# Assessment & Continuous Improvement Plan

for the

# Construction Engineering Technology (CET)

Program

at

## The University of Toledo

Toledo, Ohio

**Revised August, 2018**

## *Introduction*

The following plan outlines the process of assessment and continuous improvement required for accreditation of the program by the ETAC of ABET. Furthermore, the process is also fittingly able to act as an assessment plan for any other program justification study at the local or national level.

The Construction Engineering Technology (CET) program maintains and follows a mission statement that is supported by Program Education Objectives (PEO's) as well as Student Learning Outcomes (SLO's) and specific Program Criteria Outcomes. Specifically, PEO's are objectives that exhibit the graduates' have been prepared well enough to succeed in industry careers during the first 5 years after graduation. SLO's are specific outcomes related to student achievement upon obtaining a degree for the program. SLO's are ABET driven and mirror the specific requirements of the accrediting organization. Program Criteria Outcomes are those added student outcomes that are specific to a program in Construction Engineering Technology and are what identify the program as dealing with the construction field of study. The CET Mission Statement along with the associated PEO's, SLO's and Program Criteria are shown below.

### Construction Engineering Technology Program
### Mission Statement

(March 2017)

MISSION STATEMENT

It is the mission of the Construction Engineering Technology (CET) program to prepare students to obtain career positions as professionals in the construction and building industries where they will ensure quality in all phases of construction projects including:

- The coordination of and participation in the design process.
- The monitoring of the quality control of materials and workmanship.
- The management of costs and progression of construction.

PROGRAM EDUCATIONAL OBJECTIVES

In order to achieve this mission, the educational objectives of the program are as follows:

- Graduates will participate effectively in projects as innovative solution providers through appropriate planning, monitoring and managing of all phases of construction in their chosen sector of the industry.
- Graduates will successfully perform in their careers due to their educational background in:
    - fundamental construction and engineering skills which provide the ability to pursue professional registration and industry certifications,
    - teamwork and communications skills,
    - and with a propensity to engage in life-long learning and the continual improvement of their skills and knowledge.
- Graduates will progress successfully in their chosen sector of the construction industry by gaining additional responsibilities and entering leadership roles with their employers.

STUDENT LEARNING OUTCOMES

In support of the program educational objectives, each student successfully completing the requirements for a Degree in the Construction Engineering Technology program is expected to have:

a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities;
b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;
d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;
e. an ability to function effectively as part of a team;
f. an ability to identify, analyze, and solve broadly-defined engineering technology problems;
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;
h. an understanding of the need for and an ability to engage in self-directed continuing professional development;
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;
j a knowledge of the impact of engineering technology solutions in a societal and global context; and
k. a commitment to quality, timeliness and continuous improvement.

PROGRAM CRITERIA OUTCOMES

In order to prepare each student in the specific requirements for a Degree in Construction Engineering Technology, the program maintains the following criteria that students are expected to obtain:

1. Effective communication skills related to the construction environment through the proper usage of oral, written and graphic techniques.
2. Mathematical skills sufficient to solve and analyze technical problems associated with construction projects including building, highway and heavy construction.
3. A thorough knowledge of common construction methods and design procedures associated with building, highway and heavy construction projects.
4. A thorough knowledge of common construction materials- both their proper usage and proper testing procedures.
5. The capability to develop architectural and engineering drawings for construction projects, including working, presentation and shop drawings.
6. Proficiency in the use of computer graphics associated with civil and construction projects.
7. An understanding of working drawings for residential, commercial, highway and heavy construction projects.

8. An understanding of codes and specifications in the implementation of building and highway projects.
9. Proficiency in the use of surveying equipment to collect data and lay out projects to solve engineering problems.
10. An understanding of the mechanics of structural design.
11. A development and understanding of the proper management techniques of construction projects relative to budget, schedule, safety, organization and contractual obligations.

*Interrelationship of Mission Statement Components*

In part, the PEO's are supported by the SLO's. This relationship is shown below in Table A.

**Table A: Mapping of CET Student Outcomes to Program Educational Objectives**

| | UT CET Program Educational Objectives | | | |
|---|---|---|---|---|
| UT CET Student Outcomes | | 1 | 2 | 3 |
| | a | X | X | |
| | b | X | X | |
| | c | | X | |
| | d | X | X | |
| | e | | X | X |
| | f | X | X | X |
| | g | | X | X |
| | h | | X | X |
| | i | | X | X |
| | j | | X | X |
| | k | X | X | X |

The CET program SLO's corresponds directly to the ABET SLO's on a one to one basis and require no such mapping as it would be superfluous.

The specific CET Program Criteria Outcomes were originally used by the CET program as student outcomes. As ABET required a more prescriptive set of student outcomes, the CET program transitioned its original student outcomes into Program Criteria Outcomes 1-11 in 2005. It maintains a mapping to the current ABET Program Specific Criteria for Construction Engineering Technology and similarly named programs which changes on a relatively frequent basis. This mapping can be found in Table B. shown below. The continual use the same outcomes for program criteria have allowed a consistent historical comparison of achievement of the criteria as well as easier identification of criteria that may be slipping into a non-achieving status.

**Table B: Mapping CET Program Criteria Outcomes to ETAC-ABET Program Criteria**

| | CET Program Criteria Outcomes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ETAC-ABET Program Criteria** | 1. Effective Construction Communication skills | 2. Development of Math Skills associated with Construction | 3. Thorough Knowledge of Construction Methods | 4. Thorough Knowledge of Construction Materials | 5. Ability to Develop Construction Drawings | 6. Proficiency in Use of Graphics | 7. Understanding of Working Drawings | 8. Understanding of Codes and Specifications | 9. Proficiency in Use of Survey Equipment | 10. Understanding of Mechanics of Struct. Design | 11. Understanding of Constr. Mgmt., Estimating & Scheduling |
| **Associate Core** | | | | | | | | | | | |
| **a.** Utilize techniques that are appropriate to administer and evaluate construction contracts, documents, and codes | X | | X | X | | | X | X | | | X |
| **b.** Estimate costs, estimate quantities, and evaluate materials for construction projects | | | X | X | | | X | X | | | X |
| **c.** Utilize measuring methods, hardware, and software that are appropriate for field, laboratory, and office processes related to construction | | X | | | X | X | X | | X | | X |
| **d.** Apply fundamental computational methods and elementary analytical techniques in subdisciplines related to constr. | | X | | | | | | | X | X | |
| **Baccalaureate Core** | | | | | | | | | | | |
| **e.** Produce and utilize design, construction, and operations documents | X | | X | | X | X | X | X | | | |
| **f.** Perform economic analyses and cost estimates related to design, construction, and maintenance of systems associated with construction | | | X | X | | | X | X | | | X |
| **g.** Select appropriate construction materials and practices | | | X | X | | | | X | | X | |
| **h.** Apply appropriate principles of construction management, law, and ethics | X | | | | | | | X | | | X |
| **i.** Perform standard analysis and design in at least one sub-discipline related to construction engineering | | X | | | X | | X | | X | X | |

*Maintenance and Revision of the Mission Statement*

The Mission Statement (inclusive of the PEO's, SLO's and Program Criteria) are maintained by receiving input on a regular basis from program constituencies. Constituents of the program include:

1. Current students in the program
2. CET program Industrial Advisory Board (IAB)
3. Co-operative education program employers
4. Employers of program graduates

5. Alumni of the program
6. Graduate school programs

Graduating students' input is obtained from EBI exit surveys prior to graduation. During this survey, general information is collected about department and program strengths and weaknesses. Graduate/alumni input along with corresponding employer's supervisors is obtained via the CET Graduate and Employer Survey Initiative (GESI) on a one, three and six-year basis from the point of graduation.

