



# CONSTRUCTION MANAGEMENT



## CONSTRUCTION MANAGEMENT QUALITY IMPROVEMENT AND STRATEGIC PLAN

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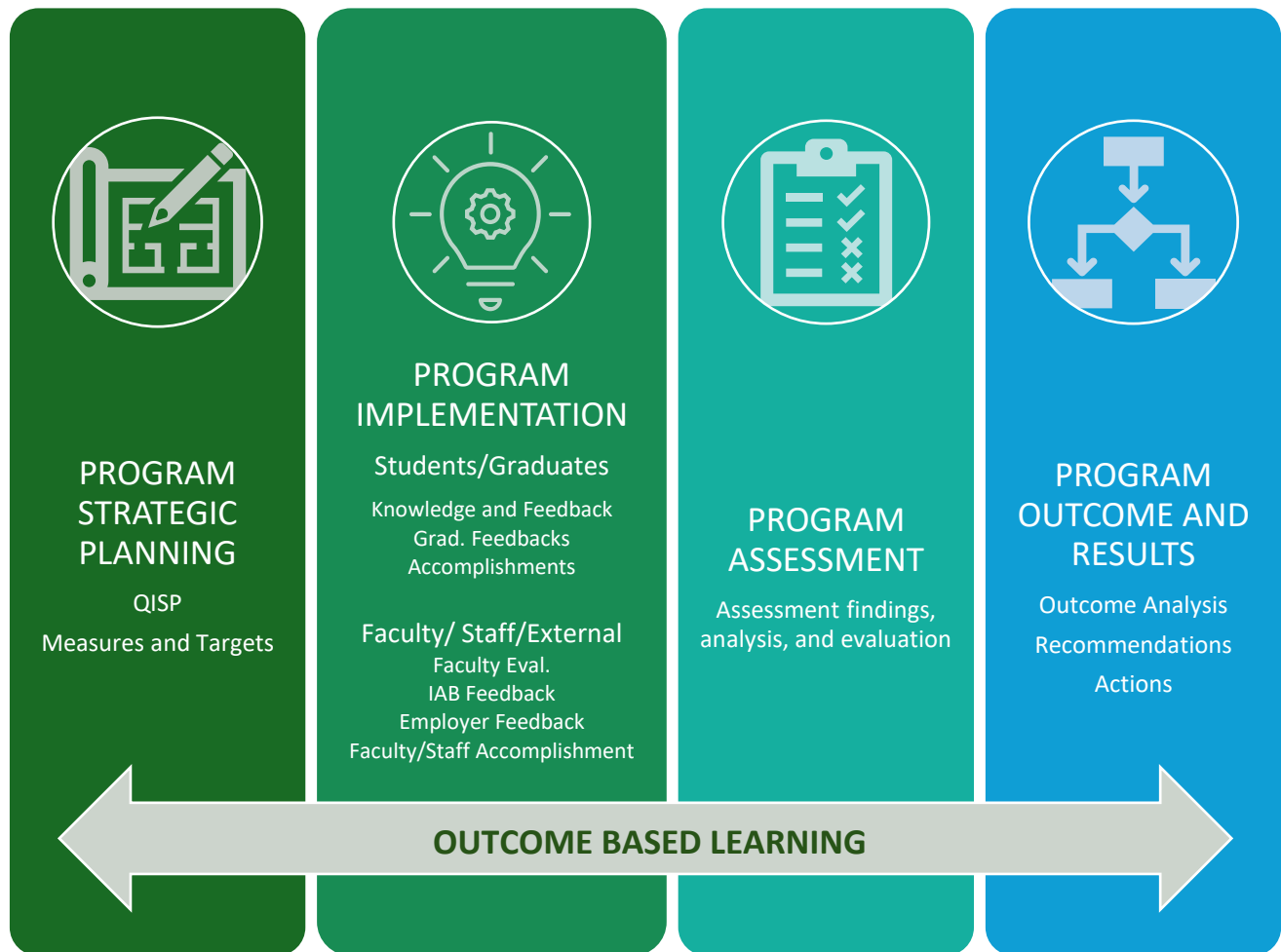
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# 1. Quality Improvement Plan Framework

