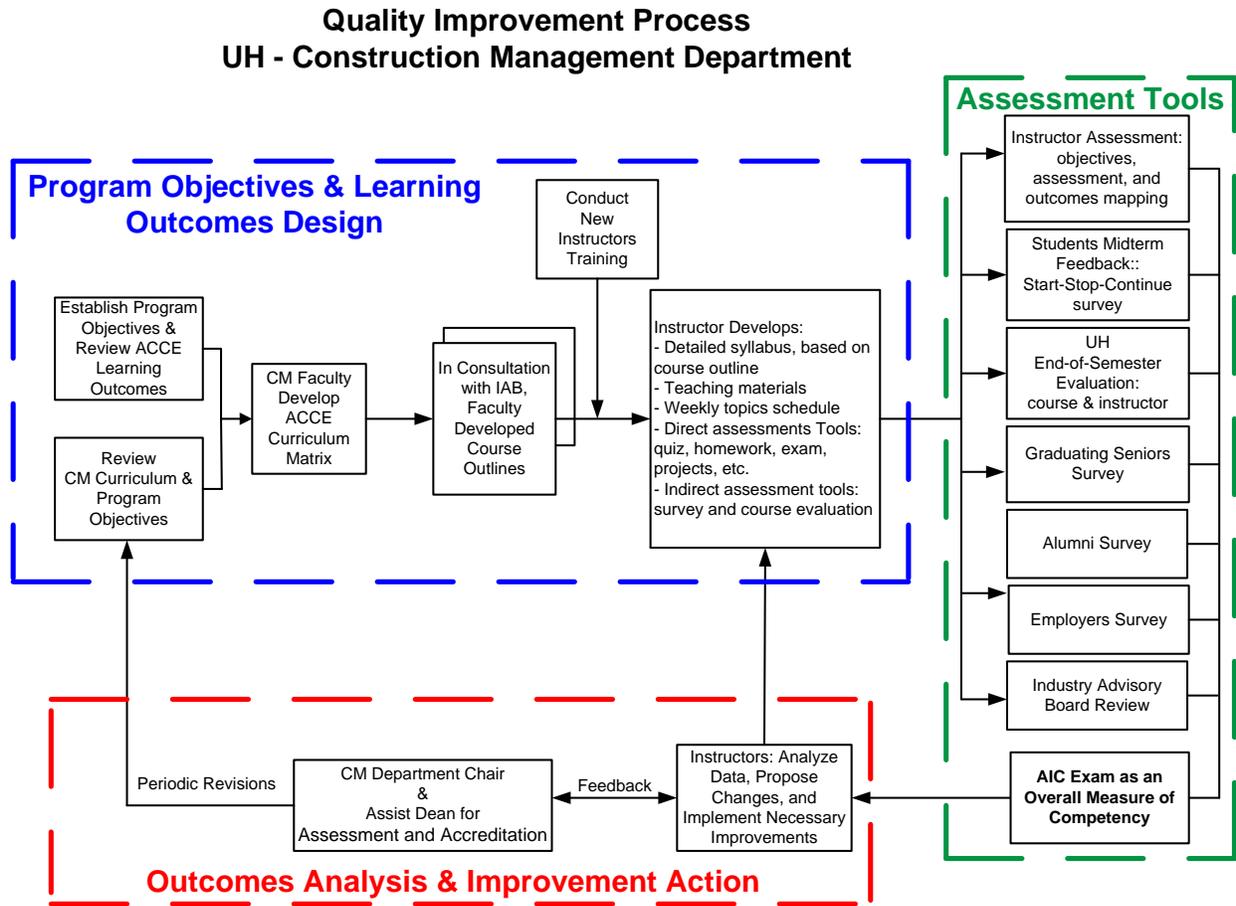
- 1) AIC Certification Exam
- 2) Graduating Seniors' Surveys
- 3) Alumni Surveys
- 4) Employers' Surveys
- 5) Industry Advisory Board (IAB) course review
- 6) University's End of Semester Course Evaluation
- 7) Instructor's Assessment (mapping of course objectives, assessment, and outcomes)
- 8) Midterm Students' Surveys (Start-Stop-Continue Feedback)

AIC National Certification Exam is given two times each year, and CM student performance data will be analyzed after results are released for each exam. Graduating Senior Survey is given once a year. The most recent Alumni Survey and Employer Surveys were conducted in summer and fall 2014 respectively. The Industry Advisory Board (IAB) meets quarterly to discuss program issues, including periodical reviews of CM course contents. The university's End of Semester Course Evaluation is conducted for each course every semester. Midterm Students' Surveys (Start-Stop-Continue Feedback) are conducted for every construction courses every semester, and instructors will prepare and submit improvement plan based on the student feedbacks.

Table 2 below lists the assessment tools used to evaluate the achievement of Student Learning Outcomes and Educational Program Objectives. Figure 1 shows a flowchart of our quality improvement process. They are followed by a description of each assessment tool.