Co-op students and employers are required to complete quality surveys after each co-op assignment. The CET IAB represents the views of co-op employers, employers of program graduates, and to some degree alumni of the program. The IAB is composed of representatives from consulting companies, government, and construction firms. The IAB meets with the entire CET faculty on an annual basis to discuss various issues related to the undergraduate program and options for our graduates. Reviews of the program educational objectives are always a topic of discussion and the IAB has the ability to directly propose changes and additions to the list.

At any point when it is found that the Mission Statement is in need of revision due to a significant amount of suggestions by constituencies and/or through the analysis of collected data, the process to modify the Mission Statement is initiated by the CET program director who acts as its curator. The director coordinates the formulation of the proposed changes from any of the sources of input previously mentioned. The proposal is first passed through the CET faculty for review and approval. The final version is then given to the IAB for review and approval.

## *The Assessment Process*

The assessment and evaluation process takes a dual approach to verification of the achievement of the PEO's, SLO's and Program Criteria Outcomes:

1. Direct evidence from course assessment measures.
2. Indirect evidence from:
    a. The Graduate & Employer Survey Initiative (GESI)
    b. College Co-op Student & Employer Surveys
    c. Senior EBI Exit Surveys

The assessment process is intended to be a continuous process that yields data on an annual basis and allows for continuous improvements to the curriculum where they are found to be warranted. The process has evolved into its current state over a period of 15 years as an understanding of the ABET outcomes assessment process has become more clear, additional types of data become available and more efficient means of assessment become apparent.

The process is always evolving and improving. The process follows the current procedures listed as follows:

*Key Measures Collection*

*Responsible Parties:* Program Faculty (Collection), Program Director (Compilation)
*Frequency:* Every semester

Each faculty member is required to provide an analysis of a key measure should it be indicated as such on the Outcomes to Assessment Instrument Linkage document (found in the Appendix of this plan). The linkage document summarizes the course assessment measurements to be used and how each student and program criteria outcome relate to each course. This linkage document provides a framework from which faculty within the program are required to operate in order to assess the outcomes assigned to courses for which they are responsible. It identifies several points within courses (projects, exams, quizzes and other assignments) which clearly relate to the program outcomes and criteria and should be analyzed as the assignments are collected and graded throughout each semester during which the course is offered.

Course key measures correspond to CET SLO's and Program Criteria as determined by the CET faculty. This relationship is shown below in Table C. A standard threshold graded level for student assignments was set at an 80% score which represents the lower end of a B grade in the standard grading scale. A threshold percentage of students achieving the 80% grade is then used for determining successful achievement of the measure in any course.

**Table C: Mapping of CET Courses to CET Student & Program Criteria Outcomes**

| | CET-1010 | CET-1100 | CET-1150 | CET-1200 | CET-1210 | CET-1250 | CET-2030 | CET-2060 | CET-2110 | CET-2220 | CET-2250 | CET-3010 | CET-3020 | CET-3120 | CET-3160 | CET-3210 | CET-3220 | CET-4250 | CET-4350 | CET-4460 | ENGT-2000 | ENGT-3600 | ENGT-4050 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Program Criteria Outcomes** | | | | | | | | | | | | | | | | | | | | | | | |
| 1) Effective construction communication skills | I | I | | | I | | A | | | | | A | | | A | A | | | | P | | | P |
| 2) Development of mathematical skills | | | | A | I | A | A | A | A | A | A | | | | | A | A | P | P | | | A | |
| 3) Knowledge of construction methods & design | | | I | A | | A | A | I | | | A | | A | A | | | A | P | P | | | | P |
| 4) Knowledge of construction materials | | | I | I | | A | | I | A | A | | | A | A | | | | | | | | | P |
| 5) Ability to develop construction drawings | | I | | | | | A | | | | | A | | | | | | | | | | | P |
| 6) Proficiency in computer graphics | | I | | | | | A | | | | | A | | | | | | | | | | | |
| 7) Understanding of working drawings | | I | | | | | A | I | | | | | | | | | | | | | | | A |
| 8) Understanding of codes & specifications | | | I | | | I | I | I | A | A | A | | A | A | A | | | A | A | | | | P |
| 9) Proficiency in use of surveying equipment | | | | | I | | | | | | | | | | | A | | | | | | | |
| 10) Understanding mechanics of structural design | | | | I | | | | | | | A | | | | | | | P | P | | | | |
| 11) Understanding of construction management | I | | | | | | | I | | | | | | | A | | | | | P | | A | A |
| **Student Outcomes** | | | | | | | | | | | | | | | | | | | | | | | |
| a) Ability to select & apply knowledge, techniques, skills | | I | I | | I | A | I | | A | A | A | A | A | A | | A | A | P | P | P | | A | P |
| b) Ability to apply knowledge of math, science, Eng & Tech | | | | A | | A | | | | | A | A | | A | | | A | P | P | | | | P |
| c) Ability to conduct standard tests & experiments | | | | | | | | | A | A | | | | | | | | | | | | | |
| d) Ability to design systems, components or processes | | | | | | | A | | | | A | | A | A | | | A | P | P | | | | A |
| e) Ability to function effectively on teams | I | | | | I | | | | A | A | | | | A | | A | A | P | | | | | A |
| f) Ability to identify, analyze and solve problems | | | | A | I | A | A | A | | | A | | | A | | A | A | P | P | | | A | A |
| g) Ability to apply written, oral & graphical communication | I | I | I | | I | | A | | | | | A | | | A | A | | | | P | A | | P |
| h) Ability to engage in self-directed lifelong learning | I | | | | | | | | | | | | | | | | | | | | A | | |
| i) Understand professional, ethical responsibility & diversity | I | | | | | | | | | | | | | | A | | | | | A | A | | A |
| j) Knowledge of ET solutions in societal & global context | | | | | | | | | | | | A | A | | I | | A | | | | | | A |
| k) Commitment to quality and improvement | | | | | | | A | | A | | | | | | | | | | | | A | | |
| 08/21/18 | | | | | I= Introduction | | | | | A= Applications | | | | | | P= Proficiency | | | | | | | |

To be successfully achieved, a key measure in courses where mostly freshman are enrolled and introductory concepts are taught, 70% of the students should attain an 80% (B) grade on a key measure assignment. In applications based courses 80% of the students are expected to attain a B-level success on assignments. In upper-level proficiency-based courses, 90% of the students are expected to perform at the 80% level

on key measure assignments. This graduated level of attainment of student outcomes and program criteria is reflected in each individual course key measure as found in the linkage document.

