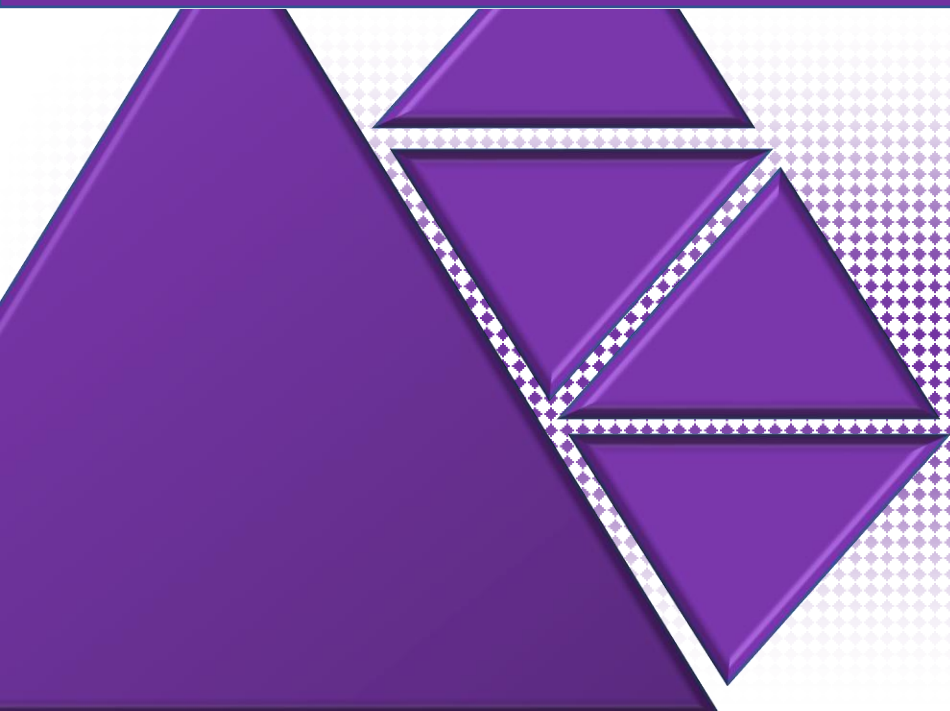


PROGRAM QUALITY IMPROVEMENT PLAN



TARLETON

STATE UNIVERSITY

CONSTRUCTION
SCIENCE & MANAGEMENT



PROGRAM
QUALITY IMPROVEMENT
PLAN

1. Quality Improvement Plan Framework

Purpose

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

- A. Program Strategic Planning
- B. Program Implementation
- C. Program Assessment
- D. Program Outcome and Result