## 1.1 Purpose

The aim of the Construction Management program's Quality Improvement and Strategic (QISP) Plan is to provide a basis to self-assess the performance in delivering quality education and to plan future improvements. The QISP has four major components which are cycled and anchored through outcome-based learning:

1. Program Planning
2. Program Implementation
3. Program Assessment
4. Program Outcomes and Results



The construction management program's strategic plan offers guidance for decisions, both short and long-term and makes sure that decisions and operations:

- Carry out the program's mission, goals, and objectives.
- Comply with mandates and regulations of the university, college, applicable laws, accrediting bodies, etc.
- Keep the program operational and fiscally healthy, now and in the foreseeable future.

## **2. Department of Mechanical Engineering**

### **2.1 Vision**

The vision of the department is to be recognized for exceptional undergraduate and graduate education and excellence in research and services in mechanical engineering, energy engineering, and construction management locally, nationally, and globally.

### **2.2 Mission**

The mission of the department is to offer students nationally recognized educational opportunities grounded in the fundamentals of mechanical engineering and involving state-of-the-art technology with applications to construction, energy, and management. The department programs support technological development and innovation to meet the needs of society. Faculty and student engagement in design projects, research, or other similar activities is essential to their professional development. The department facilitates a continuous quality improvement process for programs and a collegial atmosphere that is conducive to intellectual and scholarly pursuits of faculty and students.

## **3. Construction Management Program**

### **3.1 Mission**

The mission of the Bachelor of Science in Construction Management program is to cultivate future leaders in the ever-growing construction industry by fostering an innovative and comprehensive learning environment that promotes technical excellence, ethical integrity, leadership skills, and a lifelong learning commitment in our graduates.

### **3.2 Program Goal**

#### **Goal:**

The goal of the Construction Management program is to provide students with a comprehensive education that prepares them for successful careers as construction professionals capable of managing complex construction projects effectively, ethically, and sustainably.

#### **Strategy:**

The program emphasizes hands-on learning, industry-relevant coursework, and practical experience to develop students' technical proficiency, leadership skills, and commitment to excellence in construction management.

Equip and prepare graduates of the program to meet the evolving needs and adapt to the dynamic nature of the construction industry, contribute positively to their communities, and pursue lifelong learning and professional development opportunities in construction management and related fields.

### **3.3 Program Objectives**

The Construction Management program objectives are as follows:

**Objective 1:**

*Graduates of the program will demonstrate the capacity to manage complex construction projects including the bidding, contracting, and implementation phase as member of a management position in the construction industry.*

Key Performance Measure: Supervisory feedback from job supervisors and/or Employer Survey

Target: 70% of the respondents will rate graduate satisfactory or above by the employer/supervisor – rated as a 3 on 1 to 5 in the Likert Scale.

Key Performance Measure: Project submission from senior project – CNET0 4795

Target: 70% of graduating students will receive a rating of 80/100 or above in their senior project report/packet.

**Objective 2:**

*Graduates will demonstrate technical competence in the tools and processes required in the construction field to perform field operations and management.*

Key Performance Measure: Supervisory feedback from job supervisors and/or Employer Survey

Target: 70% of the respondents will rate graduate satisfactory or above by the employer/supervisor – rated as a 3 on 1 to 5 in the Likert Scale.

**Objective 3:**

*Graduates will demonstrate an ability to communicate effectively both orally and written in a professional environment.*

Key Performance Measure: Project presentation and report from senior design course – CNET 4795 Capstone project

Target: 70% of graduating students will receive a rating of 80/100 or above in their capstone project report/presentation.