Faculty members should follow the ensuing step by step procedure for collecting data from a course key measure:

1. Assign student work listed as a key measure in the linkage document for the course being taught.
2. Complete a standard CET course assessment form (shown below)
3. Make a number of copies of the form that corresponds to the total number of SLO's and Program Criteria assigned to the key measure. Insert one copy into each corresponding SLO or Program Criteria section of the current year assessment binder.
4. Log the summary results in each corresponding summary log on the server drive as directed by the program director. (A sample Log Sheet is shown in Figure 1 below.)

## Construction Engineering Technology
## Class Outcomes Assessment Form

**Course No:** CET-#### **Semester:**

**Course Name:** **Reviewed by:** *Instructor Name*

**Assessment measurement tool:**

*Provide a description of the assignment used as an assessment tool*

**Outcomes to be addressed by measurement (provide list):**

Program: *1-11* ABET SLO*: a-k*

**Expected/desired results (Consult Linkage Document):**

A desirable result is achieved by 70/80/90% of the students obtaining an 80% grade or better on the assignment.

**Actual Results:**

# of # (##%) of the students received an 80% or better on the assignment.

**Comments regarding results:**

*Provide any comments of issues that may have affected student results.*

**Trailing 4 results:**

| | | | | |
|---|---|---|---|---|
| Term | | | | |
| Results | | | | |

**Action Taken:**

*Provide a summary of proposed action if threshold score was not met after consulting the CET Action Decision Rules*.

Faculty members are encouraged to submit additional analyses apart from those required when they find that a course assignment directly corresponds to a particular individual student or program criteria outcome. The linkage document is periodically reviewed and updated for conformance to the current subject matter using faculty input.

**Figure 1: Typical CET Course Key Measure Log-in Sheet (ABET Outcome g shown)**

University of Toledo
Engineering Technology Department
Construction Engineering Technology – Program Outcomes Assessment Summary

| Student Outcome: ABET g) Students will have an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature. | | | | | |
|---|---|---|---|---|---|
| Assessment Measure/ Course | Semester Reported | Expectation | Results | Accept able | Actions |
| CET-3010 Architectural CADD BIM/Design for Prefabrication Case Study | SP 2017 | The desired result was to have 80% of the students score 80% or better on exam. | 8 of 8, (100%), of the students attained a 80% or better on exam. | Yes | None taken. |
| | | | | | |
| | | | | | |

*Graduate and Employer Survey Initiative (GESI)*
*Responsible Parties:* Program Director
*Frequency:* Every Year (Collection), Annually (Summary)

The program director is responsible for the GESI which provides data from the graduates and their employers. Responses are annually solicited from graduates who have been out of school for 1, 3 and 6 years. The director maintains the graduate database, transmits the surveys to the corresponding graduates and compiles the results on an annual basis. The resultant report is reviewed by the faculty as well as the IAB with action items formulated as the need is found.

Results which can be directly attributed to an individual outcome or criteria are entered into the annual assessment recap matrix and are used as a data point in the final decision of an outcome or criteria achievement. The threshold for discerning whether the corresponding outcome has been successfully achieved is a -0.5 difference. This considers that on the average, graduates normally feel a bit under prepared and could always have learned more.

*Educational Benchmarking, Inc. (EBI) Surveys*
*Responsible Parties:* Senior Capstone Instructor (Distribution via web link),
Associate Dean for Undergraduate Studies (Collection),
Program Director (Summary)
*Frequency:* Every semester (Collection), Annually (Summary)

Initial administration of the senior exit surveys is performed through a web link emailed to each student as a part of the ENGT-4050 Senior Technology Capstone course each semester. EBI, Inc. compiles and analyzes the data from the standard question forms. The program director is responsible for mining the data from the EBI report on an annual basis and producing a summary report regarding the results. Again, results which can be directly attributed to an individual student outcome or program criteria are entered into their corresponding sections in the annual assessment recap matrix as previously mentioned. For threshold scores when using EBI results to ascertain the achievement of student and program outcomes, it is deemed that both the current and 5-year trailing averages of the annual EBI ratings for a category will not significantly trail the peer institutions provided for comparison.

*Co-op Student & Employer Survey Data*
*Responsible Parties:* Career Office (Collection), Program Director (Summary)
*Frequency:* Every semester (Collection), Annually (Summary)

The College of Engineering Career Development Center (ECDC) requires that co-op students and their employers complete a multi-question survey after the student has completed each co-op assignment. Raw data from these surveys are combined into a spreadsheet for departmental review upon request. The program director is responsible for sorting and reducing the data into a useful format and summarizing the results with a report. Again, results that can be directly correlated to student outcomes or program criteria are added to the annual assessment recap matrix. For threshold scores when using Co-op Survey results to ascertain the achievement of student and program outcomes, it is deemed that success is achieved when over 70% of the responses are affirmative in nature.

*Student Outcomes & Program Criteria Outcome Evaluation Recap*
*Responsible Parties:* Program Faculty & Director
*Frequency:* Annually

After the spring semester (most normally the following fall term when all data has been made available and compiled), the CET program faculty meet to review the contents of the student outcomes and criteria binder. Log sheets are tabulated and an accounting is made on the success of the achievement of each student outcome and program criteria dependent upon the number of successful versus unsuccessful measures. Outcomes and criteria that are not successfully achieved are reviewed and strategies for improvement are formulated dependent upon the Action Decision Rules.

Each outcome and criterion's achievement success is documented on a standard form that lists the results and action items for the future. (A sample summary sheet is shown in Figure 2 below.) A summary of the assessment of all student outcomes and program criteria is then compiled in a summary matrix for ease of presentation. Table D. below shows the summary matrix for Student (ABET) Outcomes while Table E. shows the results for Program Criteria Outcomes.

**Figure 2: Typical CET Outcome/Criteria Summary Form (ABET Outcome b shown)**

## Construction Engineering Technology
## Outcome/Criteria Summary Form

**Outcome or Criteria: b)** Student will have an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.

**Date of Review:**

**Reviewed by:** **CET Faculty:** Kissoff, Beall, Mata

**Results of Measurements:**

| Number of Assessment Measures Performed | Outcome/Criteria Achieved by Measurement | Outcome/Criteria Not Achieved by Measurement |
|---|---|---|
| 19 | 14 | 5 |

**Outcome/Criteria Achieved?: YES**

**Comments regarding results:**

In two cases, results were affected by student procrastination which resulted in low scores and poor achievement levels.

**Action Taken:**

When able, additional work and discussions were performed during the term to bolster student learning of the underachieving outcomes.

The CET-1250 course will attempt to have a better defined set of values for the course final project. Freshmen have displayed an inability to yet adapt to a true open ended design project.