**Table 2: Assessment Tools**

	Internal Assessment Tools					External Assessment Tools			
	Enrollment/Scholarship	Course Evaluation	Instructor Assessment	Midterm Survey	Senior Survey	AIC Exam	Alumni Survey	Employer Survey	IAB Review
<b>Program Objectives</b>									
1: Recruitment of Minority Groups	X								
2: Recruitment of Female Students	X								
3: Provide Proper Advising and Career Guidance					X				
4: Offer Financial Assistance	X								
5: Assist in Students Placement and Career Preparation					X				
6: Offer a Well-designed Curriculum					X		X	X	
7: Engagement with the Construction Industry							X	X	X
<b>Student Learning Outcomes</b>									
A: Communication skills						X			
B: Engineering concepts						X			
C: Management concepts						X			
D: Materials, methods, project modeling & visualization						X			
E: Bidding & estimating, incl. blueprint & take-offs						X			
F: Budgeting, costs, and cost control						X			
G: Planning, scheduling, and schedule control						X			
H: Construction safety						X			
I: Construction geomatics						X			
J: Project administration						X			
<b>Course Level Improvement</b>		X	X	X					



**Figure 1: Quality Improvement Process**

### AIC National Certification Exam

Although our CM Program utilizes the assessment tools listed in the section above, it realizes the rigor of the AIC Certification Exam as a nationally recognized overall measure of competency. As a result, we place more emphasis on this tool as an encompassing validation exercise.

The AIC exam is an 8-hour test involving 300 questions that target the 10 knowledge areas listed under “Learning Goals” above. The maximum number of points available is 300 points. Points are not distributed evenly among the knowledge areas. Historically, the national passing rate for the AIC Exam has been approximately 50-60%. The CM program aims at exceeding the national passing rate of the AIC Certification Exam, and since 2011 has made passing this exam a mandatory requirement for graduation.

### Graduating Senior Survey

The graduating senior survey is administered to senior level students during spring semester. In addition to demographic and employment information, the survey asks students to provide self-ratings of their skill levels on several knowledge areas. Results are compiled and distributed by the College Assessment and Continuous Improvement committee.

**Alumni Survey**

A Construction Management alumni survey is administered periodically (usually every two years) to collect data on student post-graduation experiences. The survey includes questions about employment and long-term use of knowledge and skills gained in the degree program.

**Employer Surveys**

Historically, employer surveys have not provided much useful data due to exceedingly low response rates. However, the Industry Advisory Board (IAB) for the Construction Management program has been an active stakeholder over the last several years. The IAB provides a much needed viewpoint on the current state of industrial needs. In particular, the IAB for Construction Management has been able to provide input regarding curricular decisions thus ensuring that the degree keeps one foot in contact with the “real world”.

**Industry Advisory Board (IAB) course review**

The Industry Advisory Board (IAB) meets quarterly to discuss and finalize the issues on hand, review course content and provide feedback, and vote on matters to reach consensus. For curriculum development, the Board reviews the CM program course contents and suggests changes.

**End of Semester Course Evaluation**

At the end of each term, the University of Houston requires that each course offers students with the opportunity to provide feedback on the quality of the learning experience. The evaluations are administered electronically by the university’s Learning and Services Center. The evaluation reflects features of the course that give indication of quality and effectiveness. For example, students are asked to rate the level to which the course met learning expectations and the instructor’s presentation of material. Students are also provided space in which to contribute written comments. Statistical and narrative reports are compiled and then distributed to the colleges where these reports are in turn provided to faculty. The content of the reports serve as part of the yearly review process for faculty as well as for promotion and tenure decisions.

**Instructor’s Assessment** (mapping of course objectives, assessment, and outcomes)

Instructors are requested to file a matrix (see Table 3 below) showing the course learning objectives, methods of assessing each objective, the assessment outcomes, and plans for improvement as needed. These improvement plans are reviewed by the department chair to ensure that steps are being taken to meet student needs. This mapping exercise was implemented in spring 2012 and will continue every semester. The following table provides a sample of objectives, assessment mapping and improvement planning across the curriculum.

**Table 3: Sample of Instructor Assessment-Improvement Planning**

Course	Learning Objective	Assessed by	Improvement Plan
CNST 2341: Construction Documents	Understanding contractual relationships and chains of command	Quiz 1	Overall, students performed well on the quiz. However, the instructor will develop more material to explore contractual relationships and plans on assigning reading homework after lecture to reinforce topic.
CNST 2351: Construction Estimating I	Plan reading and quantitative takeoff	Mid-term (Items 36-50)	Observed lack of understanding in applying basic estimating to what is on the plans. For example, number of SF of painting required for a certain room based on a finish schedule. Will add an assignment to address this issue.
CNST 3331:	Float concepts	Quiz on CPM Calculation(items 5, 6, 7) and quiz on CPM concept (items 6)	There was confusion about different float concepts. Add visual illustration of differences to lecture; provide one more CPM calculation sample.
CNST 3351: Construction Estimating II	Calculate direct (labor, equipment, materials, subs) and indirect costs for definitive estimates	Quiz 3 (items 1-4) Midterm (items 1, 2a-2f)	Performance in Quiz 3 for calculating wage factor, PL&PD, FICA, W/C, unemployment was unacceptable. These calculations were reinforced by additional explanations and exercises. Improvement was notable in the Midterm.