**Objective 4:**

*Graduates and faculty members will demonstrate continued growth in professional knowledge, lifelong learning and service to profession, industry, and community.*

Key Performance Measures: Professional organization of graduate involvement

Target: 70% of graduates in the program are members of professional organizations.

Key Performance Measures: Faculty or Professional Development

Target: 70% of Faculty Members have at least 3 Faculty or Professional Development per year related to field of expertise.

Key Performance Measures: Professional Committee Members

Target: 70% of Faculty Members are involved as committee or advisory member of Professional Organization.

**Objective 5:**

*Graduates will achieve recognition and/or compensation consistent with their educational achievements.*

Key Performance Measure: Employment

Target: 70% of graduates receive an offer before or after 3 months after graduation.

**4. Student Learning Outcome**

Student Learning Outcomes are based on ACCE criteria as defined in ACCE Document 103B. The 17 student learning outcomes demonstrate students' ability to apply fundamental knowledge in construction science and construction management areas as described in ACCE Document 103B, which lists required curricular content.

Faculty in the Construction Management program at the University of North Texas operationally defined each of the 17 ACCE learning outcomes. The operational definition of each student learning outcome provides a broad categorization of the knowledge and skills graduates with a Bachelor of Science in Construction Management from the University of North Texas will possess each student learning outcome. Students graduating with a B.S. in Construction Management will achieve the following objectives:

SLO #1: Create written communications appropriate to the construction discipline.

- Develop reports and/or projects and summarize information into appropriate and concise format.
- Submit reports in a professional manner free from grammatical errors and use language and content appropriate to the construction industry.

*Assessment: CNET 4795 – Senior Project*

SLO #2: Create oral presentations appropriate to the construction discipline.

- Demonstrate verbal and non-verbal communication skills through presentation of project.
- Deliver presentation with language and message appropriate to the construction industry.

*Assessment: CNET 4795 – Senior Project*

SLO #3: Create a construction project safety plan.

- Develop a clear and concise safety plan.
- Develop procedures on accident prevention and control.
- Develop Jobsite Safety Analysis (JSA) Report

*Assessment: CNET 3410 - Term project on Construction Job Site Safety Plan*

SLO #4: Create construction project cost estimates.

- Perform quantity take off (QTO) through a set of construction documents – Drawings and Specifications.
- Perform labor productivity estimates.
- Perform material, labor and equipment pricing.

- Develop a detailed estimate of a construction project.

*Assessment: CNET 3160 – Term Project*

SLO #5: Create construction project schedules.

- Develop, update, revise, and edit schedule of a project.
- Understand cost and time variances and their impacts on the project schedule.

*Assessment: CNET 3190 – Term Project*

SLO #6: Analyze professional decisions based on ethical principles.

- Identify ethical facts and issues using applicable elements of a code of ethics and/or a company code of ethics.
- Identify the parties involved, relationships, impacts and responsibilities of each party.

*Assessment: CNET 3410 – Major Exam 1/ Class Exercise 1*

SLO #7: Analyze methods, material, and equipment used to construct projects.

- Understand common materials, methods, and equipment in construction.
- Select appropriate means and methods for a construction project.

*Assessment: CNET 1160/ CNET 2180 – Term Project*

SLO #8: Apply electronic-based technology to manage the construction process.

- Demonstrate appropriate use of technologies to complete construction operations and management tasks.

*Assessment: CNET 3160 – Term Project, CNET 3190 – Term Project*

SLO 9: Apply basic surveying techniques for construction layout and control.

- Understand distance, grade, and angular measurement.
- Demonstrate use of surveying equipment for construction layout and control
- Use three-dimensional measurement, modeling, and positioning systems.

*Assessment: CNET 2200 – Field Exercises*

SLO #10: Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.

- Understand the aspects of, and risks associated with, different project delivery methods.
- Compare different project delivery methods and select the most effective method.

*Assessment: CNET 4170 – Major Exam 1, Major Exam 3*

SLO #11: Understand construction accounting and cost control.