**Table D: Typical CET Program Student Learning Outcomes Assessment Summary**

| 04/30/17 | # of Measures | # Achieved | # Not Achieved | GESI Grads (1-Year) | GESI Employers (1-Year) | GESI Grads (3-Year) | GESI Employers (3-Year) | GESI Grads (6-Year) | GESI Employers (6-Year) | Co-op Employers | EBI Surveys | Criteria/Outcome Achieved | Comments & Action Items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Student Outcomes** | | | | | | | | | | | | | 3 & 6 yrs better. Add 1 hr to 4460 |
| a) Ability to select & apply knowledge, techniques, skills | 56 | 39 | 17 | OK | OK | Excel | Excel | Excel | Good | Excellent | Compares | Yes | |
| b) Ability to apply knowledge of math, science, Eng & Tech | 20 | 14 | 6 | Poor | Marg | | | | | Excellent | Compares | Yes | |
| c) Ability to conduct standard tests & experiments | 3 | 3 | 0 | OK | Poor | | | | | Excellent | Compares | Yes | |
| d) Ability to design systems, components or processes | 7 | 5 | 2 | Marg | Good | | | | | Excellent | Compares | Yes | |
| e) Ability to function effectively on teams | 18 | 16 | 2 | Marg | Marg | Excel | Excel | Exc | Exc | Excellent | Exceeds | Yes | |
| f) Ability to identify, analyze and solve problems | 30 | 21 | 9 | OK | Marg | | | | | Excellent | Compares | Yes | |
| g) Ability to apply written, oral & graphical communication | 20 | 12 | 8 | Poor | Poor | Excel | Good | Good | Exc | Excellent | Compares | Yes | |
| h) Ability to engage in self-directed lifelong learning | 1 | 1 | 0 | OK | Good | | | | | Excellent | Exceeds | Yes | Results from 1st term freshman |
| i) Understand professional, ethical responsibility & diversity | 3 | 1 | 2 | OK | Good | Excel | Excel | Exc | Exc | Excellent | Compares | Yes | Need more upper div results |
| j) Knowledge of ET solutions in societal & global context | 4 | 2 | 2 | OK | Poor | | | | | Excellent | Compares | Yes | Low N in 3020 bad results |
| k) Commitment to quality and improvement | 2 | 2 | 0 | OK | OK | | | | | Excellent | Compares | Yes | |
| | | | | | | | | | | | | | |
| GESI = Graduate & Employer Survey Initiative | GESI = Graduate & Employer Survey Initiative | | | | | | | Co-op Survey | | | | EBI Survey | |
| ( 1-Year Grads) | (3 and 6 Year Grads) | | | | | | | Excellent = Response > 90% | | | | Exceeds = CET Rating Exceeds others | |
| Most recent year results used | Exc = Excellent, 4.1 < 5.0 | | | | | | | Good = Response > 70% | | | | Compares = CET Rating Compares to othe | |
| Poor = Diff. Much Greater than -0.5 | Good = 3.1 < 4.0 | | | | | | | OK = Response > 50% | | | | DNTS = CET Rating Does Not Trail signific | |
| Marg= Marginal (Diff. Close to -0.5) | OK = 2.1 < 3.0 | | | | | | | Poor Response < 50% | | | | Trails = CET Rating trails all others | |
| OK = Diff. about -0.5 to 0 or better | Poor = 0.0 < 2.0 | | | | | | | | | | | | |
| Good = Overprepared | | | | | | | | | | | | | |

## Table E: Typical CET Program Criteria Outcomes Assessment Summary

| 04/30/17 | # of Measures | # Achieved | # Not Achieved | GESI Grads (1-Year) | GESI Employers (1-Year) | GESI Grads (3-Year) | GESI Employers (3-Year) | GESI Grads (6-Year) | GESI Employers (6-Year) | Co-op Employers | EBI Surveys | Criteria/Outcome Achieved | Comments & Action Items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Program Criteria Outcomes** | | | | | | | | | | | | | |
| 1) Effective construction communication skills | 19 | 13 | 6 | | | | | | | | | Yes | |
| 2) Development of mathematical skills | 24 | 16 | 8 | | | | | | | | | Yes | |
| 3) Knowledge of construction methods & design | 29 | 19 | 10 | | | | | | | | | Yes | |
| 4) Knowledge of construction materials | 17 | 9 | 8 | OK | OK | | | | | | | Yes | |
| 5) Ability to develop construction drawings | 9 | 6 | 3 | | | | | | | | | Yes | |
| 6) Proficiency in computer graphics | 17 | 16 | 1 | Good | Good | | | | | | | Yes | |
| 7) Understanding of working drawings | 12 | 8 | 4 | | | | | | | | | Yes | |
| 8) Understanding of codes & specifications | 35 | 28 | 7 | | | | | | | | | Yes | |
| 9) Proficiency in use of surveying equipment | 5 | 4 | 1 | OK | Good | | | | | | | Yes | |
| 10) Understanding mechanics of structural design | 12 | 9 | 3 | Good | OK | | | | | | | Yes | |
| 11) Understanding of construction management | 8 | 3 | 5 | Poor | Poor | Excel | Good | Excel | Excel | | | **No** | Low N in GESI 1 year results |

| | | | |
|---|---|---|---|
| GESI = Graduate & Employer Survey Initiative | GESI = Graduate & Employer Survey Initiative | Co-op Survey | EBI Survey |
| ( 1-Year Grads) | (3 and 6 Year Grads) | Excellent = Response > 90% | Exceeds = CET Rating Exceeds others |
| Most recent year results used | Exc = Excellent, 4.1 < 5.0 | Good = Response > 70% | Compares = CET Rating Compares to othe |
| Poor = Diff. Much Greater than -0.5 | Good = 3.1 < 4.0 | OK = Response > 50% | DNTS = CET Rating Does Not Trail signific |
| Marg= Marginal (Diff. Close to -0.5) | OK = 2.1 < 3.0 | Poor Response < 50% | Trails = CET Rating trails all others |
| OK = Diff. about -0.5 to 0 or better | Poor = 0.0 < 2.0 | | |
| Good = Overprepared | | | |

*Program Educational Objective Evaluation Recap*
*Responsible Parties:* Program Faculty, Program Director, IAB *Frequency*: Annually

While ETAC-ABET no longer requires Engineering Technology programs to verify achievement of its PEO's, the CET program still evaluates its PEO's as a valuable process in determining the success of the program's mission. The assessment of the PEO's provides valuable assistance to the program's faculty and IAB with regard to the process of maintaining overall program quality and direction.

As previously detailed, a portion of the achievement of the PEO's is supported by the success of the SLO's as shown in Table A. Additional outcome achievement is also supported through data obtained through the GESI responses and the Co-op survey responses. These results are reviewed on an annual basis, most normally in the following fall term and are again reviewed at the next year's IAB meeting. Due to the multiple assessment points that are obtained, a summary of these points is compiled in a matrix to allow for ease of presentation. In conjunction with the results of outcomes achievement, a conclusion of the achievement of the PEO's is then determined from the summary of the results. A sample of a summary of the PEO's achievement is found in Table F shown below.