It is important to note that the table represents only a sample of data collected. Each course has multiple learning objectives that are addressed by a specified assessment method(s). In addition, the faculty is also expected to base planning on specific student performance data. Instructors are requested to develop an improvement plan to address any unacceptable performance on any of the learning objectives.

**Midterm Students’ Surveys (Start-Stop-Continue Feedback)**

These surveys are informal tools used as a mid-term verification of the students’ perception of the learning experience. Students are provided with the following statement:

*In an attempt to continuously improve your CM Program, your instructor needs your feedback. Please list 3 candid examples of things you recommend that the course instructor should stop, start and continue in order to improve your learning experience.*

The survey form provides the student with three areas to respond described as:

- Stop (3 things that distract you and do not help you to learn more in this class)
- Start (3 things the instructor is not doing that can help you to learn more)
- Continue (3 things the instructor is doing that you want to keep or do more of)

The instructor reviews students' responses and develops a plan of action that is submitted to the department chair for review. The rationale behind the start-stop-continue surveys is to give the instructor insight into what is working and what needs improvement while there is still time to do something about it. Tables 4 and 5 are examples of improvement plans developed by instructors for specific courses based on the compiled student responses to the start-stop-continue survey.

**Table 4: Start-Stop-Continue Plan for CNST 1361**

**CNST 1361: CONSTRUCTION MANAGEMENT I**

**Start-Stop-Continue Survey Summary**

1. **Start:** Start group activities in lectures to get students more involved in lectures. Providing review on the mid-term exam. Including videos in lecture to help better demonstrate concepts. Allow back tracking in online quizzes.
2. **Stop:** Disruption due to cell phones during lectures. Lecturing so fast.
3. **Continue:** Continue keeping students attentive and involved. Continue giving real life examples. Continue posting online lectures and quizzes. Continue having review at the end of lectures.

**Improvement Plan**

1. Quizzes and tests provide valuable data to professors to measure the retention of information of students and to understand areas of needed help. In today's climate of internet test taking, many students group together in order to take tests and quizzes; this is unacceptable. Not allowing students to "back track" discourages this behavior. While I cannot propose to allow students to go back on questions already answered, I do feel like I can better prepare my students for the quizzes and exams. My resolution will be to go over a mock quiz on the first scheduled day of class in order for my students to understand better what to expect.
2. The issue of giving students more time to take notes is important. I value the class time I have with my students, but if they feel that they are rushed or do not have adequate time for note taking, then I need to adjust. My adjustment will be to slow down markedly in my delivery of the lecture. Also, intermittently during the lecture I will stop and have a review slide so that students can ask questions and "catch up" on any notes or points that may have been missed. In this manner I hope to create a better learning experience for my class.
3. Group activities are challenging due to scheduling. Many students choose not to attend group activities scheduled outside of the classroom atmosphere and essentially the instructor forfeits an entire class day and important lecture. However, I will commit to encouraging students to become more active in student related associations (such as ABC

- & AGC) which schedule many student and group activities to project sites and location. These activities and associations are typically well received and will do much to help us train a well-rounded student in the Construction Management Industry.
4. The instructor does review every lecture and there are strategic quizzes given that offer review of the materials as well. While I do not propose to give up a lecture day to review for an exam, I will commit to better communicating with my students in order for them to be fully equipped to take the exam to the best of their ability.
  5. Finally, videos can be a good tool for students. As the saying goes “a picture says a thousand words!” I will research my lectures and see if there may be applicable and relevant videos, perhaps from the book publisher’s website, that may be incorporated into my lectures. Certainly the goal is to provide the students with the most relevant and up to date information giving them the best education possible.

**Table 5: Start-Stop-Continue Plan for CNST 3355****CNST 3355: STRENGTH OF CONSTRUCTION MATERIALS****Start-Stop-Continue Survey Summary**

1. **Start:** Leave written notes on slides after lecture for studying. Go into depth of the subject and explain things better. More examples. Instructor should start speaking louder.
2. **Stop:** Improve projector quality- brightness. Speaking low. Going fast.
3. **Continue:** Good use of blackboard. Excellent teaching skills and encouraging students with questions. Open for office hours/Email. Doing online homework. Giving notes with problems worked at. Giving course schedule at the beginning of the semester. Reviewing from Previous class. Quizzes in class.

**Improvement Plan**

1. Speak louder and encourage students to sit closer to the blackboard
2. Provide more examples of each topic covered in the course and spend more time on each topic.
3. Keep using blackboard for homework and quizzes
4. Keep asking students questions during the class
5. Keep office hour and email communication with the students
6. Keep uploading writing notes on lecture slides after class
7. Keep giving all homework and exam schedules at the beginning of the semester
8. Keep reviewing previous lectures each week
9. Keep giving quizzes to students each week