- Understand the relationship between time and resources on project costs.
- Understand labor and operations cost reports.

*Assessment: CNET 4180 – Exam # 2*

SLO #12: Understand construction quality assurance and control.

- Understand the submittal process for construction materials and deliverables.
- Understand specifications as they apply to project QA/QC

- Understand the role of construction material testing standards.

*Assessment: CNET 4190 – Exam # 2*

SLO #13: Understand construction project control processes.

- Understand project control procedures and inputs.
- Understand basic project control systems and their effects on tracking project costs and budgets.

*Assessment: CNET 4170 – Major Exam 3*

SLO #14: Understand the legal implications of contract, common, and regulatory law to manage a construction project.

- Identify the essential components and critical clauses in a construction contract.
- Understand appropriate vocabulary in legal communication.
- Understand the remedies available to parties impacted by breaches of legal duties!
- Understand alternative dispute resolution methods.

*Assessment: CNET 3150 – Major Exam 1, Major Exam 3*

SLO #15: Understand the basic principles of sustainable construction.

- Understand the definition and application of sustainability.
- Understand the characteristics of sustainable materials and methods.

*Assessment: CNET 1160/ CNET 2180 – Exam #2 or Final Exam*

SLO #16: Understand the basic principles of structural behavior.

- Understand basic structural systems.
- Understand the fundamental properties of soils.
- Understand the basic forces that act upon buildings.

*Assessment: CNET 3485 – Exam #2 or Final Exam*

SLO #17: Understand the basic principles of mechanical, electrical, and piping systems.

- Understand the contractor's role in the delivery of MEP systems.
- Understand the operation and installation of MEP systems.

*Assessment: CNET 4630 – Major Exam 2, Major Exam 3*

## **Business and Interpersonal Skills**

The construction management degree includes courses in business and management which include accounting principles, legal and ethical environment of business, real estate law and contracts, economics, management concepts, entrepreneurship.

Students will demonstrate the soft skills that employers are looking for: communication, interpersonal relationships, management, problem solving, and professional skills. These skills are necessary for the student to complete assignments effectively whether in a group or independently.



## Faculty Review

Faculty members teaching construction management courses are evaluated objectively annually through student survey and supervisor evaluation.

Faculty members assess and evaluate each course against the criteria based on ACCE documentation. Documents and results will be shared with other faculty members as well as presented with the industry advisory members to ensure that the program is meeting industry's demands for our students.

### 5. Construction Management Curriculum and ACCE Criteria

The identified student learning outcomes are distributed throughout the program to reinforce and increase student mastery of basic construction management concepts and skills as shown in Table 1. Concepts and skills are generally introduced in the lower-level courses and reinforced through practice in the upper-level courses. In some courses where concepts are practiced, students are assessed both for achievement of course objectives and proficiency in selected student learning outcomes.

The curriculum has been designed to ensure student learning outcomes are fulfilled. Table 2 illustrates the contribution of individual courses in the CNET curriculum to the achievement of student learning outcomes. An "I" indicates introduction of the student learning outcome through the course content to create an awareness or basic understanding of the idea or concept. An "R" indicates courses in which skills and concepts contributing to the student learning outcome are reinforced. Reinforcement of the student learning outcome (SLO) may be in the form of creating a deeper understanding of relevant knowledge and skills and/or providing practice in the practical application of the skills or concepts.

The comprehensive assessment plan of direct and indirect assessment for each of the seventeen (17) student learning outcomes is graphically represented in the Distribution of Student Learning Outcomes and Assessment in CNET Core Curriculum matrix (Table 2) below. In Table 1, a "DA" designation indicates the course in which the student learning outcome will be assessed using a direct assessment method. An "IA" designation indicates a course in which the student learning outcome will be assessed using an indirect assessment method.