## Table F: Typical Summary of Achievement of Program Educational Objectives

| ACH= Achieved, NA=Not Achieved | PEO 1. Grads will participate effectively in projects… | PEO 2. Grads will successfully perform in their careers… | PEO 3. Grads will progress successfully in their chosen sector… | Comments |
|---|---|---|---|---|
| **Assessment Measure** | | | | |
| Student Outcomes Overall Results | ACH | ACH | ACH | See PEO to Student Outcome Mapping |
| Co-op Survey Student Resp: The work was related to my academic career | ACH | --- | --- | 93% Agree or Strongly Agree |
| Co-op Survey Student Resp: I was academically prepared for the co-op | ACH | ACH | --- | 93% Agree or Strongly Agree |
| Co-op Survey Student Resp: I was challenged by the work | ACH | --- | --- | 88% Agree or Strongly Agree |
| Co-op Survey Student Resp: I found the work overwhelming | NA | --- | --- | 60% Disagree or Strongly Disagree |
| Co-op Employer Resp: Overall Evaluation of the student work | ACH | --- | --- | 0 negative responses out of 24 total. |
| Co-op Employer Resp: Was the student academically prepared for the co-op? | ACH | --- | --- | 83% agree. |
| Senior Exit Interview: Overall Opinion of Program | # | --- | --- | Interview Sheets not collected this AY |
| Senior Exit Interview: Rating of the overall performance of Dept. | --- | # | --- | Interview Sheets not collected this AY |
| GESI Grad Response: Employed in industry? | ACH | --- | --- | All respondents are employed in industry |
| GESI Grad Response: Commensurate job titles? | ACH | --- | --- | All have job titles commensurate with CET |
| GESI Grad Response: Professional/Industry Certifications | ACH | ACH | --- | 7/7 Passes on FE. Plus LEED, PMP, ACI, ODOT & CAPM |
| GESI Grad Response: Salary Progresssion | --- | ACH | ACH | 3 & 6 yr grads progress steadily each interval |
| GESI Grad Response: Relevance of CET education prep to work? | ACH | ACH | --- | 94% rated good or excellent. |
| GESI Grad Response: Rating of skills based on CET Program preparation. | ACH | ACH | --- | All skills rated 3.7 avg. or greater out of 5 |
| GESI Grad Response: Progressed in position & taken leadership role? | --- | ACH | ACH | 97% affirmative response |
| GESI Grad Resp: Have you continued your education? | --- | ACH | ACH | 83%+ have performed some manner of CE |
| GESI Employer Response: Would you hire UT CET again? | ACH | ACH | --- | 1,3, & 6 yr employers unanimously affirmative |
| GESI Employer Response: Rank of the Grad's preparedness. | ACH | ACH | --- | Average 4.00 out of 5 rating for 1 yr. grads |
| GESI Employer Response: Rating of the Grad's Career Skills | ACH | ACH | --- | All skills rated 3.92+ out of 5, Avg. = 4.31 |
| GESI Employer Response: Grad progressed in position? | --- | ACH | ACH | Unanimously affirmative |
| GESI Employer Response: Grad gained responsibility? | --- | ACH | ACH | Unanimously affirmative |
| GESI Employer Response: Grad taken a leadership role? | --- | ACH | ACH | Nearly Unanimously affirmative |
| GESI Employer Response: Grad shown innovation? | ACH | --- | --- | Unanimously affirmative |
| GESI Employer Response: Grad shown evidence of being a problem solver? | ACH | --- | --- | Unanimously affirmative |
| | | | | |

*Continuous Improvement*
*Responsible Parties:* Program Faculty, Director
*Frequency:* Annually with measures, continuously as need arises

The process previously above shall continue on an annual basis with special attention being directed at deficient areas that require action to correct. While improvements are always welcome to any course, action for improvement due to a single unmet achievement should not always require a major overhaul of the course or assessment measure. However, to ensure adequate action is taken within a course to improve achievement of assigned outcomes, the following Action Decision Rules (ADR's) loosely based on the Westgard Rules for QC(1), shall be used to determine if action for improvement in a course is warranted due to deficient achievement.

## Table G: Action Decision Rule (ADR) Matrix for Unmet Course Key Measures

| Number of Consecutive Occurrences | Missing Desired Student Achievement Threshold by: | Examples for % of Students Scoring 80% on Measure |
|---|---|---|
| Two (2) | -50% or more | Need 90% but obtain 35% (-55%) |
| Three (3) | -25% or more | Need 70% but obtain 40% (-30%) |
| Four (4) | -10 % or more | Need 90% but obtain 77% (-13%) |
| Five (5) | -1% or more | Need 70% but obtain 68% (-2%) |

Waiver of the ADR's on a case by case basis can be made in consultation with the CET program director, or in case of courses taught by the director a consultation shall be made with another CET faculty member. Waivers can be granted to suspend ADR mandated improvement action in special cases where outside or extenuating circumstances affected the results of the course key assessment measure. Such circumstances could include power or network outages, school day cancelations, multiple exams in a single day for the majority of students, a new instructor teaching the course and so on.

Improvements on a wider program-level shall also be warranted should the overall total number of successful achievement measures be deemed to be unsatisfactory. To ensure adequate action is taken within the program to improve achievement of an unmet outcome or program criteria, the following three step process should be followed:

Step 1: The following ADR's (shown in Table H below) shall be used to determine whether further investigation or possible action for improvement at the program-level is warranted due to the aggregate make-up of the direct course measures attributable to a specific outcome. If one of the ADR thresholds is not met for the overall achievement of an outcome via key course measure totals, the process proceeds to Step 2.

**Table H: Action Decision Rule (ADR) Matrix of Outcomes & Criteria For Annual Course Measure Totals**

| Number of Consecutive Years of Occurrence: | Ratio of total Successful (Yes) vs. Unsuccessful (No) Key Course Measures for Outcome Achievement: | Example Annual Score Totals Requiring Action |
|---|---|---|
| Two (2) | Less than 1 to 1 or worse | 12 Yes & 14 No |
| Three (3) | At or just exceeding 1 to 1 or worse | 14 Yes & 12 No |
| Four (4) | 3 to 2 or worse | 12 Yes & 8 No |

Step 2: After determination that an ADR for an annual outcome total has been surpassed, a review of the associated indirect evidence shall be made. A review of the annual evidence summary of Co-op, EBI or GESI surveys should be used to determine the overall severity of the missed achievement level for the outcome in question. In any event, the process proceeds to Step 3.

Step 3: Upon reaching Step 3, the first course of action is to determine if there is an extenuating set of circumstances creating deficiencies in the achievement of a student outcome or program criteria. Such circumstances could include the sudden loss of program faculty requiring multiple part-time instructor use, a change to the structure of the university calendar or a major shift in program student demographics. Adequate evidence should be provided within the annual assessment report to document the anomalous situation causing the non-achievement.

- Should circumstances beyond the control of the program be identified as causes of the non-achievement, the process ends in no action.
- Should it be determined that improvements can be made either through multiple course actions or an overall programmatic change (such as admissions requirement alterations, prerequisite modifications, changes to multiple courses and so on), the proposed action will be followed through and the success of the changes documented in successive years.

Step 4: Loop Closure Documentation: Use the CET Loop Closure Form (shown below) to provide documentation of the improvement to the program or course and the results that occurred after the improvement was enacted. Completed Loop Closure forms should be filed in the Loop Closure Binder by year.