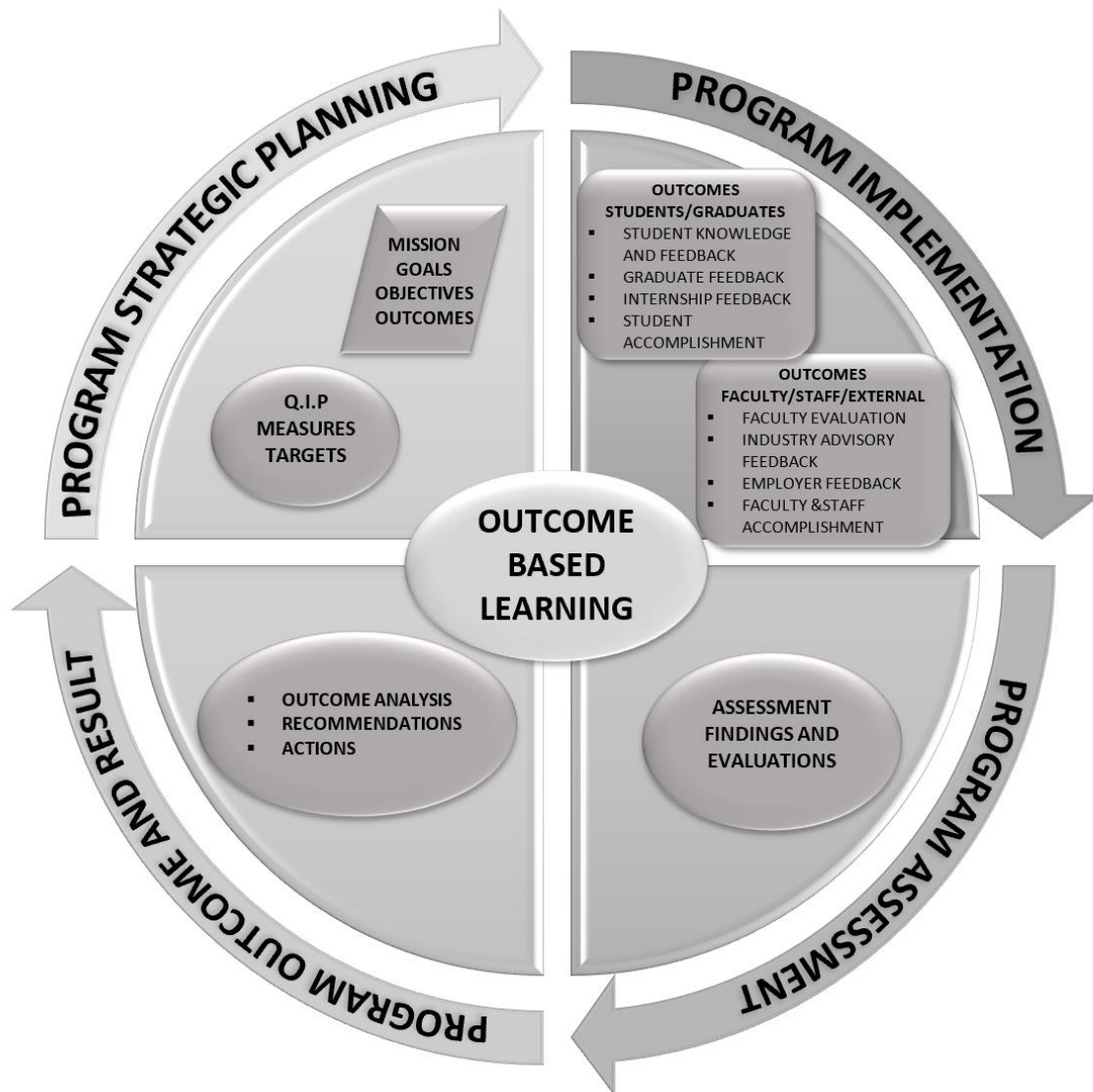


Figure 1: Quality Improvement Plan Framework

A. PROGRAM STRATEGIC PLANNING

2. Program Mission

The mission of the Construction Science and Management program is to achieve a regionally and nationally recognized, student-focused, and industry-oriented construction program that provide graduates with knowledge and skills in management and supervisory professions that are valued by the construction industry.

3. Program Goals and Learning Objectives

Goal

To prepare diverse graduates for an outstanding professional career in the construction industry and related fields through an appropriate curriculum delivered with professional and exceptional instruction to achieve excellence in student learning.

This goal will be achieved through faculty development, research and creative scholarly activities for both faculty and students, professional organizations' involvement, and excellence in teaching and learning. With this goal, the program will support its mission to achieve a regionally and nationally recognized, student focused, and industry-oriented construction program.

Objective

The TSU Construction Science and Management program objectives are as follows:

Objective 1:

Students will demonstrate the capacity to manage complex construction projects including the bidding, contracting, and implementation phase within an interdisciplinary team environment.

Key Performance Measure: Supervisory feedback from internship supervisors – CNST 4395 Internship

Target: 70% will receive a satisfactory rating or above from their supervisor – rated as a 3 on the 1 to 5 Likert Scale with 1 being Strongly Disagree and 5 being Strongly Agree

Key Performance Measure: Project submission from capstone course – CNST 4395 Capstone project

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

Objective 2:

Students 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 internship supervisors – CNST 4395 Internship

Target: 70% will receive a satisfactory rating or above from their supervisor – rated as a 3 on the 1 to 5 Likert Scale with 1 being Strongly Disagree and 5 being Strongly Agree

Key Performance Measure: Lab performance in CNST 1306/CNST 1307.

Target: 70% of students taking CNST 1306/CNST 1307 score an 80% or above on the labs.

Objective 3:

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

Key Performance Measure: Project presentation and report from capstone course – CNST 4395 Capstone project

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

Objective 4:

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

Key Performance Measures: Student involvement in professional organization’s student chapters.

Target: 70% of students in the program are members of professional organizations’ student chapter.

Key Performance Measures: Faculty or Professional Development

Target: 70% of faculty members have at least 3 faculty or professional development activities attended 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 organizations.

Objective 5:

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

Key Performance Measure: Employment

Target: 70% of graduates receive a job offer before or within three months after graduation.