**Table 1: SLO Assessments and CNET Course Matrix**

	ACCE SLO	Indirect Assessment Location(s)	Introduction Location	Reinforcement Location(s)	Direct Assessment Location(s)	Direct Assessment Tool
1	Create written communications appropriate to the construction discipline.	Senior exit & Employer Survey	CNET 3150	CNET 3410	CNET 4795	Senior Project – Written Proposal
2	Create oral presentations appropriate to the construction discipline.	Senior exit & Employer Survey	CNET 4785	CNET 4795	CNET 4795	Senior Project - Presentation

3	Create a construction project safety plan.	Senior exit & Employer Survey	CNET 1160 CNET 2180	CNET 2180 CNET 3410	CNET 3410	Individual Term Project
4	Create construction project cost estimates.	Senior exit & Employer Survey	CNET 2180	CNET 3160	CNET 3160	Term Project
5	Create construction project schedules.	Senior exit & Employer Survey	CNET 3160 CNET 4170	CNET 3190	CNET 3190	Term Project
6	Analyze professional decisions based on ethical principles.	Senior exit & Employer Survey	CNET 3150	CNET 3410	CNET 3410	Major Exam 1  Class Exercise
7	Analyze methods, materials, and equipment used to construct projects.	Senior exit & Employer Survey	CNET 1160 CNET 2180	CNET 1160 CNET 2180	CNET1160/ CNET 2180	Exam 1 Term Project
8	Apply electronic-based technology to manage the construction process.	Senior exit & Employer Survey	CNET 2300	CNET 2300 CNET 3160 CNET 3190	CNET 3160/ CNET 3190	Term Project
9	Apply basic surveying techniques for construction layout and control.	Senior exit & Employer Survey	CNET 1160 CNET 2200	CNET 2200	CNET 2200	Field Exercises
10	Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.	Senior exit & Employer Survey	CNET 1160	CNET 4170	CNET 4170	Major Exam 1 Major Exam 2
11	Understand construction accounting and cost control.	Senior exit & Employer Survey	CNET 3410	CNET 3160 CNET 4180	CNET 4170 Or CNET 4180	Class Exercise or Exam #2
12	Understand construction quality assurance and control.	Senior exit & Employer Survey	CNET 3410	CNET 4190	CNET 4190	Exam #2 or Final Exam
13	Understand construction project control processes.	Senior exit & Employer Survey	CNET 4170	CNET 4170 CNET 4180	CNET 4180	Major Exam 2
14	Understand the legal implications of contract, common, and regulatory law	Senior exit & Employer Survey	CNET 3410	CNET3150 CNET 4170	CNET 3150	Major Exam 1 Major Exam 3

	to manage a construction project.					
15	Understand the basic principles of sustainable construction.	Senior exit & Employer Survey	CNET 1160 CNET 2180	CNET 1160 CNET 2180	CNET 1160/ CNET 2180	Exam 2 or Final Exam
16	Understand the basic principles of structural behavior.	Senior exit & Employer Survey	CNET 3435	CNET 3465 CNET 3485	CNET 3485	Exam 2 or Final Exam
17	Understand the basic principles of HVAC, electrical and plumbing systems.	Senior exit & Employer Survey	CNET 2180	CNET 4630	CNET 4630	Major Exam 2 Major Exam 3



Course	Course Name	Credit Hours	SLO																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
			Written	Oral	Safety	Estimate	Schedule	Ethical Principles	Methods and Materials	Electronic Technology	Surveying	Project delivery	Accounting and Control	Quality assurance	Project Control	Contract and Law	Sustainable Construction	Structural Behavior	MEP				
CNET 3435	Structural Analysis																R	I					
CNET 3445	Steel Structures				I/R														I/R				
CNET 3465	Soils and Foundations																			R			
CNET 3485	Structural Design with Concrete, Timber, and Other Materials																			R	DA		
CNET 4170	Construction Management																			R	DA		
CNET 4180	Problem in Project Management																			R	DA		
CNET 4190	Quality Management in Construction																				I/R	DA	
CNET 4630	MEP for Construction Management																					I/R	DA
CNET 4785	Senior Design I		I	I																			

Course	Course Name	Credit Hours	SLO																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Written	Oral	Safety	Estimate	Schedule	Ethical Principles	Methods and Materials	Electronic Technology	Surveying	Project delivery	Accounting and Control	Quality assurance	Project Control	Contract and Law	Sustainable Construction	Structural Behavior	MEP
CNET 4795	Senior Design 2		R DA	R DA															
CNET 4920	Internship																		
Graduate Exit Survey			IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA
Employer Survey			IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA

### 5.1 Review Cycle

Course review is the process for evaluating the academic and strategic aspects of a course, its past and present effectiveness, as well as its future direction, in accordance with the program’s QISP mechanisms and quality standards. The assessment cycle is a three-year cycle as shown in Table 3. Each SLO will be assessed once or every other term during the three-year cycle.

**Table 3. Assessment and Review Cycle**

Course	Description	2023	2024		2025		REVIEW	2026	
		FALL	SPRING	FALL	SPRING	FALL	SUMMER	SPRING	FALL
CNET 1160	Construction Methods and Materials	█		█		█	█		█
CNET 2180	Building Construction Techniques		█		█		█	█	
CNET 2200	Surveying for Construction		█		█		█	█	
CNET 2300	Construction Graphics and Modeling	█		█		█	█		█
CNET 3150	Construction Contracts Documents	█		█		█	█		█
CNET 3160	Construction Cost Estimating	█		█		█	█		█
CNET 3190	Construction Scheduling		█		█		█	█	
CNET 3410	Occupational Safety and Liability		█		█		█	█	
CNET 3435	Structural Analysis	█		█		█	█		█
CNET 3445	Steel Structures						█		
CNET 3465	Soils and Foundations		█		█		█	█	
CNET 3485	Structural Design with Concrete, Timber, and Other Materials	█		█		█	█		█

CNET 4170	Construction Management								
CNET 4180	Problem in Project Management								
CNET 4190	Quality Management in Construction								
CNET 4630	MEP for Construction Management								
CNET 4785	Senior Design 1								
CNET 4795	Senior Design 2								
Graduate Exit Survey									
Employer Survey									

**Legend:**

	Fall Data Gathering and Analysis of Courses
	Spring Data Gathering and Analysis of Courses/ Survey
	Employer Survey
	Review of Results



## 6. Senior Design

Senior design courses and/or internships are the students' opportunity to show that they can apply the skills and knowledge applicable to all 17 SLOs obtained through their coursework prior to graduation. When reviewing SLO assessment data, reviewing senior design data should occur annually to determine if areas exist where curricular adjustments or greater emphasis would be beneficial. Data that is a result of the senior design courses include inputs on students' abilities to apply knowledge and skills in a practical manner; areas where students are over performing in their ability to apply and transfer knowledge and skills to real-world applications; areas where students are underperforming in their ability to apply and transfer knowledge and skills to real-world application; and the ability of students to understand how they are performing during their capstone.

## 7. Direct Assessment Tools

At the conclusion of each semester, course assessment data will be collected by each faculty member and forwarded to the Program Coordinator. To document course-level assessment tools used to assess student learning for each SLO, the data for each student learning outcome will be maintained together in both an electronic file and a paper-based binder, both of which shall both be referred to as an SLO Notebook. The SLO Notebooks for each of the 17 student learning outcomes will be maintained by the Program Coordinator.

The SLO Notebook will contain:

- An SLO Summary and Improvement Form
  - A brief summary of the knowledge or skills assessed for each SLO.
  - An assessment of student performance on a question-by-question basis or, alternatively, on a topic-by-topic basis that will include comparisons between student achievement and established metrics for the questions or topics covered in the assessment tools (typically a target pass rate of 70% on each question unless otherwise noted).
  - Identification of SLO deficiencies and potential curriculum gaps based on direct assessment of student-level assessment tools.
- Relevant assessment material from the appropriate course.
  - Assessment material may take the form of:
    - Exams
    - Quizzes
    - Assignments
    - Projects
    - Presentations
    - Etc.
- For each assessment tool submitted, instructors will provide:
  - An example of a student artifact sans individual student identifiers
  - Student scores (grades) for the assessment tool sans individual student identifiers
  - The course syllabus
  - The assignment is used for assessment.
  - The assignment rubric

The SLO form and notebook will document the extent each student learning outcome described in Table 1 has been met.

## **8. Indirect Assessment**

Indirect assessment of the student learning outcomes and the students' perception of the degree's ability to prepare them for industry will be collected during different points of time. Data will be collected during the capstone course, through alumni surveys, and during the Industrial Advisory Committee meetings.

- **Senior Exit Survey**

Students in their capstone course are required to write about their experiences during their capstone project. Many will work an internship in the field and see which aspect of the field they enjoy and dislike. At the end of the capstone, the students discuss what they learned in class that they found useful in their work and also what they wish they would have known before working that job. Employers are also able to provide feedback to the department and to the student about the student's performance while on the job. They rate the student's work based on 17 factors and can provide written feedback.

The course is currently offered 3 times per year.

- **Alumni Survey**

The department will submit surveys to the alumni each year. Information that comes from these surveys will include how the coursework prepared them for their careers. Data will be collected and grouped based on years since graduation to show how respondents perceive the degree at different points in their careers.

- **Construction Industry Advisory Committee**

The department plans on holding at least one Industry Advisory Committee Meeting per year. One of the main goals of this meeting is to evaluate the course assessments and provide an external assessment of the overall program to ensure that it is meeting ACCE and industry needs.

- **Job Placement**

The department will work to track student job placement at graduation each year. This will include attainment of employment, salaries, and location when possible.

- **Employer Review**

## **9. Uses of Evaluation/Assessment Results**

The result of the evaluation and assessment will be used to guide the direction of the program in terms of improvement, expansion, upgrading of equipment, curriculum revision, teaching methodology, and other factors that relate to the betterment of the Construction Management program.

The intent of the assessment is to identify weaknesses and then to implement changes to improve the curricular offering. These changes could impact several aspects of the program: curriculum, staffing, facilities, internal processes, and intended student learning outcomes.

At this point in the continuous improvement cycle, the planned changes should be implemented. In some cases, the changes are easy to implement, while in other instances, the proposed changes will have to be implemented over a period or through a series of steps. The implemented changes should be monitored to determine whether the changes made have the desired effect(s). One way of achieving this is to use the same assessment plan as used in the previous cycle and compare the actual data to the intended data. Any gaps should be studied carefully to determine the underlying cause. In situations when the outcomes have been met, the action might be to continue monitoring the outcome to ensure quality.

The report will be shared with the faculty members and the administration. The report will also be available to the industry advisory board members and alumni.

## **10. Plan of Actions**

The intent of assessment is to identify weaknesses and then to implement changes to improve the program. These changes could impact several aspects of the program: curriculum, staffing, facilities, internal processes, and intended student learning outcomes.

At this point in the continuous improvement cycle, the planned changes should be implemented. 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. The implemented changes should be monitored to determine whether or not the changes made have the desired effect(s). One way of achieving this is to use the same assessment plan as used in the previous cycle and compare the actual data to the intended data. Any gaps should be studied carefully to determine the underlying cause. In situations when the outcomes have been met, the action might be to continue monitoring the outcome to ensure quality.

## **11. Dissemination**

The report will be shared with the construction management faculty and the administration. The report will also be available to our industry advisory board members and alumni.

The construction management faculty will meet at the end of each semester to discuss the results of the assessment. All construction management faculty are invited to the meetings but those who teach the courses being assessed are required to be in attendance. Minutes from each meeting will be kept in the department.