## Construction Engineering Technology
## Loop Closure Assessment Form

**Outcome/Criteria being Assessed**:

**Course No**: **Semester**:

**Or Non-course measurement: Grad Survey EBI Survey Other**

**Description of Assessment Instrument**:

**Prior Results**: **Semester**: **Year**:

**Action Taken from Prior Results**:

**Current Results**:

**New Results Satisfactory?? Yes ____ No _____**

**Further Action Recommended?**:

**Closure reviewed by**: **Date of Report**:

*Documentation*

Documentation of the annual assessment review and continuous improvement process shall be collected and stored in a binder containing the following items:

1) Summary Report
    a. Narrative of annual assessment results
    b. Comments on data & results
    c. Updates on continuous improvement initiatives
    d. Summary of proposed actions
2) Summary Matrix of Assessment results
    a. Student Outcomes & Program Criteria Summary Matrix
    b. Program Educational Objectives Summary Matrix
    c. Matrix of Unmet Course Assessment Measures
3) Annual Summary Report of EBI results
4) Annual Summary Report of Co-op surveys
5) Annual Summary Report of GESI results
6) Tabbed sections for outcomes assessment containing:
    a. Outcomes/Criteria Section Summary Form
    b. Outcomes/Criteria log sheets in each section
    c. Course Outcome sheet for each assessment measure listed in linkage
7) Loop closure and improvement form along with any supporting documentation regarding the closure

*References*

1. Westgard Rules & Multi-rules for QC, https://www.westgard.com/mltirule.htm

## History of Plan Revisions

| | |
|---|---|
| November 2017 | Initial plan formalized and distributed to faculty for comments. |
| May 2018 | Addition of examples to ADR tables. |
| | Addition of form for Continuous Improvement Loop Closure. |
| August 2018 | Updated Linkage Document and Outcomes & Criteria Matrix for improved coverage of Outcome d, ENGT-2000 and CET-1150 & 3160. |

# *APPENDIX*

# Construction Engineering Technology Program Assessment Outcomes to Assessment Instrument Linkage

This document has been prepared in order to identify, on a class by class basis, the assessment instruments from each class that are used to support the ABET Student Outcomes and Program Criteria that are required of the Construction Engineering Technology program. This will guide those teaching the classes as to where to look to prepare, collect and evaluate key measures for the assessment of the program. This document needs to be used in conjunction with the CET Mission Statement and outcomes matrix which lists the individual outcomes for the program.

## CET-1010 Introduction to CET

- Professional Registration Quiz Problems
  ABET/Student Outcomes: i,
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Technical Communications Worksheet
  ABET/Student Outcomes: g, CET Criteria: 1
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Engineering Ethics Quiz Problems
  ABET/Student Outcomes: i
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Graduate Degrees Quiz Problem
  ABET/Student Outcomes: h
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Teamwork Quiz Problems
  ABET/Student Outcomes: e
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- CM/GC Consultant Quiz Problems
  CET Criteria: 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- "Figure It Out " Calculation Assignment
  ABET/Student Outcomes: g, CET Criteria: 1
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

**CET-1100 Architectural Drafting**

- Final Plan Set Drafting Project
  ABET/Student Outcomes: a & g, CET Criteria: 1,5,6 & 7
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

**CET-1150 Construction Materials & Codes**

- Construction Research Term Papers
  ABET/Student Outcomes: a & g, CET Criteria: 3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Exam Questions on Construction Methods & Design
  ABET/Student Outcomes: a, CET Criteria: 3
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Exam Questions on Construction Materials
  ABET/Student Outcomes: a, CET Criteria: 4
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Exam Questions on Codes & Specifications
  ABET/Student Outcomes: a, CET Criteria: 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

**CET-1200 Engineering Mechanics**

- Statics Exam: Vector Mechanics Problem
  ABET/Student Outcomes: b & f, CET Criteria: 2,3, 4 & 10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Shear & Bending Moment Problem
  ABET/Student Outcomes: b & f, CET Criteria: 2,3, 4 & 10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-1210 Surveying**

- Survey Field Book Review
  ABET/Student Outcomes: a, e, f & g, CET Criteria: 1 & 9
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Field Traverse Project
  ABET/Student Outcomes: a, e, f & g, CET Criteria: 1 & 9
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Bearing & Azimuth Calculation Problem
  ABET/Student Outcomes: a & f, CET Criteria: 2, 9
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

**CET-1250 Building Systems**

- Heat Loss & Gain Calculation Homework
  ABET/Student Outcomes: a, b & f, CET Criteria:2,3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Foot-candle Calculation Homework
  ABET/Student Outcomes: a, b & f, CET Criteria:2,3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

- Circuit Breaker Design Homework
  ABET/Student Outcomes: a, b & f, CET Criteria:2,3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 70% of Students
  Instructor Analyzed

**CET-2030 Construction Graphics**

- Final Site Plan Drafting Project Submittal
  ABET/Student Outcomes: a, g & k, CET Criteria: 1,3,5,6, & 7
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed
- Site Layout Checking Quiz/Assignment
  ABET/Student Outcomes: k,
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed
- 3 Drafting Qualifier Assignments (File Set-up and Inroads)
  ABET/Student Outcomes: a, CET Criteria: 6,
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed
- Horizontal & Vertical Curve Quiz or Exam Problems
  ABET/Student Outcomes: a & f, CET Criteria: 2 & 3
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed
- Site Layout Assignment
  ABET/Student Outcomes: d & f, CET Criteria: 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed
- Highway Standards Exam Problems
  ABET/Student Outcomes: CET Criteria: 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Site Plans Exam Problem
  ABET/Student Outcomes: CET Criteria: 7
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Site Dimensioning Exam Problem
  ABET/Student Outcomes: CET Criteria: 5
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Highway Plan Reading Exam Problem
  ABET/Student Outcomes: a, CET Criteria: 7
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Site Plans Reading Qualifier Exam
  ABET/Student Outcomes: a, CET Criteria: 7
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-2060 Construction Estimating**

- Final Cost Estimating Project
  ABET/Student Outcomes: f, CET Criteria: 2,3,4,7,8 & 11,
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-2110 Materials Testing**

- Concrete Mix Design & Compressive Strength Lab Reports
  ABET/Student Outcomes: a, c & e CET Criteria: 2,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- ACI Field Testing Technician – Grade 1 Certification
  ABET/Student Outcomes: b, c & k CET Criteria: 4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Final Exam
  ABET/Student Outcomes: a, c & e CET Criteria: 2,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-2220 Soil Mechanics**

- Proctor and Soil Compaction Lab Reports
  ABET/Student Outcomes: a, c & e CET Criteria: 2,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Unconfined Soils Compression Lab Reports
  ABET/Student Outcomes: a, c & e CET Criteria: 2,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Differential Settlement Calculation Problems
  ABET/Student Outcomes: a, CET Criteria: 2,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-2250 Structural Design**

- Wood Column, Beam & Truss Exam Problems
  ABET/Student Outcomes: a, b, d & f, CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Steel Beam, Bearing Plate and Column Exam Problems
  ABET/Student Outcomes: a, b, d & f, CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3010 - Architectural CADD**

- Written & Graphical Midterm Exam
  ABET/Student Outcomes: a,b & g, CET Criteria: 1, 5, & 6
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Written & Graphical Final Exam
  ABET/Student Outcomes: a,b & g, CET Criteria: 1, 5, & 6
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- BIM Case Study
  ABET/Student Outcomes: j,
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3020 - Sustainable Design & Construction**

- LEED Project Case Study
  ABET/Student Outcomes: a,d &j, CET Criteria:3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Design Vignette
  ABET/Student Outcomes: a,d &j, CET Criteria:3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3120 Advanced Construction Materials**

- Pavement Design Project
  ABET/Student Outcomes: a,b,d, e, f, CET Criteria:3,4 & 8
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3160 Contracts & Specifications**