4. Student Learning Outcome

Student Learning Outcomes are based on ACCE criteria as defined in ACCE Document 103B. The 20 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 science and management program at Tarleton State University operationally defined each of the 20 ACCE learning outcomes. The operational definition of each student learning outcome provides a broad categorization of the knowledge and skills graduates with a Bachelor's of Science in Construction Science and Management from Tarleton State University will possess for each student learning outcome. Students graduating with a B.S. in Construction Science and Management will achieve the following objectives:

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

- Summarize information into appropriate and concise format
- Format professional communications
- Use language and content appropriate to audience

Assessment: CNST 4395 - Final project/internship presentation.

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

- Demonstrate verbal and non-verbal communication skills
- Tailor language and message to the audience being addressed
- Deliver correct information

Assessment: CNST 4395 - Final oral presentation of project and internship.

SLO #3: Create a construction project safety plan

- Prepare safety data and fact sheets
- Prepare task training checklists
- Develop Jobsite Safety Analysis (JSA) Report

Assessment: CNST 3320 - Term project on Construction Job Site Safety Plan

SLO #4: Create construction project cost estimates

- Read plans and understand specifications
- Perform quantification/takeoff (QTO), pricing, and productivity estimates
- Develop conceptual, current, projected, and revised project budgets

Assessment: CNST 2323 and CNST 3302 - Final Comprehensive Exam

SLO #5: Create construction project schedules

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

Assessment: CNST 3385-Term Project Report / CNST 4322 – Laboratory Exercise 5: Primavera, Laboratory Exercise 10: 4D Model Analysis

SLO #6: Analyze professional decisions based on ethical principles

- Identify ethical 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

Assessment: CNST 4313 – Homework 5, Exam 2

SLO #7: Analyze construction documents for planning and management of construction processes

- Examine the submittal process
- Read plans and understand specifications
- Understand contract requirements and deliverables

Assessment: CNST 3302 – Laboratory Exercises / CNST 4322 – Laboratory Exercises

SLO #8: 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: CNST 1306/1307 – Laboratory Project / CNST 4310 - Laboratory Exercises 1 to 6, CNST 4310 Comprehensive Final Exam

SLO #9: Understand construction management skills as a member of a multi-disciplinary team

- Participate with various project members to accomplish a construction project
- Understand the training, experience, and qualifications of various parties involved in the construction project
- Understand team member roles and responsibilities for successful project outcomes
- Create a project-specific management plan

Assessment: CNST 4322 – Laboratory Exercise 1: Multi-Disciplinary Team Members

SLO #10: Apply electronic-based technology to manage the construction process

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

Assessment: CNST 1305 – Term Project, CNST 4322 – Laboratory Exercise 3 to 12. CNST 3302 – laboratory Exercises.

SLO #11: 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: CNST 3335 – Laboratory Exercises 1 to 10.

SLO #12: 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: CNST 3321 – Major Exam 1, CNST 4322 – Major Exam 1

SLO #13: Understand construction risk management

- Identify and understand different types of risk
- Understand techniques for risk shifting and mitigation
- Quantify risk

Assessment: CNST 3321 – Major Exam 1, CNST 3385 – Major Exam

SLO #14: Understand construction accounting and cost control

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

Assessment: CNST 3385 – Final Exam / CNST 3321 – Comprehensive Final Exam

SLO #15: 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: CNST 3311 – Laboratory Exercises reports

SLO #16: 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: CNST 3321 – Comprehensive Final Exam

SLO #17: Understand the legal implications of contracts, and 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: CNST 3321 – Major Exam 1, CNST 4325 – Final Exam

SLO #18: Understand the basic principles of sustainable construction

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

Assessment: CNST 1306 and CNST 1307 – Major Exam 1, Assignment

SLO #19: 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: CNST 3308 – Major Exams, Final Exam, CNST 4310- Major Exam 1

SLO #20: Understand the basic principles of mechanical, electrical, and piping (MEP) systems

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

Assessment: CNST 3301 – Major Exams, Laboratory reports / CNST 3309 – Major Exams, Laboratory Reports

Business and Interpersonal Skills

Students will demonstrate the soft skills that employers seek: 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 will evaluate the result objectively on an annual basis. The faculty will map the courses against the criteria based on ACCE documentation. This document will be shared with the advisory board to ensure that we are meeting industry's demands for our students.

B. PROGRAM IMPLEMENTATION

5. Construction Science and Management ACCE Criteria

The identified student learning outcomes (1-20) are distributed throughout the program in order to reinforce and increase student mastery of basic construction science concepts and skills. 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 for both achievements of course objectives and proficiency in selected student learning outcomes.

The curriculum has been designed to ensure student learning outcomes are fulfilled. Table 1 illustrates the contribution of individual courses in the CNST 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 create a deeper understanding of relevant knowledge and skills and/or providing practice in the practical application of the skills or concepts.

The comprehensive direct and indirect assessment plan for each of the 20 student learning outcomes is graphically represented in the Distribution of Student Learning Outcomes and Assessment in CNST Core Curriculum matrix (Table 1) 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.

The courses are split into three main groups for defining assessment cycles. Project Controls refers to tasks that relate to controlling a building project including making plans, drafts, simulations, and estimates for materials and costs. Project Admin relates to tasks associated with administering a project such as safety, ethical behavior, managing the workers and operations of a project, and contractual obligations. Materials and Methods are the tasks necessary to the construction of a structure. The courses associated with each group are identified in Table 1. Each group will be assessed once per three-year period as defined in Table 2.

SLO Assessments and CNST Course Matrix

	ACCE SLO	Indirect Assessment Location(s)	Introduction Location	Reinforcement Location(s)	Direct Assessment Location(s)
1	<i>Create written communications appropriate to the construction discipline</i>	Senior Exit & Employer Survey	CNST 3311	ENGT 3318	CNST 4395
2	<i>Create oral presentations appropriate to the construction discipline</i>	Senior Exit & Employer Survey	CNST 3301	ENGT 3318	CNST 4395
3	<i>Create a construction project safety plan</i>	Senior Exit & Employer Survey	CNST 1306	CNST 2323 CNST 1307	CNST 3320
4	<i>Create construction project cost estimates</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321	CNST 3302 CNST 2323
5	<i>Create construction project schedules</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321	CNST 3385 CNST 4322
6	<i>Analyze professional decisions based on ethical principles</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321	CNST 4313
7	<i>Analyze construction documents for planning and management of construction processes</i>	Senior Exit & Employer Survey	CNST 1305	CNST 2323 CNST 3321 CNST 3385	CNST 3302 CNST 2323
8	<i>Analyze methods, materials, and equipment used to construction projects</i>	Senior Exit & Employer Survey	CNST 1306	CNST 4310 CNST 2323	CNST 1306 CNST 1307
9	<i>Understand construction management skills as a member of a multi-disciplinary team</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321 CNST 3385	CNST 4322
10	<i>Apply Electronic-based technology to manage the construction process</i>	Senior Exit & Employer Survey	CNST 1305	CNST 2323	CNST 4322 CNST 3302
11	<i>Apply basic surveying techniques for construction layout and control</i>	Senior Exit & Employer Survey	CNST 3335		CNST 3335
12	<i>Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process</i>	Senior Exit & Employer Survey	CNST 2323	CNST 4322	CNST 3321 CNST 4322
13	<i>Understand construction risk management</i>	Senior Exit & Employer Survey	CNST 3321	CNST 3385	CNST 3321 CNST 3385
14	<i>Understand construction accounting and cost control</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321	CNST 3385 CNST 3321
15	<i>Understand construction quality assurance and control</i>	Senior Exit & Employer Survey	CNST 3311	CNST 3308	CNST 3311

16	<i>Understand construction project control processes</i>	Senior Exit & Employer Survey	CNST 3321	CNST 3385	CNST 3321
17	<i>Understand the legal implications of contract, common, and regulatory law to manage a construction project</i>	Senior Exit & Employer Survey	CNST 2323	CNST 3321	CNST 4325
18	<i>Understand the basic principles of sustainable construction</i>	Senior Exit & Employer Survey	CNST 1306	CNST 1307 CNST 4322	CNST 1306 CNST 1307
19	<i>Understand the basic principles of structural behavior</i>	Senior Exit & Employer Survey	CNST 3311	CNST 3308 CNST 4310	CNST 3308 CNST 4310
20	<i>Understand the basic principles of mechanical, electrical and piping systems</i>	Senior Exit & Employer Survey	CNST 3301	CNST 3309	CNST 3301 CNST 3309

Course	Course Name	Course Group	Credit Hours	SLO																			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				write	oral	safe	est	sch	ethic	doc	meth	team	IT	surv	del	risk	acct	qa / qc	cntl	contract	sust	struc	MEP
CNST 3311	Construction Materials Test and Inspection	Materials & Methods	2-4 (3)	I													R DA					I	
CNST 3320	Construction Safety Management	Project Admin	3-0 (3)			I/R DA																	
CNST 3321	Construction Management	Project Admin	3-0 (3)					I							I/R DA	I/R DA	R DA		I/R DA				
CNST 3335	Construction Layout & Site Development	Materials & Methods	2-4 (3)												I/R DA								
CNST 3385	Construction Project Scheduling	Project Admin	2-4 (3)					R DA									R DA	I/R DA		R			
CNST 4310	Site & Building Foundations	Materials & Methods	2-4 (3)									R DA											R DA
CNST 4313	Construction Law & Ethics	Project Admin	3-0 (3)						I/R DA														
CNST 4322	BIM	Materials & Methods	2-4 (3)	R	I/R			R DA					I/R DA	R DA		DA							
CNST 4325	Contract Admin	Project Admin	3-0 (3)																			I/R DA	
CNST 4395	Construction Capstone	Capstone	3-0 (3)	R DA	R DA									R									

Course	Course Name	Course Group	Credit Hours	SLO																			
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				write	oral	safe	est	sch	ethic	doc	meth	team	IT	surv	del	risk	acct	qa / qc	cntl	contr act	sust	struc	MEP
Student Exit Survey	Collected at Graduations (3/year)			IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	
Employer Review	Collected once every 3 years			IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	
Student Feedback	Collected once every year.			IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	IA	

Table 2. Assessment and Review Cycle

Cycle	Course Group	SLO Assessed	Color Code
Year 1	Materials and Methods		Purple
Year 2	Project Admin		Black
Year 3	Project Control		Gray

	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May
Instructor-level Data Collection																								
All Course-level assessment data received by Department Head																								
Department Head analyzes and summarizes data for targeted SLO's. Department collaborates on annual Outcomes/Objectives, Measures, and Achievement Targets. Department Head and Faculty determine program curricular changes and strategies to address findings																								
Finalize annual Outcomes/Objectives, Measures, and Achievement Targets and input into WEAVE. IRE completes review of Department's annual findings. WEAVE																								
IRE completes review of Department's annual findings. WEAVE entries for current year.																								
Department/Division Heads enter and review fall semester findings																								
IRE completes mid-year holistic review of Department's annual data. WEAVE activity.																								
Department Heads enter and review spring semester Findings.																								
Department Heads enter all annual data/findings in Weave and finalize. Program curriculum is updated to incorporate curricular changes. Faculty implement curriculum changes from previous year.																								
Department Heads complete annual data, Annual Report/Analysis Questions, and finalize any applicable action plans. Updates to curriculum are input into Courseleaf and passed to the Curriculum Committees. Academic Advisors are notified of potential changes.																								
Divisional leaders (Deans/AVPs) complete review of their department's annual data. Annual Report																								
IRE completes annual data. Annual Co-Curricular/Administrative Assessment Compliance Report																								
Divisions (VPs) complete annual data. Divisional Annual Report.																								
President reviews annual data. Annual Report with VP's.																								

6. Assessment Cycle

Student learning outcomes are assigned to a primary course group in the Construction Science curriculum. Each course group has an assigned Course Group Coordinator. Three of the four course groups (Materials, Methods, Design, & Analysis; Project Administration; and Project Controls) are assigned relevant SLOs to review during the assessment cycle.

Capstone courses and internships are the students' opportunity to show that they can apply the skills and knowledge applicable to all 20 SLOs obtained through their course-work prior to graduation. When reviewing SLO assessment data, reviewing capstone 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 capstone 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 course.

The assessment cycle is a three-year cycle. Each SLO will be assessed once during the three-year cycle. Each year of the assessment cycle will focus on a course group.

7. Course Notebook and Direct Assessment

At the conclusion of each semester, course assessment data will be collected by each instructor and forwarded to the Assessment 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 20 student learning outcomes will be maintained by the Assessment 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 without individual student identifiers
 - Student scores (grades) for the assessment tool without individual student identifiers
 - The course syllabus
 - The assignment 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.

- **Current or Continuing Student Survey**
This survey will be conducted every year to solicit feedback from the students in terms of their satisfaction with course delivery, course offerings and availability, and their experience within the program.

- **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 capstone course is currently offered three times per year.

- **Alumni Survey**

The department will submit surveys to the alumni each year. Information from these surveys will include how the coursework prepared alumni 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 program 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.

Initially, the goal will be to break the program into three components and assess each component over a three-year cycle.

- **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**

The Construction Science and Management faculty members and staff will meet at the end of each semester to discuss the results of the assessment. All Engineering Technology 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 and posted into the Weave assessment site.

C. PROGRAM ASSESSMENT AND ANALYSIS

9. Uses of Evaluation/Assessment Results and Actions Taken

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 science and management program.

D. PROGRAM OUTCOME AND RESULT

10. Plan of Action

The intent of assessment is to identify weaknesses and then to implement changes in an effort to improve the program. These changes could impact a number of 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 faculty members and the administration. The report will also be available to the industry advisory board members and alumni.