- Construction Contract Cases
  ABET/Student Outcomes: g, CET Criteria: 1, 8, & 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Midterm or Final Test questions on General Conditions
  ABET/Student Outcomes: g, CET Criteria: 1, 8, & 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3210 Survey Applications**

- Final Topography Collection Project
  ABET/Student Outcomes: a, e, f & g, CET Criteria: 1 & 9
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Survey Field Book Grade
  ABET/Student Outcomes: a, e, f & g, CET Criteria: 1 & 9
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Metes & Bounds Interpretation Problem
  ABET/Student Outcomes: a & f, CET Criteria: 2
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-3220 Hydrology & Hydraulics**

- Bernoulli Application Quiz
  ABET/Student Outcomes: b, CET Criteria: 2
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Storm Sewer and Culvert Design Projects
  ABET/Student Outcomes: a, d (Sewer), e, f , CET Criteria: 3
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- E&SC Plan Final Exam Problem
  ABET/Student Outcomes: j, CET Criteria: None
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**CET-4250 Advanced Structural Design**

- Masonry Wall Design Project
  ABET/Student Outcomes: a,b,d,e & f,CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed
- Reinforced Concrete Floor Slab & Beam Design Project
  ABET/Student Outcomes: a,b,d,e & f,CET Criteria:2,3,8 & 10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed
- Reinforced Concrete Column Design Project
  ABET/Student Outcomes: a,b,d,e & f,CET Criteria:2,3,8 & 10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed
- Concrete Formwork Design Project
  ABET/Student Outcomes: a,b,d,e & f,CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

**CET-4350 Soils, Foundations & Earth Structures**

- Shallow or Deep Foundation Problem
  ABET/Student Outcomes: a, b, d & f, CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

- Retaining Wall Design Problems
  ABET/Student Outcomes: a, b, d & f, CET Criteria: 2,3,8 &10
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

- OSHA Excavation Regulation Problems
  ABET/Student Outcomes: a, CET Criteria: 3, 8 & 10 Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

**CET-4460 Construction Management & Scheduling**

- Final Project Schedule
  ABET/Student Outcomes: a & g, CET Criteria: 1 & 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

- Midterm or Final Test on of CPM, time reduction, resource management project cost, and PERT.
  ABET/Student Outcomes: a,g CET Criteria: 1 & 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90% of Students
  Instructor Analyzed

**ENGT-2000 Professional Development (CET student scores only)**

- Resume' Second Draft Improvement
  ABET/Student Outcomes: k, CET Criteria: None
  Satisfactory Threshold Score:
  50% score improvement over 1st Draft
  Attainment Level: 80% of Students
  Instructor Analyzed

- Life Long Learning Quiz
  ABET/Student Outcomes: h, CET Criteria: None
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Engineering Ethics Case Study Essay
  ABET/Student Outcomes: i, CET Criteria: None
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Engineering Ethics Final Exam Problems
  ABET/Student Outcomes: i, CET Criteria: None
  Attainment Level: Cumulative 80% of Question Set Answered Correctly
  Instructor Analyzed

- Communications Final Exam Problems
  ABET/Student Outcomes: g, CET Criteria: None
  Attainment Level: Cumulative 80% of Question Set Answered Correctly
  Instructor Analyzed

- Diversity Final Exam Problems
  ABET/Student Outcomes: i, CET Criteria: None
  Attainment Level: Cumulative 80% of Question Set Answered Correctly
  Instructor Analyzed

**ENGT-3600 Engineering Economics**

- Analytical Final Exam Problem
  ABET/Student Outcomes: f, CET Criteria: 2
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Replacement Analysis/Economic Service Life Problem
  ABET/Student Outcomes: a & f, CET Criteria: 2 & 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

- Economic Analysis Project
  ABET/Student Outcomes: a, f & g CET Criteria: 11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 80% of Students
  Instructor Analyzed

**ENGT-4050 Senior Project Capstone**

- Final Project Presentation
  ABET/Student Outcomes: a, b, d*, e, f & g
  CET Criteria: 1,3,4,5,7,8 &11
  Satisfactory Threshold Score: 80% (B Grade)
  Attainment Level: 90 %
  Director Analyzed
  *Advisors to break out scores for design (Outcome d)

## EBI Senior Exit Survey

- Exit Interview
  ABET/Student Outcomes: a-k
  Attainment Level: Averages will not significantly trail the peer groups surveyed.

## CET Graduate & Employer Surveys

- Various
  ABET/Student Outcomes: a-k
  CET Criteria:4,6,9,10,11
  Attainment Level: Average of all Annual Attainment Level: Difference between perceived importance and preparedness will not be more than -0.5.

## Co-op Student & Employer Surveys

- Various
  ABET/Student Outcomes: a-j
  Attainment Level: The number of affirmative responses will exceed 70% for all categories.

## Construction Engineering Technology
## Graduate Questionnaire (3 or 6 Year Alum)

Name: Graduation Year:
Contact Information: E-Mail:

Positions Held (List most current First): Salary Code History

| | Position | Employer | Dates | 1 yr, 3yrs, 6yrs |
|---|---|---|---|---|
| 1. | _____ | _____ | _____ | ___ ___ ___ |
| 2. | _____ | _____ | _____ | ___ ___ ___ |
| 3. | _____ | _____ | _____ | ___ ___ ___ |

**Salary Code: A) <$30,000 B) $30,000 - $40,000 C) $40,000 - $50,000**
**D) $50,000 - $60,000 E) $60,000 - $70,000 F) $70,000 - $80,000 G) >$80,000**

Check the type of industry in which you are currently employed:

___ General Contractor/Construction Mgr. ___ Design Consultant
___ Construction Component Sales/Manufacturing ___ Governmental Agency
___ Specialty Contractor (ME, Conc., Etc.) ___ Facilities Mgmt./Owners Rep./PM
___ Highway/ Utilities Contractor ___ Testing Laboratory ___ Other (Explain)

Looking back, how relevant was your educational preparation in the CET program to the type of work you have been doing in this industry?

__ Excellent, __ Good, __ Average, __ Marginal, __ Poor, __ No Opinion

**Rank** each curriculum area as it has been most helpful to you.
(Assign all of the areas a ranking 1-6 with 1= Most to 6= Least Helpful, **using each # only once**.)

__ Project Mgmt., __ Surveying, __ Graphics, __ Materials, __ Structural, __ Eng. Design

**Rate** how well prepared by the CET program you were in the following skills as they pertain to your current position. (1= Poor to 5= Excellent) ___ Engineering Skills, ___ PM Skills, ___ Written Communications, __ Verbal Communications, ___ Teamwork, ____ Ethics.

Have you progressed in your position; gaining responsibility and leadership roles? Yes / No

Have you continued your education by (check all that apply) : ___ Reading professional journals, __ Attending professional conferences, ___ Taking professional courses, ___ Attempting to obtain an advanced degree, ___ Teaching or training in your organization?

Professional Registration/Certification

| Type | Year Passed | # of Attempts | State | Comments/Type |
|---|---|---|---|---|
| FE/PE | _____ | _____ | ____ | |
| AIC-CPC | _____ | _____ | ____ | |
| LEED-AP | _____ | _____ | ____ | |
| Other | _____ | _____ | ____ | |

Any additional comments on what you think we should be adding to our program regarding new methods, technology or subjects? Please let us know. Thank you.

# Construction Engineering Technology Graduate
# Employer Questionnaire (3 or 6 Year Alum)

In order to assess the abilities of our graduates, as their immediate supervisor, we would ask you to please complete this survey with regard to the following graduate of the University of Toledo Construction Engineering Technology Program. Please return this form to us through the graduate for which you are providing the review. Thank you.

Graduate Name: _____

Company Name: _____

Your Name & Job Title: _____

How long have you supervised this employee? _____

Would you hire another UT CET graduate in your company given the opportunity?

Yes No Why?

Rate how well prepared the CET graduate is in the following skills as they pertain to you're their current position. (1= Poor to 5= Excellent or NA = not applicable)

___ Engineering Skills
___ Project or Construction Management Skills
___ Written Communications
___ Verbal Communications
___ Teamwork
___ Ethics

Has the graduate progressed in their position while at your company? Yes / No / Somewhat

Gained responsibility? Yes / No / Somewhat

Taken leadership roles? Yes / No / Somewhat

Has the graduate shown evidence of being innovative? Yes / No / Somewhat

Has the graduate shown evidence of being a problem solver? Yes / No / Somewhat

Are there any skills or knowledge base that would have better prepared this graduate for successful employment in your company?

Thank you!!

# Construction Engineering Technology
# Graduate Questionnaire (1 Year Alum)

Name: Degree: BSCET Year:

Contact Information: E-Mail:

Positions Held (List Most current First):

| | Position | Employer | Dates | Salary Code |
|---|---|---|---|---|
| 1. | _____ | _____ | _____ | _____ |
| 2. | _____ | _____ | _____ | _____ |
| 3. | _____ | _____ | _____ | _____ |

Salary Code: A) $20,000 - $30,000 B) $30,000-$40,000 C) $40,000 -$50,000
D) $50,000 - $60,000 E) $60,000 -$70,000 F) >$70,000

Contact information for current supervisor:

Check the type of industry in which you are currently employed:

___ General Contractor/Construction Mgr.
___ Building Component Manufacturing
___ Proprietary Systems Contractor
___ Highway Contractor
___ Design/Build Contractor
___ Design Consultant
___ Governmental Agency
___ Utilities Contractor
___ Testing Laboratory
___ Other (Explain)

How relevant to the type of work you have been doing in this industry was your education in the CET program?

Excellent __, Good __, Average __, Marginal __, Poor __, No Opinion __

Compare your education with those of your peers and co-workers from other schools.

Much Better __, Better __, Similar __, Worse __, Much Worse __, No Opinion __

Have you sought registration or certification from any professional organization? (State Board of Registration, American Institute of Constructors, etc.) When did you attempt registration? What was the result of your attempt?

Have you continued your education by taking other degrees or certification courses?

Considering the following major subject areas that the CET program emphasizes in its curriculum, rate **(from 5 being the highest to 1 being the lowest)** your perception as to the importance of each category in your current career position and how well prepared you were to work in each area because of the education you received in the UT CET Program. (Were you able to step right into the tasks you were handed or did it take additional training and education?)

| Curriculum Area | Perceived Importance | Educational Preparedness | Comments on Items Well Prepared/Lacking |
|---|---|---|---|
| Survey Applications | ____ | _____ | |
| Project Management | ____ | _____ | |
| Materials | ____ | _____ | |
| Graphics/Plan Preparation | ____ | _____ | |
| Structural Design | ____ | _____ | |

Considering the following 11 criteria that ABET requires of graduates in programs to which it gives accreditation, rate **(from 5 being the highest to 1 being the lowest)** your perception of the importance of each item and how well prepared you were in each of these areas because of the education you received in the UT CET Program.

| Perceived Importance | Educational Preparedness | |
|---|---|---|
| _____ | _____ | An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities. |
| _____ | _____ | An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies. |
| _____ | _____ | An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes. |
| _____ | _____ | An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives. |
| _____ | _____ | An ability to function effectively as part of a team. |
| _____ | _____ | An ability to identify, analyze, and solve broadly-defined engineering technology problems. |

| | | |
|---|---|---|
| _____ | _____ | An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature. |
| _____ | _____ | An understanding of the need for and an ability to engage in self-directed continuing professional development |
| _____ | _____ | An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity. |
| _____ | _____ | A knowledge of the impact of engineering technology solutions in a societal and global context. |
| _____ | _____ | A commitment to quality, timeliness, and continuous improvement. |

Considering the criteria to which you responded above, describe your ability, knowledge and understanding pertaining to your educational preparedness when viewing a recent project that you have been involved in at your place of employment. What were you well prepared for? What were you not prepared for?

Looking back at your educational experience, what if anything would you modify in the CET program that would have helped you more in your career?

Add courses in: _____

Delete courses in : _____

Improve lab & equipment in : _____

Improve instruction in: _____

Improve advising & Counseling in: _____

Additional Comments:

# Construction Engineering Technology Graduate
# Employer Questionnaire (1 Year Alum)

In order to assess the abilities of our graduates, as their immediate supervisor, we would ask you to please complete this survey with regard to the following graduate of the University of Toledo Construction Engineering Technology Program. Please return this form in the self-addressed stamped envelope provided to the graduate. Thank you.

Graduate Name: _____

Business Name: _____

Business Address: _____

_____

Your Name & Job Title: _____

How long have you supervised this employee? _____

Would you hire another UT CET graduate in your company given the opportunity?

Yes No Why?

Considering the following major subject areas that the CET program emphasizes in its curriculum, rate (**from 5 being the highest to 1 being the lowest)** your perception as to the importance of each category in their current career position and how well prepared they are to work in that area as a result of their education in the UT CET Program. (Was the employee able to step right in to the tasks handed them or was additional training required?)

| Curriculum Area | Perceived Importance | Educational Preparedness | Comments on Items Well Prepared/Lacking |
|---|---|---|---|
| Survey Applications | ____ | _____ | |
| Project Management | ____ | _____ | |
| Materials | ____ | _____ | |
| Graphics/Plan Preparation | ____ | _____ | |
| Structural Design | ____ | _____ | |
| Overall | | _____ | |

Considering the following 11 criteria that ABET requires of graduates in programs to which it gives accreditation, rate **(from 5 being the highest to 1 being the lowest)** your perception of the importance of each item and how well prepared this employee is in each of these areas because of the education they received in the UT CET Program.

| Perceived Importance | Educational Preparedness | |
|---|---|---|
| _____ | _____ | An ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities. |
| _____ | _____ | An ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies. |
| _____ | _____ | An ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes. |
| _____ | _____ | An ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives. |
| _____ | _____ | An ability to function effectively as part of a team. |
| _____ | _____ | An ability to identify, analyze, and solve broadly-defined engineering technology problems. |
| _____ | _____ | An ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature. |
| _____ | _____ | An understanding of the need for and an ability to engage in self-directed continuing professional development |
| _____ | _____ | An understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity. |
| _____ | _____ | A knowledge of the impact of engineering technology solutions in a societal and global context. |
| _____ | _____ | A commitment to quality, timeliness, and continuous improvement. |

Additional comments on the educational preparedness of this employee: