Outcome Assessment Plan

(ABET Student Outcomes 1-7)

Civil Engineering Program
College of Engineering & Petroleum
Kuwait University

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Contents

1 Civil Engineering Program Mission, Vision, and Objectives

1.1 Mission

The mission of the Civil Engineering (CE) program is to serve the people of the State of Kuwait by providing a broad and high-quality education to its students for a successful professional career, to conduct strong basic and applied research for national needs, and to serve the industry, civil engineering profession, and community at large through innovative solutions, dissemination of knowledge, and advancement of civil engineering in major areas of the profession.

1.2 Vision

The vision of the CE program is to establish an outstanding program of regional and international reputation for providing a quality engineering education, excellent research and services to the profession and the community; to produce top-quality civil engineers; and to employ principles of continual quality improvement to enhance its program.

1.3 Program Educational Objectives (PEOs)

The educational objectives of the CE program are to produce graduates who will:

1. Engage in professional careers in a broad range of civil engineering areas in public and private sectors in Kuwait, or successfully pursue advanced studies and careers in academia or in other research environments.
2. Advance in responsibility and leadership in their careers and engage in continuous professional development to respond to rapidly evolving technological and social challenges.
3. Contribute to the welfare of society and the development of the profession through responsible practice of engineering and involvement in professional organizations.

These objectives are published in the undergraduate catalogue and at the following website:
http://www.eng.kuniv.edu/civil/?com=content&act=view&id=691

2 Program Constituents

The constituents of the Civil Engineering program include:

i. Students
ii. Faculty
iii. Alumni
iv. Employers

Additional constituents considered as well qualified entities to provide useful input for the educational objectives and program outcomes include:

- Industrial Advisory Board,
- Student Advisory Council, and
- Local chapters of professional societies.

Table 2.1 Summarizes the Program Constituents and the Modes of Interacting with and Receiving feedback from them.

Table 2.1. Constituents of CE program.

Constituent	Feedback Mode	Frequency
Students	• Exit surveys • Meetings with Student Advisory Council	• Every semester • Twice annually
Faculty	• Instructor Class Evaluation Form (ICEF) • Samples of student work • Teaching Area Group (TAG) evaluations/assessments • Reports from CE assessment coordinator • Reports of Undergraduate Program Committee (UPC) • Faculty survey	• Every semester • Every semester • Annual • Annual • Annual • Every two years
Alumni	• Alumni Survey	• Every three years
Employers	• Employer Survey	• Every three years
Industrial Advisory Board	• Meetings and feedback	• As needed. Minimum every three years
Professional Societies	• Conferences /seminars	• As needed. Minimum every three years

As shown in Table 2.1, the input/feedback received from the constituents provides the basis for evaluating and assessing if and how these objectives meet the needs of the constituents of the CE program.

Because the program educational objectives are expected to meet the local and regional workforce demand and the professional aspirations of our alumni, the needs of employers of our graduates and those of our graduates are gauged via alumni and employer surveys conducted every three and four years, respectively. The feedback received from these surveys by and large affect how the program objectives are designed to meet their needs. Further, CE faculty surveys carried out anonymously online at: **http://www.eng.kuniv.edu/oaa/faculty**
every two years, and periodic meetings and discussions held on an as-needed basis with an Industrial Advisory Board (IAB) also provide us with additional feedback in reviewing and revising the program objectives.

3 Processes of Review / Revision to PEO

The process of assessing and revising the program's educational objectives considers several expectations and/or constraints. Firstly, they are to be consistent with the institutional mission. Secondly, they are to help develop skills to assure that the graduates of the program can pursue successful professional careers in industry and/or academia. Thirdly, the objectives are expected to be correlated with ABET 2025 Criterion 3 in terms of the educational outcomes. Last but not least, they are to represent a reasonable consensus on a wide range of opinions as to the relative importance of the skills/outcomes that the constituents of the program perceive as being important to their careers, both professionally and as members of the society. Thus, the process for the assessment and revision of PEOs are guided by the input/feedback received mainly from the alumni of the CE program and their employers at various stages of the periodic assessment and revision process.

The flow chart in Exhibit 1 summarizes the steps followed in establishing the program educational objectives (PEOs) as they presently stand.

At the initial stage of the review-revision process, a draft of the educational objectives is first prepared by the CE Undergraduate Program Committee (UPC), guided by the institutional mission statement, previous ABET reviews of the CE program and the relevant results and statistics observed in the latest employer and alumni surveys.

The first draft of program objectives is then communicated to the CE Faculty, External Advisory Council (EAC), and employers and CE alumni via surveys for their comments and feedback. A second draft reflecting the feedback received from these constituents is then prepared by UPC for review and approval by the CE Faculty Council and the college.

The second draft subsequently prepared by UPC incorporating the comments and recommendations received from all the aforementioned constituents is then conveyed to the College Undergraduate Program Committee for discussion, comments, possible revisions and approval.

As a last step, a second alumni survey is conducted to gauge the relevance and importance of the revised educational objectives to the professional careers, experiences, and accomplishments of the CE alumni to arrive at the final form of PEOs. Whenever needed, the same process is also utilized as a periodic review-revision-feedback loop to improve or update the program objectives.

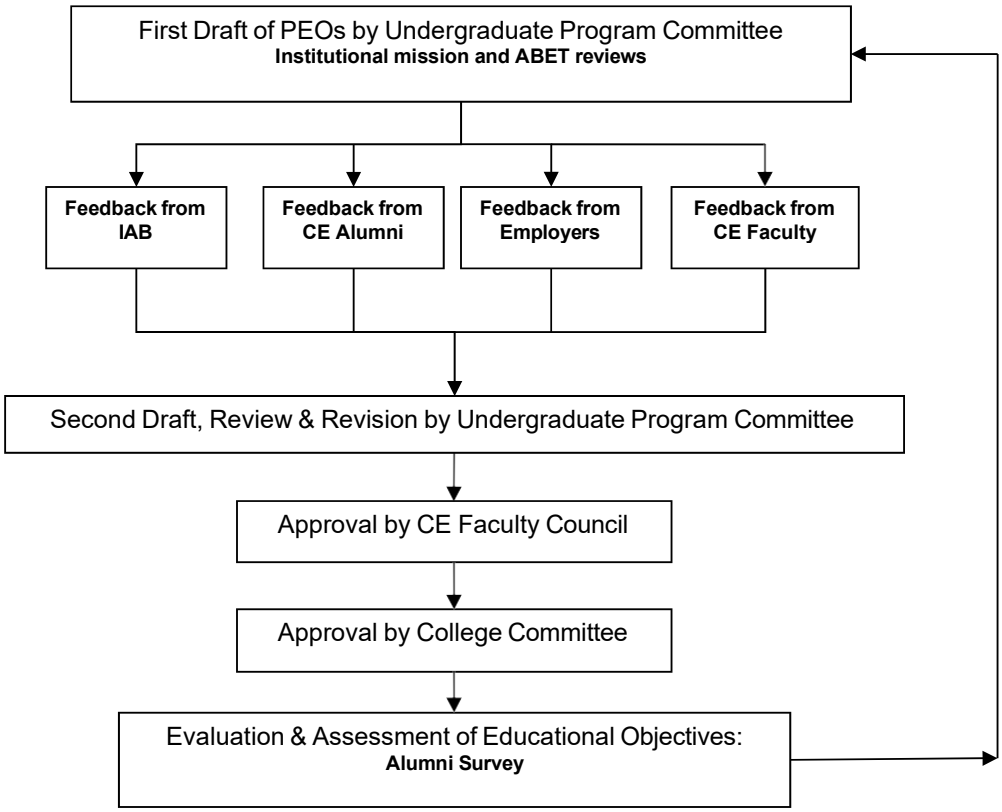

Exhibit 1. Flow chart describing the process in establishing and revising program educational objectives.

4 Student Outcomes

4.1 Student outcomes consistent with ABET

Graduates of the Civil Engineering program shall demonstrate achievement of the following outcomes that are consistent with ABET outcomes 1 - 7 in the shown order:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

4.2 Relationship Between Student Outcomes and Program Educational Objectives

The relationship of the seven student outcomes to program educational objectives and the CE curriculum is shown in Table 4.1.

Table 4.1. Relationship Between Program Educational Objectives and Student Outcomes

CE/ ABET	Student Outcome	Program Educational Objectives		
		1	2	3
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	√		
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	√	√	
3	An ability to communicate effectively with a range of audiences		√	
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			√
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.		√	
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	√		
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies		√	

4.3 Relationship between CE courses and student outcomes

Table 4.2 lists the contribution of various courses in meeting student outcomes using the weights H, M or L. Explanation of weights H, M or L is provided in the following:

H: Indicates that demonstrating this knowledge or skill in the course is critical for the overall aggregate performance of the student, i.e., it is one of the most important outcomes of the course. In teaching practice, it means: 1) Provide formal instruction, 2) opportunities to develop and demonstrate the skill, and 3) formal assessment.

M: Indicates that demonstrating this knowledge or skill in the course has considerable impact on the overall aggregate performance of the student. In teaching practice, it means: 1) Provide indirect instruction, 2) opportunities to develop and demonstrate the skill, and 3) formal assessment.

L: Indicates that demonstrating this knowledge or skill in the course has only a minor impact on the overall aggregate performance of the student. In teaching practice, it means: 1) Provide opportunities to demonstrate the skill, and 2) informal assessment.

Table 4.2: Civil Engineering Curriculum and Student Outcomes Matrix (1 – 7)

TAG	Course No.	Course Name	Student Outcomes						
			1	2	3	4	5	6	7
CORE ENG.	ENGR 202	Statics	M		M				
	ENGR 204	Strength of Materials	H	M					L
STRUCTURE	CE 252	Engineering Materials	L	M	L	L		H	
	CE 271	Structural Analysis I	H		H	L			
	CE 371	Structural Analysis II	H		M				L
	CE 373	Reinforced Concrete I	M	H	H	M			L
	CE 471	Steel Design I	H	H	L	L	L		M
	CE 473	Reinforced Concrete II	M	H	H				L
	CE 475	Pre-stressed Concrete	H	H	L	M	L		L
	CE 476	Computer Appl. in Structural Eng.	M	H	H	L	M		L
TRANSPORTATION	*CE 235	Geomatics Engineering	M		L	L	M	H	M
	CE 366	Transportation Engineering	H	M	L	L	L	M	L
	CE 461	Traffic Engineering	H	M	M	M	L	M	L
	CE 462	Traffic Control Systems	H	H	M	M	M	M	L
	CE 463	Highway Materials & Construction	M	H	L	M	M		
	CE 464	Urban Transportation Planning	H		M	L	M	M	
	CE 465	Pavement Design	M	H	L	M	M		
WATER RESOURCES	CE 310	Fluid Mechanics	H	L					
	CE 311	Water Resources	H	M	L	L	M	H	
	CE 412	Open Channel Hydraulics	H	M	L				L
	CE 413	Groundwater Hydraulics	H	M	L	L	L		L
	CE 414	Hydraulic Engineering	H	H	M		M		H
	CE 429	Groundwater Contamination	H			M			M
ENVIRONMENTAL	CE 210	Ecology & Environment Systems	H		L	M	L		
	CE 312	Environmental Engineering	H	H	L	L	L	H	
	CE 411	Water & Wastewater Treatment	H	H	M	L	M	L	M
	CE 419	Environmental Pollution Control	H	H	H	M	M	H	L
	CE 425	Computer Appl. In water Resources & Environmental Engineering	H	H	M		M		
	CE 454	GIS & Remote Sensing in Eng. Applications	M		M	H	L	L	
	CE 456	Sustainability & Green Engineering	M	H	M	H	L		M
COASTAL	CE 401	Coastal Engineering Fundamentals	H	L	M	L	L	H	L
	CE 403	Coastal Processes & Modeling	H	H	M	M	M	M	H
CONSTRUCTION MNGMT.	CE 430	Legal, Professional & Social Aspects			H	H	H		H
	CE 434	Const. Estimation & Cost Control	H	H					M
	CE 435	Construction Engineering Management	M	M	H		M		H
	CE 436	Construction Work Improvement	H		H	M	H		M
	CE 437	Concrete Const. & Technology	H	H	M	M	M		M
	CE 449	Civil Engineering Systems	H	H			M		H
GEOTECH.	CE 350	Soil Mechanics	H	L	L		L	H	L
	CE 451	Foundation Engineering	H	H	L	L	M	L	L
	CE 452	Earth & Earth Retaining Structures	H	H	L		M	L	L
	CE 455	Computer Appl. in Geotech. Eng.	H	H	L		M	L	H
DESIGN	CE 201	Introduction to Design	M	H	H	M	M		M
	CE 490	Capstone Design	L	H	H	M	M		M
GENERAL	CE 395	Engineering Training	L	L	M	L	H		L

Key:

(1) Apply fundamentals to solve engineering problems, (2) Design, (3) Communication,
(4) Ethical/professional responsibility, (5) Teamwork, (6) Laboratory work, (7) Self / Lifelong learning.
H = High ; **M** = Medium; **L** = Low

*Note: From the next academic year 2023-2024, for the new batchesCE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)

5 Assessment of Student Outcomes

Student outcomes are assessed in two ways: (1) Direct assessment and (2) Indirect assessment.

5.1 Direct Assessment

Direct assessment of student outcomes is based on evaluation done by the Civil Engineering faculty and includes the following items:

5.1.1 Instructor Course Evaluation Form (ICEF)

ICEF is an online form that provides a summary evaluation of student outcomes by the instructor in a course. Instructors are encouraged to provide feedback on student performance and any logistical difficulties faced during the course in the comments sections. As ICEF is the building block of student outcome assessment, therefore it is mandatory to submit ICEF for every section of a course and for all courses in the department. In any case the TAG coordinators should ensure that the minimum number of ICEFs are submitted as noted in Section 7.

5.1.2 Course portfolios

Course portfolios with samples from homeworks, quizzes, tests, exams, projects reports, term papers etc. showing that the curriculum is fully covered, and students possess the appropriate outcome attributes.

Course portfolios should be prepared with appropriate evidence according to the schedule in Section 7 after the end of each semester.

As per the Course Classification Form (Table 4.2), if the rating for the student outcome is **H**igh or **M**edium, the supporting evidence should be prepared according to Table 5.1.

Table 5.1: List of Evidences required for H & M Ratings of Student Outcomes

Outcome No.	***Description***	***Evidences required***
1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	Homeworks, exams, quiz, project report
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	Homeworks, exams, quiz, Project progress, Project report (emphasizing design problems), Rubrics if needed

Table 5.1: List of Evidences required for H & M Ratings of Student Outcomes

Outcome No.	*Description*	*Evidences required*
3	An ability to communicate effectively with a range of audiences.	Examples of student presentations, lab reports, project reports, faculty evaluation for oral & written presentations.
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	Include evidences addressing ethical issues. Include evidences showing the impact of engineering solutions on safety, health, welfare and the well-being of the society and the environment.
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	Group work, evaluation reports showing contributions of team members, team work log sheet, end-of-project reflection on their team work experience.
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Homeworks, exams, quiz, Project report, Lab reports.
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Evidences should include student work showing information seeking library search, internet search. Evidences showing student participation in professional societies, seminars etc.

These evidences shall be compiled in a course folder according to the requirements presented in Table 5.2 for each Civil Engineering course. Please refer to Section 7 for the procedure and requirements of evidence preparation and statistical assessment of level of attainment of each student outcome.

Table 5.2: Evidence for Course folder collection

TAG	Course #	Course Name	**Provide copy of:** [Course Description & Course Classification Form] – ***by OA office*** [Instructor Course Evaluation Form, Final Grades, Course Syllabus] + [following items] – ***by the Instructor***
CORE	ENGR 202	Statics	Homeworks, Quiz, Mid-term Exams, Final Exam.
	ENGR 204	Strength of Materials	Homeworks, Quiz, Mid-term Exams, Final Exam.
STRUCTURE	CE 252	Engineering Materials	Homeworks, Quiz, Mid-term Exams, Final Exam, Lab reports, Lab exam.
	CE 271	Structural Analysis I	Homeworks, Quiz, Mid-term Exams, Final Exam.
	CE 371	Structural Analysis II	Homeworks, Quiz, Mid-term Exams, Final Exam, Evidence for use of software tools.
	CE 373	Reinforced Concrete I	Homeworks, Quiz, Mid-term Exams, Final Exam.
	CE 471	Steel Design I	Homeworks, Quiz, Mid-term Exams, Final Exam, Project report, Report evaluation sheet.
	CE 473	Reinforced Concrete II	Homeworks, Quiz, Mid-term Exams, Final Exam
	CE 475	Pre-stressed Concrete	Homeworks, Quiz, Mid-term Exams, Final Exam, Case studies.

Table 5.2: Evidence for Course folder collection

TAG	Course #	Course Name	**Provide copy of:** [Course Description & Course Classification Form] – ***by OA office*** [Instructor Course Evaluation Form, Final Grades, Course Syllabus] + [following items] – ***by the Instructor***
	CE 476	Computer Appl. in Structural Eng.	Homeworks, Quiz, Mid-term Exams, Final Exam, Weekly progress reports, Project reports, Evaluation sheet for teamwork, oral presentation and written project report.
TRANSPORTATION	*CE 235	Geomatics Engineering	Homeworks, Mid-term Exams, Final Exam, Lab reports, Field report and Course project and presentation.
	CE 366	Transportation Engineering	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Lab reports, Lab exam.
	CE 461	Traffic Engineering	Homeworks, Quiz, Mid-term Exams, Final Exam, Project reports, Evaluation sheet for teamwork, oral presentation and written project, Evidence for use of Synchro software.
	CE 462	Traffic Control Systems	Homeworks, Quiz, Mid-term Exams, Final Exam, Evidence for use of Synchro software, Project reports, Evaluation sheet for teamwork, oral presentation and written project.
	CE 463	Highway Materials & Construction	Homeworks, Quiz, Mid-term Exams, Final Exam, Case studies and Project reports, Evaluation sheet for teamwork and written project.
	CE 464	Urban Transportation Planning	Homeworks, Quiz, Mid-term Exams, Final Exam, Project reports, Presentation evaluation reports (oral & written), Evidence for use of software tools, Evidence for review of Journal articles.
	CE 465	Pavement Design	Homeworks, Quiz, Mid-term Exams, Final Exam, Evidence for use of software tools, Case studies and project reports, Evaluation sheet for teamwork and written project.
WATER RESOURCES	CE 310	Fluid Mechanics	Homeworks, Quiz, Mid-term Exams, Final Exam.
	CE 311	Water Resources	Homeworks, Quiz, Mid-term Exams, Final Exam, Lab reports, Lab exam.
	CE 412	Open Channel Hydraulics	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam.
	CE 413	Groundwater Hydraulics	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Case studies.
	CE 414	Hydraulic Engineering	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Project reports, Evidence for usage of computer software, Evaluation sheet for presentation, teamwork and written project.
	CE 429	Groundwater Contamination	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Case studies.
ENVIRONMENTAL	CE 210	Ecology & Environment Systems	Homeworks, Quiz, Mid-term Exams, Final Exam, Reports on case studies addressing ethical issues, Evaluation sheet for written report.
	CE 312	Environmental Engineering	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Lab reports, Lab exam, Project reports, Evaluation sheet for written report.
	CE 411	Water & Wastewater Treatment	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Case studies, Project reports, Evidence for use of software tools, Evaluation sheet for teamwork, oral presentation and written report.
	CE 419	Environmental Pollution Control	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Presentation evaluation reports, Project reports, Case studies.
	CE 425	Computer Appl. In water Resources & Environmental Engineering	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Evidence for use of software tools, Presentation evaluation reports, Project reports.
	CE 454	GIS & Remote Sensing in Eng. Applications	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Computer assignments, Project report, Evaluation sheet for teamwork, oral presentation and written project.
	CE 456	Sustainability & Green Engineering	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Project report, Evaluation sheet for teamwork, oral presentation and written project.
COASTAL	CE 401	Coastal Engineering Fundamentals	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam.

Table 5.2: Evidence for Course folder collection

TAG	Course #	Course Name	**Provide copy of:** [Course Description & Course Classification Form] – ***by OA office*** [Instructor Course Evaluation Form, Final Grades, Course Syllabus] + [following items] – ***by the Instructor***
	CE 403	Coastal Processes & Modeling	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Evidence for use of computer software, Reports on case studies and evaluation sheet.
CONST. MNGMT.	CE 430	Legal, Professional & Social Aspects	Homeworks, Quiz, Mid-term Exams, Final Exam, Case studies practicing code of ethics, Project reports, Evaluation sheet for oral presentation, teamwork, and written report.
	CE 434	Const. Estimation & Cost Control	Homeworks, Quiz/Tests, Mid-term Exams, Final Exam, Evidence for use of software tools, Project report, Evaluation sheet for project report.
	CE 435	Construction Engineering Management	Homeworks, Quiz, Mid-term Exams, Final Exam, Lab reports, Evidence for use of software tools, Project reports, Evaluation sheet for oral presentation, teamwork and written report.
	CE 436	Construction Work Improvement	Homeworks, Quiz, Mid-term Exams, Final Exam, Evidence for use of software tools, Reports on site visits, Project reports, Evaluation sheet for oral presentation, teamwork and written report.
	CE 437	Concrete Const. & Technology	Homeworks, Quiz, Mid-term Exams, Final Exam, Reports on field trips.
	CE 449	Civil Engineering Systems	Homeworks, Mid-term Exams, Final Exam, Project reports, Case studies, Evaluation sheet for oral presentation, teamwork and written report, Evidence for usage of computer software.
GEOTECH.	CE 350	Soil Mechanics	Homeworks, Quizzes, Mid-term Exams, Final Exam, Lab reports, Lab exams.
	CE 451	Foundation Engineering	Homeworks, Mid-term Exams, Final Exam, Project reports, Evaluation sheet for teamwork and written report, Case studies.
	CE 452	Earth & Earth Retaining Structures	Homeworks, Mid-term Exams, Final Exam, Project Reports, Evaluation sheet for oral presentation, teamwork and written report, Case studies.
	CE 455	Computer Appl. in Geotech. Eng.	Take home exams, Computer-aided small project reports, Final project reports, Evaluation sheet for oral presentation, teamwork and written report.
DESIGN	CE 201	Introduction to Design	Homeworks, Quiz, Mid-term Exams, Final Exam, Project Report, Evaluation sheet for oral presentation, teamwork and written report, Evidence for addressing ethical issues and professional responsibilities.
	CE 490	Capstone Design	Homeworks, Design Project report, Evaluation sheet for oral presentation, teamwork and written report. Evidence for use of software tools, Evidence for addressing ethical issues, safety & environmental concerns, Information seeking evidence (library & internet search).
GENERAL	CE 395	Engineering Training	Project reports, Evaluation sheet for oral presentation, and written report.

*Note: From the next academic year 2023-2024, for the new batches CE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)

5.1.3 Laboratory notebooks and reports

Laboratory notebooks and reports in which students demonstrate their ability to conduct experiments and analyze and interpret data. Laboratory reports provide direct evidence of students' written communication skills and use of modern equipment and software tools for data analysis.
All courses with laboratory components need to submit laboratory notebooks and reports as evidence of attained student outcomes.

5.1.4 Capstone design reports

Capstone design represents the culmination of the four-year student learning in the Civil Engineering department. The capstone design report succinctly sums up the attainment of nearly all student outcomes and in a way reflects on the overall achievement of student outcomes in the department.

All the direct student outcomes are to be shared & updated by the respective faculty in the below SharePoint link (Common Course Folder Room). Each faculty can access only their own folders and no access is given to anyone else except the designated administrative people.

https://ku365.sharepoint.com/sites/assessmentroom/civil/Shared%20Documents/Forms/AllItems.aspx?id=%2Fsites%2Fassessmentroom%2Fcivil%2FShared%20Documents%2FCourse%20Assessment%20Files%2FAcademic%20Year%202022%2D2023&p=true&ct=1685863330861&or=OWA%2DNT&cid=e55fb2ee%2D9b2c%2De8de%2Db381%2D6255ef3490eb&ga=1

5.2 Indirect Assessment of Student Outcomes

Indirect assessment of student outcomes is done through the following surveys:

5.2.1 Student exit survey

Student exit surveys include student self-assessment and evaluations of and the level of satisfaction on:

- Program outcomes
- Educational environment
- Support services and facilities.

Comments on the student's general educational experience and program outcomes, and his/her suggestions as to how to possibly improve these at Kuwait University and at the program level are also encouraged and sought explicitly.

5.2.2 Alumni survey

Alumni surveys seek evaluations on various skills related to the program outcomes and ask the CE alumni to evaluate:

- Level of preparation they received in these skills/outcomes as students
- Importance of these in employment
- Three skills/outcomes they consider most important for employment.

5.2.3 Employer survey

Employer surveys are conducted once every four years and cover fifteen fields, including

skills, abilities, and attributes that the program and college consider important for its graduates. They solicit employers' evaluations on these as well as their importance in Civil Engineering practice. In addition, the employers are asked to list other attributes that they think the CE program graduates should acquire to:

- Succeed in their future professional careers
- Describe training they provide to entry-level civil engineers, if any
- Compare our graduates to those from other universities
- Comment on the particular strengths of the program
- Address areas that may need improvement.

5.2.4 Faculty survey

Faculty surveys are anonymously conducted every two years. They ask the CE faculty members to evaluate:

- Students' level of achievement in the program outcomes
- Importance of the program outcomes to the CE profession
- Quality of support services, facilities, and work environment
- Overall institutional quality

6 Adopted Process for Attainment of Student Outcomes

This section explains the practices adopted in the Civil Engineering department to address student outcomes, assessment methods used and evidences required to fully document attainment of student outcomes.

6.1 Student Outcome 1

"An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics."

6.1.1 Outcome Indicators

- Identify engineering problems that admit analytical formulation and solutions
- Develop analytical models describing the behavior of engineering systems or processes
- Evaluate and interpret model predictions.

6.1.2 Outcome Attributes (Course level outcomes – Measurable)

Students are able to:

1.1 Model and analyze a given engineering problem mathematically using the basic principles of physics, mathematics, chemistry, and engineering science, and identify the principal parameters and variables affecting the nature of the problem,

1.2 Solve an engineering problem using analytical, numerical, graphical, and/or experimental methods, and

1.3 Use modern tools (computer programming, packages, internet download programs, and sophisticated laboratory equipment) in solving engineering problems,

1.4 Demonstrate knowledge of calculus, linear algebra, differential equations, vectors, probability, and statistics in engineering problem solving,

1.5 Demonstrate how knowledge of mathematics and science (physics, chemistry, and biology) together, are used in modeling and understanding of engineering systems.

6.1.3 Practices to Address Outcome Attributes

1.1 : The basic tools to model and solve an engineering problem are provided by the compulsory science courses:

MATH 101	-	Calculus I
MATH 102	-	Calculus II
MATH 111	-	Linear Algebra
MATH 211	-	Calculus III

MATH 240 - Ordinary Differential Equations
PHYS 101 + 105 - Physics I and Laboratory
PHYS 102 + 107 - Physics II and Laboratory
CHEM 101 + 105 - Chemistry I and Laboratory

and by the compulsory engineering courses:

ENGR 104 - Engineering Graphics
ENGR 202 - Statics
ENGR 203 - Dynamics
ENGR 204 - Strength of Materials
ENGR 208 - Engineering Thermodynamics I
ENGR 209 Engineering Economy
ENGR 304 - Engineering Probability and Statistics
ENGR 307 - Applied Numerical Methods and Programming in Engineering

1.2 The design skills in civil engineering disciplines are covered in the following compulsory courses:

CE 201 Introduction to Design
CE 271 & 371 Structural Analysis
CE 366 Transportation Engineering
CE 373 & 473 Reinforced Concrete I & II
CE 312 Environmental Engineering
CE 451 Foundation Engineering
CE 435 Construction Engineering and Management

Additional design skills are taught in civil engineering elective subjects in major disciplines of Civil Engineering at the senior level.

1.3 Computer programming (in MATLAB) is introduced and used in the course:
ENGR 307 - Applied Numerical Methods and Programming in Engineering
In some courses (like CE 373), students have to write their own computer programs.

1.4 Students are introduced to commercially available software tools for modeling, analyzing, and designing various civil engineering systems and components in the following courses:

CE 371 Structural Analysis II
CE 366 Transportation Engineering
CE 312 Environmental Engineering
CE 434 Construction Estimation and Cost Control
CE 435 Construction Engineering and Management
CE 476 Computer Applications in Structural Engineering

Note: ENG205+207 (Electrical Engineering Fundamentals) have been removed from the curriculum.

6.1.4 Assessment Methods and Evidences

1. Students should show that they can identify engineering problems. Problem identification entails two procedures:
   a) The ability to recognize an engineering problem. An engineering problem is an opportunity for change in which engineering solutions can be applied to improve on existing or anticipated conditions; and
   b) The ability to define an engineering problem. Defining a problem means describing, in concrete and specific terms, the existing or anticipated condition that creates the opportunity for change and the goal state(s) that provides the direction and endpoint for change.

2. Students should show that they can employ general principles, theories, concepts, and/or formulas from mathematics, science, and engineering in the solution of problems in civil engineering. For a particular problem, students should demonstrate that they can:
   a) Define and describe the pertinent principle, theory, concept, and/or formula.
   b) Explain why it is appropriate to the problem; and,
   c) demonstrate how it has been applied in the solution of the problem.

3. Student shall demonstrate that they can analyze problems, that is, isolate and describe the important components of a problem: what is given (design specifications, availability of materials, performance requirements, testing standards, etc.); what is known from previous experience relevant to the problem; and what the unknowns are.

4. Students should show that they can represent a problem in a form that makes finding solutions more efficient and effective. Such representations are typically visual, such as a model, flow chart, diagram, or table. This visualization should represent the components of the problem in a way that leads to the construction of a solution.
5. Student shall respond positively, after they have been on the job, to the training and guidance they received at Kuwait University in solving engineering problems.
6. Students shall achieve a positive rating from their employers regarding their ability to solve engineering problems.

Direct and indirect assessment of this outcome is done in accordance with Section 5 as summarized below:

Portfolios: Samples of problem sets and students' brainstorming notes from homework and/or tests in which students show their ability to creatively solve engineering problems. These samples should exhibit students' proficiency at identifying, analyzing, representing, and solving problems.

Faculty survey: Faculty should express satisfaction with students' ability to identify, formulate, and solve engineering problems.

6.1.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of students' performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.2 Student Outcome 2

"An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors."

6.2.1 Outcome Indicators

- Establish objectives of a design project based on needs,
- Define and formulate the design problem based on objectives and constraints,
- Generate ideas and alternative solutions for a given problem,
- Evaluate alternatives to choose the best, and
- Develop a physical or numerical model that represents the best solution.

6.2.2 Outcome Attributes (Course Level Outcomes - Measurable)

Graduates are able to:

2.1: Recognize the need for design of a product or process,

2.2 : Define the problem (goals, objectives, constraints, etc.),

2.3 : Plan the design process,

2.4 : Gather related information, consult codes and standards, and read manufacturers' catalogs,

2.5 : Evaluate the various alternatives, make decision, and justify the selection,

2.6 : Communicate the design and justifications by written reports, engineering drawings, and oral presentations, and

2.7 : Implement and realize the design.

6.2.3 Practices to Address Outcome Attributes

2.1 : In different courses, and at different levels of the curriculum, students are asked to recognize and identify the need for solving open-ended problems and to work on open-ended design projects that stimulate their creativity, originality, and independent thinking.
The design component in the projects is considered as a decision-making process, often iterative, in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet the stated objective.

2.2 : Design procedure and steps to be followed are introduced in various courses such as CE 201, CE 311. CE 312, CE 350, CE 490 etc. In these courses, concepts such as design goals, objectives, constraints, and brainstorming are considered, and also relevance of professional ethics, safety, reliability and environment are presented as well as concepts of standards and codes.

2.3 : In design projects, especially at the senior level, students are asked to familiarize themselves with the various steps involved in the design process of a particular civil engineering field. This is done in the following courses: CE 311, CE 312, CE 373 & 473, CE 350, CE 366, CE 490 etc.

2.4 : students are required to take the following into consideration:

i. Use all resources available to support their work, and among them are computational tools, laboratory equipment, and workshop facilities.
ii. Make decisions about materials, shapes, and dimensions based on standards and codes set by professional organizations.
iii. Select parts that are available in the local market, after studying their integration in the systems designed by them, and after consultation of related standards, professional publications, and manufacturers catalogues.
iv. Study, by themselves, topics that are not included in the curriculum, or that have not been covered in their course of study before their involvement in the project work.
v. Students are encouraged to join professional societies (ASCE, ACI, etc.) and to be active within the local chapters of these societies. This will introduce them to professional publications and to modern engineering tools and practices.
vi. These ideas and practices are developed in the following courses: CE 311, CE 312, CE 373 & 473, CE 350, CE 366, CE 490 etc.

2.5 : It is expected that the students will:

i. Consider various possible alternatives, and to analyze the advantages and/or disadvantages of each possible alternative, considering all requirements and constraints.
ii. Make decisions that should be justified based on detailed analyses using basic sciences, mathematics, and engineering sciences, and on safety, reliability, aesthetic, ethical, social, economic, and environmental considerations.

2.6 : Students will do the following:

i. Write well-documented progress and final reports, including all necessary calculations, analyses and drawings.
ii. Give in-class oral presentations describing the gradual advance in the work and a final public presentation with the participation of all the project team members.

2.7 Design of comprehensive systems is considered in the CE capstone design courses offered in at least five recognized major areas of civil engineering. These courses require, among other things, teamwork, progress and final reports, and oral public presentation.

6.2.4 Assessment Methods and Evidences

In order to determine that students have had substantial design experience, the following capabilities should be demonstrated:

- Show that they can engage productively and creatively in the process of design. Design is a multi-dimensional activity that requires a balance of opposing characteristics: divergent and convergent thinking, synthesis and analysis, aesthetic and utilitarian sensibilities. The process itself is flexible and recursive; that is, designers often find it necessary to skip around among the different phases of the process. It is helpful to think of the design process as defined by the following phases:

    1. Establishing the goal of the design project, the outcome that must be attained.
    2. Defining the project. This phase consists of identifying the criteria for the outcome and the parameters for the project. The criteria are a reflection of the desired needs that the project must meet, the standards against which the success of the outcome will be measured. The parameters are the boundaries within which the designers must work, the materials available, the kinds of expertise that are appropriate, the limitations on cost and time, etc.
    3. Brainstorming for alternative possibilities. These may be possibilities for achieving the outcome of the project or possibilities for finding solutions to immediate problems that come up during the process.
    4. Choosing the best of the possible solutions. This part of the process involves matching possible solutions to criteria. These may be criteria for the outcome of the project established formally earlier in the project or criteria developed informally for more immediate problems.
    5. Creating a prototype or model that embodies or represents the chosen solution.
    6. Testing the prototype or model against the criteria for the project. The results of this testing may send the designers back to any of the above stages.
    7. Choosing and justifying to an appropriate audience the final system, component, or process. Both choosing and justifying must be done in reference to the criteria spelled out for the project outcome.

One good way of determining the extent students understand and can apply the design procedures is to ask them to keep a design notebook for their capstone projects. The steps of the design process can be outlined at the beginning of the notebook and students can keep a running log of their own design processes, using the language and concepts of design to describe the steps that they are using. The instructor of the capstone course can review these notebooks at regular intervals to get an idea of how the students' design project is progressing, and provide feedback as needed.

Portfolios: Final technical reports and other reports and documents related to a design project. Included with these reports and documents will be students' design logs for the project, and teachers' comments on the submitted work.

Videos: Student presentations of their design projects, design posters and close-ups of the posters themselves.

Computer files: Electronic copies of students' computerized analyses and drafting packages associated with the senior design project.

Surveys: as explained in Section 5.

6.2.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.3 Student Outcome 3

"An ability to communicate effectively with a range of audiences"

6.3.1 Outcome Indicators

- Communicate effectively in written form,
- Communicate effectively orally, and
- Communicate effectively in graphical form.

6.3.2 Outcome Attributes (Course Level Outcomes - Measurable)

Students are able to:

3.1 : Present concepts and ideas clearly, logically, and with appropriate balance of textual, tabular, and graphical materials, and are able to explain their observations and findings succinctly,

3.2 : Organize material into appropriate presentational form (written and oral) using correct grammar and appropriate style,

3.3 : Speak clearly & loudly, vary vocal tone and pattern as appropriate to the prevailing conditions, and use the allocated time efficiently

3.4 : Competently respond to questions and comments,

3.5 : Use computer applications and tools to prepare and present their work.

6.3.3 Practices to Address Outcome Attributes

- Oral communication is introduced and developed in the courses:
  ENGL 123 - English (conversation is a major part of this course)

- Oral communication is also developed during discussions in all classes like CE 201 (Introduction to Design), CE 430 (Legal, Professional & Social Aspects), CE 434 (Construction Estimation & Cost Control) etc. Among the requirements of the course CE 490 (Capstone Design) is a public presentation, where each student must present a talk about one task within the project.

- Technical writing is introduced and developed in the course:
  ENGL 221 - Technical writing (students must prepare and present an essay about a technical topic)

- Technical writing skills are developed in written reports required in the laboratory courses like CE 252 (Engineering Materials), CE 311 (Water Resources), CE 350 (Soil Mechanics), CE 366 (Transportation Engineering), CE 435 (Construction Engineering & Management) etc. and in progress and final reports of design projects for courses like CE 312 (Environmental Engineering), CE 451 (Foundation Engineering) etc.

- Graphical presentation of engineering design information is practiced in the courses ENGR 104 (Engineering Graphics), *CE 235 (Geomatics Engineering), CE 252 (Engineering Materials), CE 271 & 371 (Structural Analysis I & II), CE 373 & 473 (Reinforced Concrete I & II), CE 434 (Construction Estimation & Cost Control), CE 435 (Construction Engineering & Management), CE 490 (Capstone Design) etc.

  *Note: From the next academic year 2023-2024, for the new batches CE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)

6.3.4 Assessment Methods and Evidences

In order to demonstrate achievement of communication skills students should:

1. Exhibit a mastery of the forms of discourse appropriate to the profession of engineering: oral and written project proposal, oral and written progress report, technical report, technical presentation, etc. Depending on the form that is used, students should demonstrate that they can:

1. Describe the context (institutional and/or technological) of a problem and the significance of that problem within that context (introduction).
2. Describe clearly and precisely the procedures used to solve the problem (methods).
3. Report both verbally and visually the findings (results).
4. Interpret the findings in a way that is appropriate to the audience (discussion); and
5. Propose recommendations for a solution to the problem and justify that solution persuasively (conclusion).

These five features may be found in the typical technical report or presentation and reflect a way of thinking that is expected of engineers. In many capstone courses, students do most of these kinds of communications:

2. Show that they can summarize technical material in a way that is appropriate to a particular audience. Graduates should demonstrate that they can synthesize their own work and the work of others in the form of abstracts, executive summaries, and literature surveys.

3. Show that they can communicate successfully for obtaining and maintaining productive employment.

- Express confidence, upon graduation, of their ability to communicate effectively in their engineering careers and satisfaction with the guidance and instruction they received in writing and speaking.

- Respond positively, after they have been on the job, to the usefulness and appropriateness of the preparation they received at Kuwait University in oral and written communication.

- Achieve a positive rating from their employers regarding their ability to communicate effectively.

Portfolios: A collection of students' engineering reports, including lab reports, proposals, progress reports, and technical reports. Portfolio should include exhibits of students' ability to summarize technical material: abstract, executive summaries, and literature reviews as well as express themselves orally in a public setting.

Videos: Examples of student presentations: technical reports, proposals, laboratory reports, and mock job interviews.

Exit survey: Students are asked questions about oral and written communication: how confident they are in their preparation to perform capably on the job, their understanding of the kinds of writing and speaking they will be asked to do as professional engineers, the quality of guidance and instruction they received in writing and speaking.

Alumni / Employer / Faculty survey: According to the description of Section 5.

6.3.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.4 Student Outcome 4

"An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts."

6.4.1 Outcome Indicators

- Demonstrate knowledge of professional codes of ethics, and
- Evaluate ethical dimensions of a problem or case.

6.4.2 Outcome Attributes (Course Level Outcomes - Measurable)

Students are able to:

4.1 : Understand and apply the rules and commitments of ethical behavior during the course of their study,

4.2 : Understand the codes of ethics and their application in the engineering profession, and

4.3 : Critically review and properly analyze professional case studies related to ethical issues.

6.4.3 Practices to Address Outcome Attributes

(i) The codes of ethics are introduced in the course CE 201 (Introduction to Design) & developed in CE 430 (Legal, professional, ethical & social aspects of Engineering) with case studies dealing with a wide range of ethical issues, pertinent to the civil engineering profession and practice.

(ii) Students are encouraged to take the elective course ENGR 310 (Engineering Ethics).

(iii) Ethical dilemmas, professional responsibility & legal implications of civil engineering projects are also discussed in the capstone course as applicable.

(iv) Impact of engineering solutions on society and emphasis on public welfare through competent engineering solutions is also emphasized in courses CE 201 (Introduction to Design), CE 252 (Engineering Materials), CE 373 & 473 (Reinforced Concrete Design I & II), CE 456 (Sustainability & Green Engineering) and CE 490 (Capstone Design).

(v) Students are encouraged to study elective courses related to contemporary issues and to the impact of technology on society like 0360-108 (Ethics and Modern Society), 0940-145 (Islam, Science and Technology Issues).

6.4.4 Assessment Methods and Evidences

- Students need to show that they can apply an understanding of ethical responsibility to a design project or a practical situation. This means demonstrating that they can

  1. Identify the ethical issues pertinent to the project.
  2. Generate ethical criteria related to the project
  3. Incorporate those criteria in the justification of the final outcome of the project; and
  4. Argue effectively for responsibility of the engineer for that particular design project in maintaining the optimal balance between the contending forces of utility, cost, and risks.

- Respond positively, after they have been on the job, to the preparation in professional and ethical responsibility they received at Kuwait University.

- Achieve a positive rating from their employers regarding their professional and ethical responsibility.

Portfolios: Final technical reports of design projects or analysis of case histories in which students demonstrate their understanding of professional and ethical responsibility within the context of the project.

Exit survey: Seniors are asked questions about their understanding of the ethical responsibilities of engineers and the extent to which their education at Kuwait University has contributed to that understanding.

Alumni / Employer /Faculty survey: Practices as described in Section 5.

6.4.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.5 Student Outcome 5

"An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives."

6.5.1 Outcome Indicators

- Recognize essential requirements of effective teams, and
- Function effectively in teams to complete a task.

6.5.2 Outcome Attributes (Course Level Outcomes - Measurable)

Graduates are able to:

5.1 : Recognize that the main resources of a team project are the team members with their different personalities and qualifications,

5.2 : Learn to divide assigned duties into sub-tasks and assign the various tasks among the team members according to their capabilities,

5.3 : Recognize and use diversity in personalities, background, and experience to the team's advantage,

5.4 : Support other team members in their tasks, and lead or follow when appropriate to the needs of the team,

5.5 : Play the role of a team leader in one or more of the project tasks,

5.6 : Identify the main goal of the project and the goals of the various tasks, by individual and group brainstorming,

5.7 : Manage time effectively, by preparing a time plan for each task within the original work plan,

5.8 : Identify the parameters involved in the project, to clearly specify them and to understand their inter-relation or influence on each other,

5.9 : Classify the tasks according to their order of priority, and execute them according to this order,

5.10 : Cooperate positively in the work, make evaluation of the work accomplished on a regular basis, accept, and give constructive criticisms, and self-evaluate their performances to improve the cooperation and to overcome any drawback issues,

5.11 : Negotiate alternative approaches with other team members to develop a consensus design solution,

5.12 : Report problems to team leader and members,

5.13 : Prepare and present progress and final reports on assigned duties in the specified time.

6.5.3 Practices to Address Outcome Attributes

- Teamwork is introduced and practiced in all laboratory courses, and especially, in CE 201 (Introduction to Design) & CE 490 (Capstone design courses).

  Besides the cooperation between team members required in the laboratory work and in report writing, some senior courses contain design components that require cooperation in collecting information, in planning, in discussion of alternatives, and in execution.

- Some of the elective courses require teamwork in design projects. In particular, the course CE 395 (Engineering Training) enables students to work in industry with multi-disciplinary teams and working on real-life engineering applications.

6.5.4 Assessment Methods and Evidences

Graduates shall demonstrate that they possess a conceptual understanding of group dynamics, that is, how to make groups work effectively. This conceptual understanding includes:

1. How to create a group climate that encourages success.
2. How to recognize and make effective use of power resources in group activities.
3. How to use communication strategies for dealing productively with conflict.

There are several ways in which students could attain such a conceptual understanding: (1) take a course in the English/ELU department that includes training in group dynamics; (2) receive training from the faculty member directing the capstone course; (3) watch a video on working effectively with groups; (4) attend a workshop sponsored by an engineering professional organization and/or the College. The following capabilities shall be developed:

- Show that they can participate effectively as team members in long-term group projects: working cooperatively with others, accepting divergent views, encouraging active participation of others, dealing productively with conflict, and taking leadership roles as the need arises to accomplish the group's objective.

- Show that they can work successfully with people who are in other fields and those who perform a variety of functions within a group. This means that they must:

  1. Exhibit respect for these people and the diversity they bring to the group.
  2. Accept and incorporate, where appropriate, ideas from people with different perspectives; and
  3. Explain pertinent engineering principles and applications to people who have no training in those principles and applications but who need to make use of them.

Direct Assessment: Assessment data for the two preceding bullets can be obtained by asking students in group projects to evaluate the contributions of all the members of the group, to write an end-of-project reflection on their teamwork experience (describing it and discussing what they learned from the experience), and/or to keep a teamwork log in which they record who does what when.

- Report, upon graduation, positive experiences related to the work they have done in teams. And if those experiences have been negative, they should show that they know what they could have done to make their teams work more productively.

- Respond positively, after they have been on the job, to the training and guidance they received at Kuwait University in working in teams.

- Achieve a positive rating from their employers regarding their ability to work effectively in multi-disciplinary teams.

Peer evaluations: A collection of students' assessment of their team members and their teamwork experience to be turned in after group projects and at the mid-point as well as the end of extended group projects.

Exit survey: Seniors are asked questions about their teamwork experiences in their courses: whether those experiences were positive or negative, what they learned from the experiences about the skills and strategies they could employ to make group work successful, what they know about the conceptual understanding of group dynamics, and their impressions of the instruction and guidance in teamwork they received from their professors. They will also be asked if they've taken the opportunity to attend professional development seminars that focused on teamwork, interpersonal communication, or time management skills.

Other surveys: As outlined in Section 5.

6.5.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.6 Student Outcome 6

"An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions."

6.6.1 Outcome Indicators

- Design experiments or experimental procedures,
- Conduct experiments, and
- Analyze and interpret experimental data.

6.6.2 Outcome Attributes (Course Level Outcomes – Measurable)

Graduates are able to:

6.1 : Use standard experiments for collecting data, required to express physical properties and phenomena,

6.2 : Acquire experimental data accurately, and analyze sources of error and error propagation, calibrate instruments used in experimental measurements,

6.3 : Use of computational tools and specialized codes for the analysis of data collected (i.e., codes for optimization, simulation, or frequency analysis),

6.4 : Analyze and interpret experimental data using engineering principles and appropriate statistical techniques,

6.5 : Write reports and present results in tabular and/or graphical forms using computer software,

6.6 : Plan, design and execute experiments to solve engineering problems.

6.6.3 Practices to Address Outcome Attributes

6.1 : Experimental work is introduced in the following core and civil engineering courses:

PHYS 105	Physics I Laboratory
PHYS 107	Physics II Laboratory
CHEM 105	Chemistry I Laboratory
*CE 235	Geomatics Engineering
CE 252 L	Engineering Materials Laboratory
CE 311 L	Water Resources Laboratory
CE 312 L	Environmental Engineering Laboratory
CE 350 L	Soil Mechanics Laboratory
CE 366 L	Transportation Engineering Laboratory
CE 435 L	Construction Engineering & Management Laboratory

*Note: From the next academic year 2023-2024, for the new batches CE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)
Note: ENG205+207 (Electrical Engineering Fundamentals) have been removed from the curriculum

6.2 : In the CE laboratory courses, data collection, recognition of error sources, analysis of error propagation, statistical analysis of results, curve fitting, discussion, use of spreadsheet, word processing and graphics packages are

required in formal written reports. Instrument calibration is also introduced in most of the CE laboratory courses (CE 235, CE 252 L, CE 311 L, CE 312 L, CE 350 L, CE 366 L, CE 435 L).

6.3 : Report writing is introduced in the course:

ENGL 221 Technical Writing

6.4 : Statistical analysis and curve fitting are introduced in the course:

ENGR 304 Engineering Probability and Statistics

6.5 : Design, planning, and set up of experiments for specific purposes are addressed in the CE laboratory courses (CE 236, CE 252 L, CE 311 L, CE 312 L, CE 350 L, CE 366 L, CE 435 L) where individual, or team projects are assigned to the students.

6.6.4 Assessment Methods and Evidences

In order to demonstrate that students have achieved this outcome, the students are examined for the following capabilities:

- Show that they can take an experimental problem and develop a hypothesis, define the pertinent dependent and independent variables, and establish a sound experimental method that will allow them to measure the variables and test the hypothesis.

- Show that they can conduct an experimental procedure, use laboratory materials properly and safely, carefully note observations in a laboratory notebook, and clearly describe the procedure.

- Show that they can measure and record raw experimental data and analyze those data for the purposes of understanding and explaining the data. Graduates should be able to represent data in both verbal and visual forms (equations, tables, graphs, figures, etc.) in a way that is both an accurate and an honest reflection of the data.

- Show that they can render the data meaningful by discussing the data in the context of the hypothesis and appropriate theories and principles and by stating, clearly and concisely, conclusions that can be drawn from the experiment.

The four bullets in this operational definition match the main parts of a lab report: introduction, experimental set-up, results, and discussion/conclusion. Thus, the lab report provides an excellent way of determining whether or not students have achieved this outcome. Also exit and faculty surveys may be used to find the satisfaction of the parties concerned related to this outcome.

6.6.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

6.7 Student Outcome 7

"An ability to acquire and apply new knowledge as needed, using appropriate learning strategies."

6.7.1 Outcome Indicators

- Recognize the need for life-long learning as an essential requirement,
- Acquire new knowledge/skills independently, and
- Reflect on own understanding and learning.

6.7.2 Outcome Attributes (Course Level Outcomes – Measurable)

Students are able to:

7.1 : Seek intellectual experiences for personal and professional development,

7.2 : Appreciate the relationship between basic knowledge, technological advances, and human needs,

7.3 : Life-long learning as a necessity for professional development and survival.

7.4 : Read and comprehend technical and other materials, and acquire new knowledge independently,

7.5 : Use the library facilities, the World Wide Web, and educational software (encyclopedias, handbooks, and technical journals on CDs).

6.7.3 Practices to Address Outcome Attributes

(i) Students are encouraged to join professional societies and associations such as ASCE, ACI, Kuwait Society of Engineers, etc. and to be directly involved in their activities.

(ii) Students are given reading topics in some courses. They have to read, understand and submit an essay or a homework about these topics.

(iii) In design projects, students have to consult references, codes and standards, technical journals, and manufacturers catalogues. They have also to go through topics or chapters not covered in class.

(iv) Students are encouraged to carry out library searches, on-line search, and Internet search of special engineering sites.

(v) Students are encouraged to communicate with industrial and academic experts by assigning them projects or open-ended problems that require consultation with such experts.

(vi) Students are encouraged to attend engineering seminars and general lectures.

6.7.4 Assessment Methods and Evidences

For those who are presently students, indicators may be pursued that would suggest a desire and ability to pursue further learning. And for graduates, evidence should demonstrate that they are taking advantage of the learning possibilities that present themselves. For example, they should:

- Show that they can use the critical information-seeking tools that enable engineers to continue to stay up to date in their profession: internet resources, engineering journals, patent materials, standards, etc.

- Show that as long as they continue to be employed as engineers, they are actively involved in the profession: membership in an engineering society, achievement and maintenance of technical registration for engineers, involvement in continuing education, etc.

- Express, upon graduation, both a full appreciation for the need for and the motivation to pursue further education and training, both engineering and otherwise, over their lifetimes.

- Show that after graduation they have continued to seek opportunities for further education and training, both engineering and otherwise.

Portfolios: Samples from homework and reports demonstrating students' ability to use the information-seeking tools of engineering & the ability to acquire knowledge independently through self-learning.

Exit survey: Students are asked whether or not they have participated in life-long learning activities on campus and what form that participation took. They are also asked about their perception of the need for life-long learning and their plans to pursue life-long learning related to their professional field--membership in engineering societies, professional certification, graduate education, continuing education, etc.--and non-professional interests.

6.7.5 Performance Metrics

The following performance metrics are used to satisfy the attainment of this student outcome:

1- In relevant courses, the average rating of student's performance on this outcome is 3 or higher.
2- Eighty percent of instructors of sampled courses report student performance on this outcome of 3 or higher.
3- In surveys, the average rating of graduates' performance on this outcome is rated 3 or higher.

7 Procedure for Student Outcome Assessment and Evidence Preparation

This section describes the method adopted for student outcome assessment and evidence preparation. This procedure was explained to the TAG coordinators and faculty through presentation, consultations, and examples from the fall 2017. It was approved by the TAG coordinators in Spring 2018.

7.1 Student outcome assessment procedure

The procedure consists of the steps described below. Details are included in Appendix A.

1- Develop performance indicator(s) (PI) for each student outcome.
2- Design a problem (in quiz, exam, project, or homework) targeting a specific PI and test students for this PI (& outcome).
3- Evaluate student performance using an assessment tool (e.g., grading checklist, rubrics, peer review etc.)
4- Tabulate performance of each student in the said assessment.
5- Find average performance after excluding the data for those students who failed the course.
6- Compare the average to the following thresholds to convert student performance data to outcome assessment data.

Table 7.1: Outcome assessment indicator based on student average.

Class average for students PASSING the course	Outcome assessment indicator	Performance Level
< 60%	1	Very weak
60% - 69%	2	Weak
70% - 79%	3	Satisfactory
80% - 89%	4	Very good
> 90%	5	Excellent

Threshold value of the outcome assessment indicator is set to be 3 by the College. Instructor should flag student performance if the assessment indicator is below 3.

Please note that the above percentage ranges for assigning outcome assessment indicator are not to be applied in the 'hard' sense because the assessment is based on only one assessment task. Instructors can use data from additional tasks or use their judgement to assign the adjusted outcome assessment indicator. Instructor judgement is particularly necessary for classes with low enrollment (< 20) as performance of a few students can significantly skew the average. However, it is expected that this

adjustment should not result in a jump of more than 1 in the final calculated outcome assessment indicator.

7.2 Evidence preparation for student outcome assessment

The faculty need to submit the following as evidence for assessment of a particular student outcome:

1. Performance Indicator (PI) statement of the outcome.
2. Problem with Grading List / Rubric or other performance evaluation tool.
3. List of student performance on the Problem and performance averages.
4. Conversion of performance averages to outcome Indicator and a statement on level of attainment of the outcome.
5. Samples of student work (one each of Best, Average and Worst).

Note: Faculty members opting to withhold submission of student work should make a note that these samples are available with the instructor. However, TAG coordinators shall make sure that at least one submission for each pertinent outcome in an academic year contain samples of student work.

A sample submission is included in Appendix – A.

7.3 Semester-wise plan for student outcome assessment

Student outcomes are assessed mostly through the compulsory courses offered by the CE department. Table 7.2 presents the semester-wise plan adopted for student outcome assessment and evidence preparation for each TAG of the department. This plan can be updated/revised as required or requested by the TAGs in consultation with the OA coordinator.

Table 7.2: Required number of evidence for student outcomes in CE compulsory courses in each semester.

TAG	Course No.	Course Name	Student Outcomes							Total for TAG
			1	2	3	4	5	6	7	
COLLEGE	ENGR 202	Statics	M		M					
		Required No. of evidence for outcomes	1		1					2
	ENGR 204	Strength of Materials	H	M					L	
		Required No. of evidence for outcomes	1	1						2
DESIGN	CE 201	Introduction to Design	M	H	H	M	M		M	
		Required No. of evidence for outcomes		1	1		1		1	4
	CE 490	Capstone Design	L	H	H	M	M		M	
		Required No. of evidence for outcomes		1	2	2	2		2	9
STRUCTURE	CE 252	Engineering Materials	L	M	L	L		H		
	CE 271	Structural Analysis I	H		H	L				
	CE 371	Structural Analysis II	H		M				L	
	CE 373	Reinforced Concrete I	M	H	H	M			L	
	CE 473	Reinforced Concrete II	M	H	H				L	
		Required No. of evidence for outcomes	2	2	2	1		1		8
TRANSPORTATION	*CE 235	Geomatics Engineering	M		L	L	M	H	M	
	CE 366	Transportation Engineering	H	M	L	L	L	M	L	
		Required No. of evidence for outcomes	2	1			1	2	1	7
WATER RESOURCES & ENVIRONMENTAL	CE 310	Fluid Mechanics	H	L						
	CE 311	Water Resources	H	M	L	L	M	H		
		Required No. of evidence for outcomes	2	1			1	1		5
	CE 312	Environmental Engineering	H	H	L	L	L	H		
		Required No. of evidence for outcomes	1	1				1		3
CONST. MNGMT.	CE 430	Legal, Professional & Social Aspects			H	H	H		H	
	CE 435	Construction Engineering Management	M	M	H		M		H	
		Required No. of evidence for outcomes			1	1	1		2	5
GEOTECH	CE 350	Soil Mechanics	H	L	L		L	H	L	
	CE 451	Foundation Engineering	H	H	L	L	M	L	L	
		Required No. of evidence for outcomes	2	1			1	1		5
		TOTAL	**11**	**9**	**7**	**4**	**7**	**6**	**6**	**50**

Student Outcome's Key:

(1) Apply fundamentals to solve engineering problems, (2) Design, (3) Communication,
(4) Ethical/professional responsibility, (5) Teamwork, (6) Laboratory work, (7) Self / Lifelong learning.

*Note: From the next academic year 2023-2024, for the new batches CE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)

7.4 Semester-wise plan for course folder and ICEF submission

Representative samples of course folders are to be prepared by the faculty members each semester to demonstrate curriculum coverage and student performance. Table 7.2 presents the semester-wise plan adopted for course folder preparation and ICEF submission for each TAG of the department. Ideally, ICEF should be submitted for each section of all courses. However, in the light of submissions in the past, it is required that the TAGs should submit the minimum number of ICEFs as listed in Table 7.3.

This folder / ICEF submission plan can be updated/revised as required or requested by TAGs after informing the OA coordinator in writing of the proposed changes. Please refer to Section 3 for items to be included in the folder of each course. Faculty members offering elective courses that are not taught annually should especially prepare folders for such courses.

Refer to Appendix B for College guidelines on course folder and ICEF preparation as well as outcome assessment tools (grading check lists and rubrics).

Table 7.3: Minimum number of course folder & ICEF submission for each semester

TAG	Course No.	Course Name	No. of Folders	No. of ICEFs
CORE ENG.	ENGR 202	Statics	2	4
	ENGR 204	Strength of Materials	2	4
STRUCTURE	CE 252	Engineering Materials	1	2
	CE 271	Structural Analysis I	1	3
	CE 371	Structural Analysis II	1	2
	CE 373	Reinforced Concrete I	2	2
	CE 471	Steel Design I	1 / year	1
	CE 473	Reinforced Concrete II	2	2
	CE 475	Pre-stressed Concrete	1 / year	1
	CE 476	Computer Appl. in Structural Eng.	1 / year	1
TRANSPORTATION	*CE 235	Geomatics Engineering	2	3
	CE 366	Transportation Engineering	1	2
	CE 461	Traffic Engineering	1 / year	1
	CE 462	Traffic Control Systems	1 / year	1
	CE 463	Highway Materials & Construction	1 / year	1
	CE 464	Urban Transportation Planning	1 / year	1
	CE 465	Pavement Design	1 / year	1
WATER RESOURCES	CE 310	Fluid Mechanics	1	2
	CE 311	Water Resources	1	2
	CE 412	Open Channel Hydraulics	1 / year	1
	CE 413	Groundwater Hydraulics	1 / year	1
	CE 414	Hydraulic Engineering	1 / year	1
	CE 429	Groundwater Contamination	1 / year	1
ENVIRONMENTAL	CE 312	Environmental Engineering	1	2
	CE 411	Water & Wastewater Treatment	1 / year	1
	CE 419	Environmental Pollution Control	1 / year	1
	CE 425	Computer Appl. In water Resources & Env. Engineering	1 / year	1
	CE 454	GIS & Remote Sensing in Eng. Applications	1 / year	1
	CE 456	Sustainability & Green Engineering	1 / year	1
COASTAL	CE 401	Coastal Engineering Fundamentals	1 / year	1
	CE 403	Coastal Processes & Modeling	1 / year	1
CONSTRUCTION MNGMT.	CE 430	Legal, Professional & Social Aspects	1	2
	CE 434	Const. Estimation & Cost Control	1 / year	1
	CE 435	Construction Engineering Management	1	2
	CE 436	Construction Work Improvement	1 / year	1
	CE 437	Concrete Const. & Technology	1 / year	1
	CE 449	Civil Engineering Systems	1 / year	1
GEOTECH.	CE 350	Soil Mechanics	1	2
	CE 451	Foundation Engineering	1	2
	CE 452	Earth & Earth Retaining Structures	1 / year	1
	CE 455	Computer Appl. in Geotech. Eng.	1 / year	1
DESIGN	CE 201	Introduction to Design	3	4
	CE 490	Capstone Design	5	6
GENERAL	CE 210	Ecology & Environment Systems	1	1
	CE 395	Engineering Training	1	1
	TOTAL	**Compulsory Courses**	**31**	**50**
		All Courses	**41**	**75**

*Note: From the next academic year 2023-2024, for the new batches CE-236 (Construction Surveying) will be removed from the curriculum & replaced with CE-235 (Geomatics Engineering)

8 Continuous Improvement Plan of Civil Engineering Department

Implementation of the continuous improvement plan in the Civil Engineering department involves all constituents and their inter-relationships is depicted in Exhibit 2.

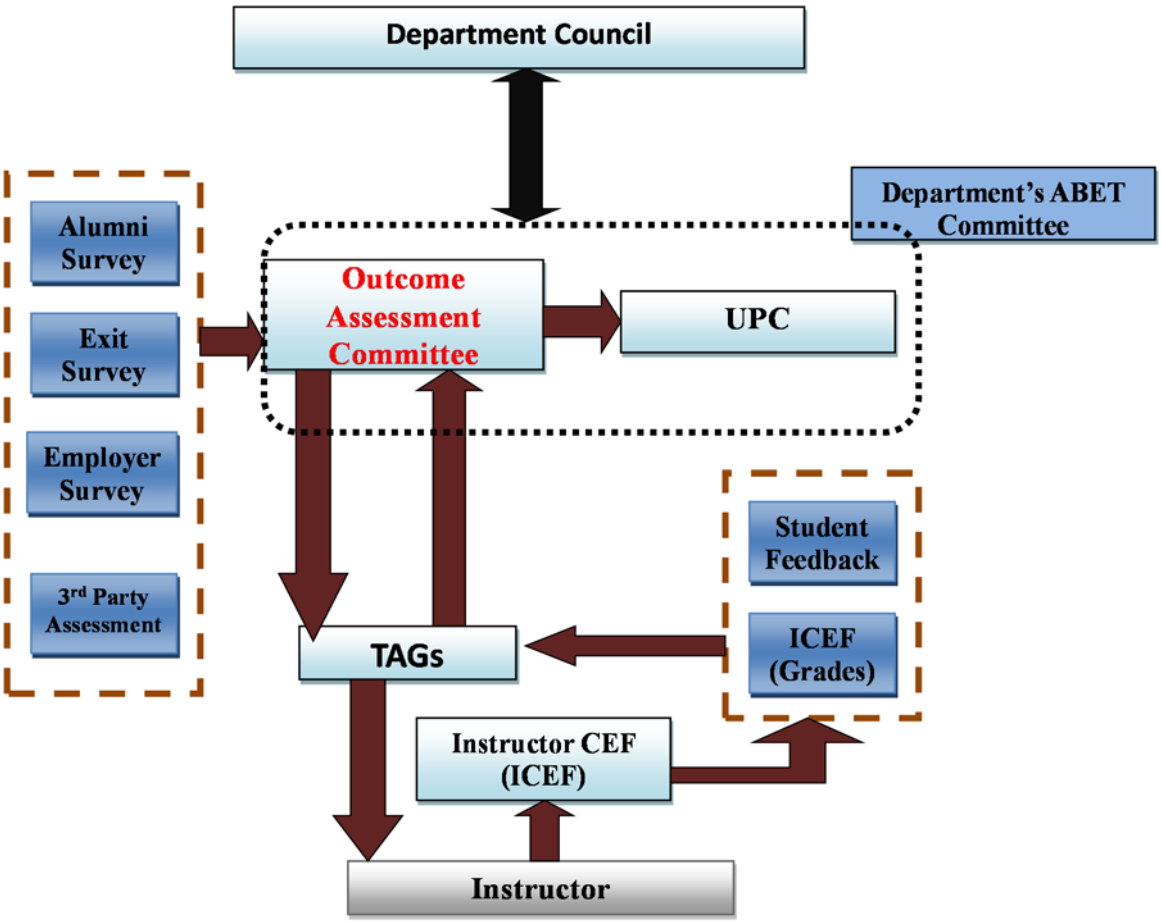

Exhibit 2: Flowchart for Outcome Assessment in Civil Engineering Department

The two basic requirements for implementation of the continuous improvement plan are: (1) Sufficient and meaningful outcome assessment data and (2) Analysis and evaluation of the assessment data against established performance metrics. These requirements are explained below in the context of continuous improvement of the Civil Engineering program at Kuwait University.

8.1 Sources of data for assessment

Data for outcome assessment is collected by various constituents at varied frequency as explained below.

8.1.1 Data to be collected every semester for each six-year assessment cycle

- Instructor Course evaluation Forms (ICEFs)
- Samples of student work
  - Student presentations (slides and/or video)
  - Laboratory reports from appropriate courses
  - Technical products and reports from capstone course
  - Project reports from appropriate courses
  - Samples of homework and tests from CE courses
- Statistical analysis of student performance for selected outcomes as detailed in Section 7.

Compilation of the above items in a Course portfolio (or course folder) is termed as Direct Assessment of student outcomes.

8.1.2 Data to be collected annually for each six-year assessment cycle

- Graduating Senior Exit Survey
- Membership/activity in student professional organizations

8.1.3 Data to be collected twice for each six-year assessment cycle

- Employer Survey
- Alumni Survey
- Faculty Survey

Data collected in items 8.1.2 and 8.1.3 is termed as Indirect Assessment.

8.2 Analysis and Evaluation of Assessment Data

The Program Assessment Coordinator and the TAG leaders compile and carry out the initial analysis of the assessment data. Interpretations are made to determine the extent the performance criteria are met, based on targeted levels.

8.2.1 Student Outcomes Assessment Metrics and Cycle

Assessment of student outcomes is under the jurisdiction of Outcome Assessment Committee of the department. The assessment metrics and review cycle are explained below.

(a) Student Outcomes Assessment Metrics

- The students will receive an average rating of 3 or above from the instructors for student outcomes rated as H & M for all courses.

- Lab and major design reports will receive 70% and above using relevant assessment tools.
- Oral presentations and teamwork will receive 70% and above using relevant assessment tools.

- TAG evaluations of course assessments related to student outcomes will be positive.
- The average ratings for student outcomes in surveys will be 3 and above.
- Student Satisfaction Index (SI) will be more than 3 for items not related to academic student outcomes in student surveys.

(b) Student Outcomes Assessment Review Cycle

The student outcomes are evaluated every academic year. The achievement of the outcomes is determined according to the metrics mentioned. In the Fall Semester of each academic year the TAGs evaluate course assessment data for the previous academic year. Once these evaluations are completed, the Assessment Coordinator compiles them, along with survey results that might be available, into an Assessment report. The report is submitted to the Undergraduate Program Committee for possible corrective actions at the course and curriculum levels.

8.2.2. Program Educational Objectives (PEO) Review

Review of PEOs is under the jurisdiction of Undergraduate Program Committee (UPC) with input from the Outcome Assessment Coordinator. Items to be reviewed for PEOs include the following:

(a) PEO review metrics

- Graduates' preparation several years after graduation, based on surveys of outcomes that are related to the objectives, will receive an average rating of 3 or more.
- The level of importance of the outcomes in surveys that are related to objectives will receive an average rating of 3 or more.
- In placement data 90% of the graduates will find jobs and/or go for further studies within 1 year of graduation
- The evaluation of the educational objectives by the Industrial Advisory Board of the department will be positive.

(b) PEO review cycle

The Program Educational Objectives (PEO) are reviewed every three years. The level of achievement of the educational objectives is determined according to the metrics mentioned above. Revision of the educational objectives may occur at the end of the six-year assessment cycle that includes an evaluation visit from ABET.

8.3 Feedback Channels

The results are shared with concerned faculty and the Undergraduate Program Committee for possible corrective actions at the course and curriculum levels,

respectively. The students are also informed about the results and recommendations via the Student Advisory Committee. The results and recommendations regarding common courses are communicated to the College of Engineering and the College of Science via the Office of Academic Assessment.

8.4 Responsibilities / expectations of constituents for OA process

This section outlines the responsibilities of the constituents who are primarily engaged in academic activities in the civil engineering department.

8.4.1 Organization

Within the civil engineering department, the faculty members take or more of the following roles:

- Faculty
- Teaching Area Groups (TAGs)
- Outcome Assessment Coordinator (OAC)
- Undergraduate Program Committee (UPC)
- Other Departmental Committees
- Chairman

Responsibilities / expectations from each entity from the point of view of Student Outcome Assessment is as follows:

(a) Faculty

Faculty members constitute the basic building block of the department and its activities. Their participation in the OA process is vital. Without their participation, the OA process cannot proceed forward. The tasks expected from all faculty members are as follows:

1. Course development
   - Development of course objectives/outcomes/teaching/assessment
   - Use of appropriate tools in teaching/assessment
   - Revise/teach course based on course outcomes and assessment.
2. Course assessment
   - Re-design homework, quizzes, and exams to measure outcomes.
   - Use standard assessment tools and other appropriate to a particular course. In particular, use the online Instructor Class Evaluation Form for each course every semester supported with outcome evidences (assessments, quizzes, exams, HW, reports, student portfolios).
3. Participate in Faculty Surveys once every 2-3 years.
4. Participate in and provide feedback from assessments to TAGs.

(b) Teaching Area Groups (TAGs)

Each TAG comprises of all faculty members teaching in the particular area. The coordinator of each TAG is also a member of the UPC. TAGs in the Civil Engineering Department are:

i- Coastal

ii- Construction Management
iii- Environmental
iv- Geotechnical
v- Structures
vi- Transportation
vii- Water Resources

Additionally, there are two coordinators for the common College courses viz.
viii- Statics
ix- Strength of Materials

The mandate and specific tasks of the TAGs are as follows:

1. Course development
   - Review course objectives, outcomes, and assessment methods/tools
   - Revise course descriptions based on review and assessment.
2. Course assessment
   - Analyze and evaluate assessment results from courses.
   - Evaluate student performance in courses each semester in terms of student outcomes rated as H and M.
   - Provide feedback to UPC.
3. Maintain minutes of meetings, discussions/topics, attendees, and recommendations sent to UPC and Chairman for action.
4. Each TAG is responsible for all compulsory and elective courses offered in the area.
5. Prepare an annual outcome assessment report that should include activities of the TAG in the academic year like call for meetings, meeting minutes, course evaluations and recommendations for improvement. Each student's outcome shall be evaluated for the courses of the TAG.

(c) Outcome Assessment Coordinator

As a member of UPC, coordinates assessment activities with help from a secretary assigned mainly to assessment work. The mandate of the assessment coordinator is in general, focused on ABET Engineering Criterion 3 (student outcomes), and 4 (continuous improvement) with important feedback for Criterion 2 (program educational objectives) and Criterion 5 (Curriculum). This mandate includes the following specific tasks:

- Liaison with the Office of Academic Assessment (OAA) of College of Engineering of Kuwait University.
- Outcome Assessment plan development and maintenance
- Assessment tools development and maintenance
- Coordination of course assessments through TAGs
- Analyses of results from TAGs and OAA on Student Exit Surveys, Faculty Surveys, Employer and Alumni Surveys
- Reports assessment results to UPC and Chairman
- Prepares an annual report to be reviewed by UPC, Department Chairman and OAA.

(d) Undergraduate Program Committee (UPC)

The UPC consists of the chair of the committee assigned by the Department Chairman, the five TAG coordinators, and the assessment coordinator. The secretary assigned to the assessment process assists the group as a whole.

The mandate of UPC covers all 9 ABET Engineering Criteria.

1. Students
2. Program Educational Objectives
3. Student Outcomes
4. Continuous Improvement
5. Professional Component
6. Faculty
7. Facilities
8. Institutional Support and Financial Resources
9. Program Criteria

Specific task/responsibilities of UPC cover the following:

- Compiling information related to all 9 ABET engineering criteria.
- Revision/upgrading of Civil Engineering program curriculum, course contents and outcomes.
- Overall responsibility for preparing the civil engineering program for the ABET engineering criteria requirements.
- Preparation of Self-Study report of the department for the upcoming ABET visit in 2025.
- Presentation of all material in the format required by ABET Self-Study Report
- Keeping a systematic log of UPC activities, including minutes of meetings, discussion, attendees, and communications with Civil Engineering department Chairman and Council

(e) Other Departmental Committees

In general, all civil engineering departmental committees should make adjustments in their basic philosophy and mode of operations to include the following key points:

1. Consider relevant program objectives and ABET engineering criteria in the policies, strategies, and activities.
2. Assess if the relevant objectives and criteria are being met.
3. Provide feedback to UPC and Chairman

(f) Chairman

The overall responsibility of the Chairman, as the leader the Civil Engineering Department, covers all ABET Engineering Criteria. More specifically, the Chairman assumes the responsibility to:

1. Oversee curriculum development and assessment.
2. Involve constituencies.
   - Industrial advisory board
   - Alumni gathering(s)
   - Student advisory council

- Student Exit Surveys (every semester)

3. Facilitate implementation of assessment
   - Involve all faculty
   - Enable UPC and assessment coordinator.
4. Act based on assessment results.

9 Outcome Assessment Operation Plan (Fall 2021 – Spring 2024)

Tentative operation plan for outcome assessment of the Civil Engineering Department is outlined in Exhibit 3 and explained below:

Academic Year 2020/21 - Fall 2020

- Prepare OAA annual report for 2019/20 for updated outcomes 1-7.
- Activated Virtual assessment Room.
- Prepare 2019/20 student exit survey report.
- Prepare 2019/20 on-line course assessment report.
- Coordinate assessment activities among engineering programs.
- Administer end of Semester Student Exit Survey.

Academic Year 2020/21 - Spring 2021

- Coordinate assessment activities among engineering programs.
- Completed 70% Virtual Assessment Room
- Administer end of Semester Student Exit Survey.

Academic Year 2021/22 - Fall 2021

- Prepare OAA annual report for 2020/21.
- Prepare 2020/21 student exit survey report.
- Prepare 2020/21 on-line course assessment report.
- Coordinate assessment activities among engineering programs.
- Administer end of Semester Student Exit Survey.

Academic Year 2021/22 - Spring 2022

- Ask TAGs to submit required Course folders (online) with Instructor Evaluation Form (Online).
- Completed 80% Virtual Assessment Room
- OAA visit to Civil Engineering Department for ABET procedures.
- Coordinate assessment activities among engineering programs.
- Meeting with TAGs for ABET requirement.
- Meeting with Capstone Design Committee.
- Administer end of Semester Student Exit Survey.

Academic Year 2022/23 - Fall 2022

- Prepare OAA annual report for 2021/22
- Prepare 2021/22 student exit survey report.
- Prepare 2021/22 on-line course assessment report.
- Prepare Employer Survey Report.
- Coordinate assessment activities among engineering programs.
- Administer end of Semester Student Exit Survey.
- Send request to TAGs –Updating Performance Indicators
- Send request to TAGs on Teaching Goal Inventory- Deciding the relevance of Student Outcome in a course.

- OAA visit to Civil Engineering department.
- Employees workshop on preparing Display materials.

Academic Year 2022/23 - Spring 2023

- Coordinate assessment activities among engineering programs.
- Administer end of Semester Student Exit Survey.
- Completed 95% Virtual Assessment Room
- Meeting with Chairman / UPC/TAGs on Continuous Improvement process.
- Review OAA visit to department labs.
- Employees workshop on preparing Assessment evidence.
- Meeting with OAC on updating ABET program criteria.
- Submit draft copy of Annual Assessment Plan.
- Prepare Capstone Rubrics & ABET Capstone design checklist.

Academic Year 2023/24 - Fall 2023

- Prepare OAA annual report for 2022/23
- Prepare 2022/23student exit survey report.
- Prepare 2022/23 on-line course assessment report.

- Coordinate assessment activities among engineering programs.
- Improve Virtual Assessment Room.
- Review Capstone Design guidelines of Civil Engineering department.
- Check all Rubrics in Capstone design Course.
- Prepare Faculty survey report.
- Prepare faculty members to measure and report updated student outcomes 1-7.
- Adopt Performance Indicator (PI) based student outcome assessment procedure.
- Send request for evaluation to ABET.
- Request placement data from ETAC.
- Administer end of Semester Student Exit Survey.

Academic Year 2023/24 - Spring 2024

- Coordinate assessment activities among engineering programs.
- Improve Self-study report.
- Improve Lab Report.
- Meeting with Industrial Advisory Board.
- Administer end of Semester Student Exit Survey.

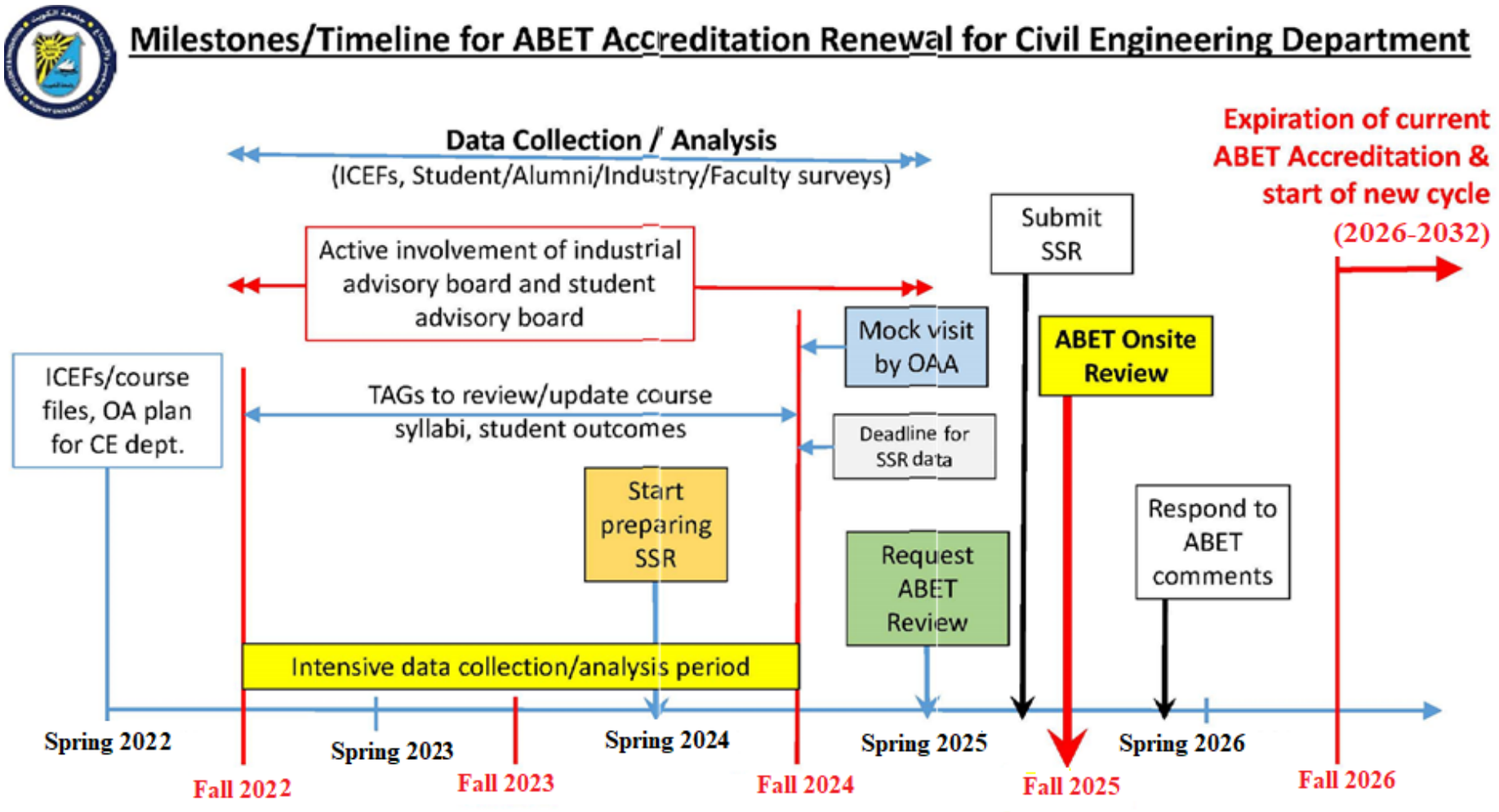

Exhibit 3: Timeline for ABET Accreditation Renewal for Civil Engineering Department (2021 – 2026)

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APPENDIX A

Student Outcome Assessment and Evidence Preparation

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Guidelines for ABET Student Outcome Assessment and Evidence Preparation

Civil Engineering Department

College of Engineering & Petroleum

Kuwait University

Prepared by:

Dr. Prof. Humayun R. H. Kabir

CE Assessment Coordinator

June 2023

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Contents

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1 Introduction

It is well understood that the final course grades are not reflective of student outcome assessment because of the following reasons:

- ✓ **Student outcomes** assessment measures the knowledge that is gained by the students in the course.
- ✓ Final letter grades **include factors other than student knowledge** (e.g. attendance, class participation, curving, bonus etc.)
- ✓ Grades are **accumulation of all intended outcomes of the course**.
- ✓ **Grades** in a course are an **indirect way of outcome assessment** but do not flag the strengths and weakness of specific student learning outcomes in the course.
- ✓ Grades are given at the end of a semester while student outcomes are assessed at the end of a number of courses spanning many semesters [for program assessment].

Therefore, **student outcomes** need to be **directly assessed** through specific tasks (Exam, Quiz, HW etc.) [or **Performance Indicators (PI)**] during the semester instead of basing these on the final letter grades.

This guide is intended to explain the recommended procedure for evaluating student outcomes to comply with ABET criterion 3. It will also describe a practical way of compiling evidence for student outcome assessment as well.

2 Suggested procedure for student outcome assessment

The suggested procedure for student outcome assessment can be broken into the following steps:

1) TAGs to develop ***Performance indicators (PI)*** for all **H & M rated outcomes** in the **compulsory courses.**
   - ❑ **What are PIs?**
     These are specific tasks that can be directly measured during the semester through homework, quiz, exam, project, presentations etc.
   - ❑ **How to develop PIs?**
     Take a look at "Objectives" in course outlines. Refer to Example in Section 3.
2) Choose one PI for an outcome in a semester and gather quantitative evidence for its assessment.
3) Repeat step (2) for all outcomes for compulsory courses of the TAG in a semester.
4) Choose different PIs in the next semester and repeat steps (2) and (3).
5) Target is that each faculty member prepares this detailed outcome assessment only ONCE a year. TAG coordinators need to facilitate this task.

This procedure is explained through an Example in Section 3.

3 Example of student outcome assessment

3.1 **Step 1**: Develop Performance Indicators (PIs)

How to develop PIs? – Take a look at "Objectives" in course outlines

Example: CE 271 – Structural Analysis I

Objectives[§]:

1. To introduce the student to the engineering applications of physics and calculus by teaching the fundamentals and methods of structural analysis and their applications. (a)
2. Compute applied loads on a structural system using building code (e.g. ASCE 7), follow the load path and determine internal forces and deformations (e, g).
3. Introduce analysis of statically indeterminate structures (a, e).

PIs for outcome 'a' for this course could be stated as:

i. Students will be able to use integration for computing slope/deflection of a structure.
ii. Students will demonstrate the ability to solve system of simultaneous algebraic equations for finding forces in a truss.

3.2 **Step 2**: Design an activity (homework, quiz, exam problem, project, presentation etc.) to measure student performance related to the PI.

Example PI for outcome 'a' in ENG 204:

PI: Students will be able to use integration for computing beam slope/deflection.

The PI related to this outcome is tested through Q3a on the Midterm II exam as shown in Fig. 1 on the next page.

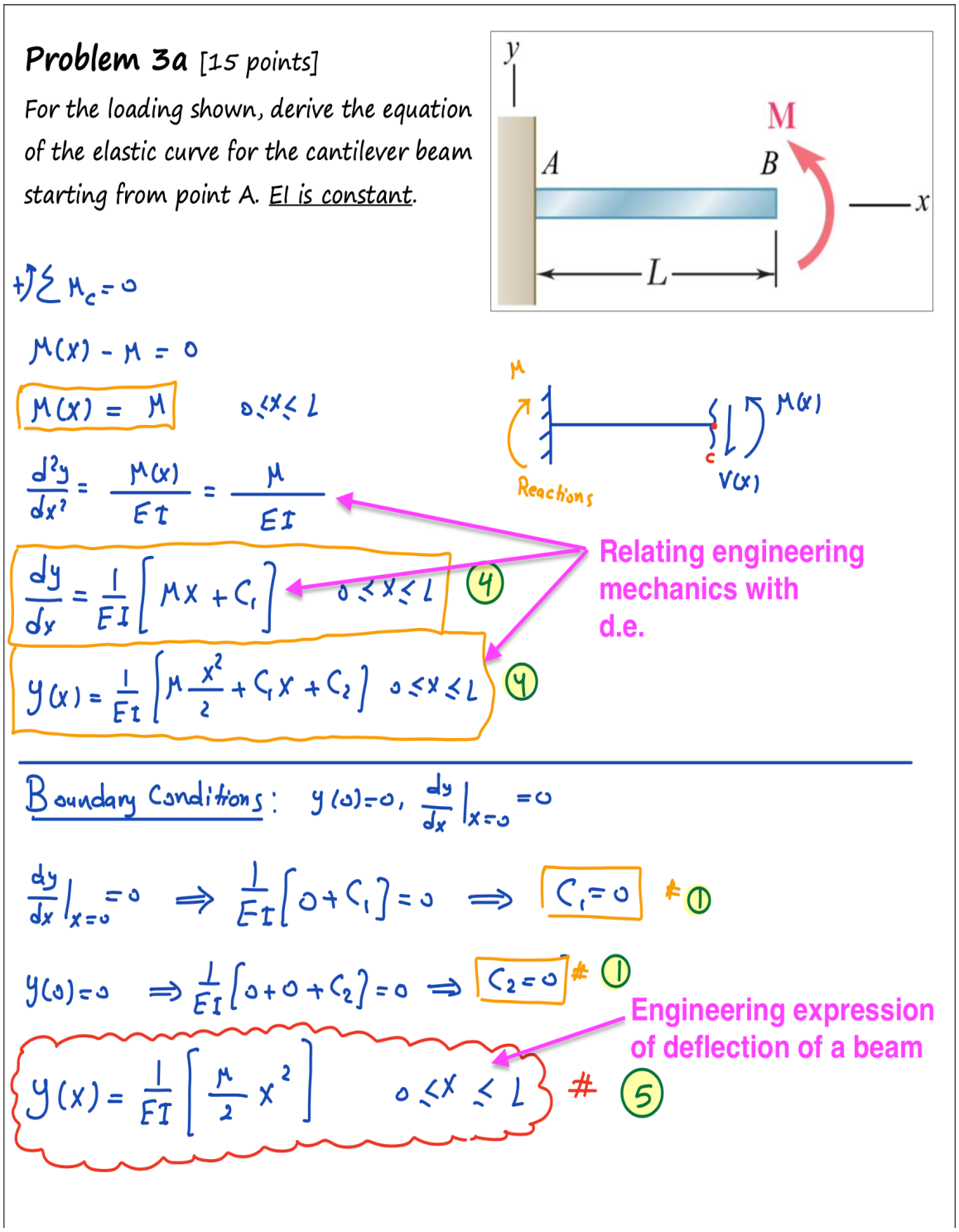

Fig. 1: Assessment task and grading checklist for PI related to outcome 'a'

3.3 **Step 3:** Evaluate student performance using an Assessment Tool.
Assessment tool used in the Example is a Grading checklist as marked on the solution in Fig. 1.

3.4 Step 4: Gather quantitative evidence of student performance.

This is the tabulation of points obtained by each student in the problem as shown in Table 1.

Table 1: Points obtained by each student on Q3a

S.No.	Student Number	FINAL Q3a
	Max. points	15
1	2181150009	11
2	2181144223	11
3	2181143188	9
4	2191119855	0
5	2211116926	5
6	2181143775	14
7	2181144502	10
8	2191117316	11
9	2211124820	13
10	2192131188	11
11	2192131259	1
12	2201115981	8
13	2191113195	13
14	2191116646	2
15	2211120143	15
16	2191117162	0
	Average of ALL students for Q3a	8.38
		55%
	Average of students PASSING the course	
		67%

3.5 Step 5: Convert student performance to outcome assessment data.

Step 5(a): Compute the following measures:

1- Class average for ALL students.
2- Class average for students PASSING the course. This can only be determined after compilation of final course grades.

In the above example,

Class average Of All students = 55%
Class average for students PASSING the course = 67%

Step 5(b): Compare class performance with threshold values

Assign outcome assessment indicator (between 1 and 5) based on the class average as shown in Table 2. Use this indicator in the online Instructor Course Evaluation Form (ICEF) as well.

Table 2: Outcome assessment indicator based on student average

Class average for students PASSING the course	Outcome assessment indicator	Performance Level
< 60%	1	Very weak
60% - 69%	2	Weak
70% - 79%	3	Satisfactory
80% - 89%	4	Very good
> 90%	5	Excellent

Threshold value of the outcome assessment indicator is set to be 3 by the College. Instructor should flag student performance if the assessment indicator is below 3.

Please note that the above percentage ranges for assigning outcome assessment indicator are not to be applied in the 'hard' sense because the assessment is based on only one assessment task. Instructors can use data from additional tasks or use their judgement to assign the adjusted outcome assessment indicator. Instructor judgement is particularly necessary for classes with low enrollment (< 20) as performance of a few students can significantly skew the average. However, it is expected that this adjustment should not result in a jump of more than 1 in the 'hard' calculated outcome assessment indicator.

In the above example:

Outcome Assessment indicator = 1 ALL students
Outcome Assessment indicator = 2 PASSING students

As the outcome assessment indicator for the particular problem is 1; therefore, the **performance is Very Weak.**
The outcome assessment indicator for the students passing the course is 2; therefore, the Performance is Weak.

Step 5(c): Complete the summary evaluation of outcome on the prescribed form shown below.

Summary Evaluation of Student Outcome

Year	**2022-23**	**Semester**	**Spring**
Outcome	**a**	**Course**	**ENG 204-06A**
Performance indicator	1. Math- Differential equations relating to engineering		
Assessment information	Midterm II: Q3a.		
Evaluation Tool used	Grading Checklist		
Summary of student performance			
Measure	**Class average of students PASSING the course (**55%)		
Performance	**Very Weak (<60%)**		
Outcome Indicator	1		
Comments	Student registered in my class were having very weak preparation for this course. They don't meet the outcome criteria.		
Attachments	☒Assessment task ☒Grading checklist ☐Rubric ☒Statistical data of student performance ☒Samples of student work ☐Others (_)		

4 What the faculty needs to submit as evidence?

The faculty need to submit the following as evidence for assessment of a particular student outcome

1. Performance Indicator (PI) statement of the outcome.
2. Problem with Grading List / Rubric or other performance evaluation tool.
3. List of student performance on the Problem and performance averages.
4. Conversion of performance averages to outcome Indicator and a statement on level of attainment of the outcome.
5. Samples of student work (one each of Best, Average and Worst).

   Note: Faculty members opting to withhold submission of student work should make a note that these samples are available with the instructor. However, TAG coordinators shall make sure that at least one submission for each pertinent outcome in an academic year contain samples of student work.

A sample submission is included in Appendix - A.

APPENDIX - A

Sample submission for outcome assessment

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Department of Civil Engineering
Student Outcome Assessment

Summary Evaluation of Student Outcome

Year	2017-18	**Semester**	Fall 2017
Outcome	a	**Course**	ENGR 202
Performance indicator	Students will be able to apply concepts of vector analysis and linear algebra to solve static equilibrium problems.		
Assessment information	Question 1 on the Final Exam.		
Evaluation Tool used	Grading Checklist		
Summary of student performance			
Measure	Class average of students PASSING the course		
Performance	68%		
Outcome Indicator	3		
Instructor's Comments	Class average of students passing the course is 68% that is close the threshold of 70% for an outcome assessment indicator of 3. Therefore, class performance is satisfactory on this outcome. As class performance is on the border of being satisfactory, therefore student performance shall be watched in coming semesters.		
Attachments	☑ Assessment task ☑ Grading checklist ☐ Rubric ☑ Statistical data of student performance ☑ Samples of student work ☐ Others (_____)		

Outcome assessment indicator based on student average

Class average for students PASSING the course	Outcome assessment indicator	Performance Level
< 60%	1	Very weak
60% - 69%	2	Weak
70% - 79%	3	Satisfactory
80% - 89%	4	Very good
> 90%	5	Excellent

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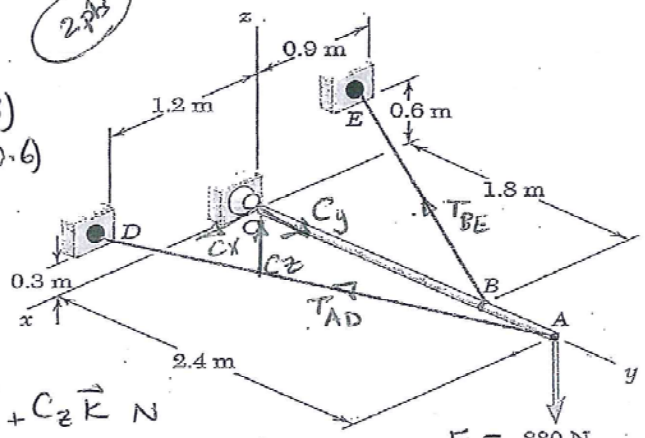
Assessment Task and Grading Checklist

Problem No. 1 **(20 Points)** [outcome 'a']

A 2.4 meter long boom is held in equilibrium by a ball-and-socket at C and by two cables AD and BE. Determine the tension in each cable and the reaction at C.

$A = (0, 2.4, 0)$
$B = (0, 1.8, 0)$
$C = (0, 0, 0)$
$D = (1.2, 0, 0.3)$
$E = (-0.9, 0, 0.6)$

2 pts



$\vec{C} = C_x\vec{i} + C_y\vec{j} + C_z\vec{k}$ N

$\vec{F} = -880\vec{k}$ N

$\vec{T}_{AD} = T_{AD}\vec{U}_{AD} = T_{AD}\left[\frac{1.2\vec{i} - 2.4\vec{j} + 0.3\vec{k}}{2.7}\right]$ N

8 pts

$\vec{T}_{AD} = \left(\frac{4}{9}T_{AD}\vec{i} - \frac{8}{9}T_{AD}\vec{j} + \frac{1}{9}T_{AD}\vec{k}\right)$ N

$\vec{T}_{BE} = T_{BE}\vec{U}_{BE} = T_{BE}\left[\frac{-0.9\vec{i} - 1.8\vec{j} + 0.6\vec{k}}{2.1}\right]$

$\vec{T}_{BE} = \left(-\frac{3}{7}T_{BE}\vec{i} - \frac{6}{7}T_{BE}\vec{j} + \frac{2}{7}T_{BE}\vec{k}\right)$ N

$\Sigma F_x = 0 = C_x + \frac{4}{9}T_{AD} - \frac{3}{7}T_{BE} = 0$ ——— (1)

$\Sigma F_y = 0 = C_y - \frac{8}{9}T_{AD} - \frac{6}{7}T_{BE} = 0$ ——— (2)

$\Sigma F_z = 0 = C_z - 880 + \frac{1}{9}T_{AD} + \frac{2}{7}T_{BE} = 0$ ——— (3)

Take moment about point C:

$\Sigma \vec{M}_C = 0 = \left(\vec{r}_{CA} \times \vec{T}_{AD}\right) + \left(\vec{r}_{CA} \times -880\vec{k}\right) + \left(\vec{r}_{CB} \times \vec{T}_{BE}\right) = 0$

8 pts

$$= \begin{vmatrix} i & j & k \\ 0 & 2.4 & 0 \\ \frac{4}{9}T_{AD} & -\frac{8}{9}T_{AD} & \frac{1}{9}T_{AD} \end{vmatrix} + \begin{vmatrix} i & j & k \\ 0 & 2.4 & 0 \\ 0 & 0 & -880 \end{vmatrix} + \begin{vmatrix} i & j & k \\ 0 & 1.8 & 0 \\ -\frac{3}{7}T_{BE} & -\frac{6}{7}T_{BE} & \frac{2}{7}T_{BE} \end{vmatrix}$$

$$= \frac{4}{15}T_{AD}\vec{i} - \frac{28}{15}T_{AD}\vec{k} - 2112\vec{i} + \frac{18}{35}T_{BE}\vec{i} + \frac{27}{35}T_{BE}\vec{k} = 0$$

$\frac{4}{15}T_{AD} - 2112 + \frac{18}{35}T_{BE} = 0$ ——— (4)

$-\frac{16}{15}T_{AD} + \frac{27}{35}T_{BE} = 0$ ——— (5) $\Longrightarrow$

From eq. (5)

$$\frac{16}{15} T_{AD} = \frac{27}{35} T_{BE}$$

$$T_{AD} = 0.723\, T_{BE}$$

Substitute in eq. (4)

$$T_{BE} = 2986.9 \approx 2987 \text{ N}$$

$$T_{AD} = 2160 \text{ N}$$

2 pts Final solutions and calculations

$$C_x = 320.3 \text{ N}$$

$$C_y = 4480.4 \text{ N}$$

$$C_z = -213.2 \text{ N}$$

$$\vec{C} = (320.3\,\vec{i} + 4480.4\,\vec{j} - 213.2\,\vec{k})\ \text{N}$$

Statistical analysis of student performance

Year 2017-18, Fall 2017 ENGR 202 - Statics, Section 1	For students passing the course
S.No.	Final Exam
	Q1
	Outcome 'a'
	20
1	14
6	9
10	13
12	12
13	14
14	20
16	20
18	18
19	14
20	16
21	12
22	2
average	14
median	14
max	20
min.	2
Average (%)	68%

Note: Data for students who withdrew or failed the course is not included in student average calculation.

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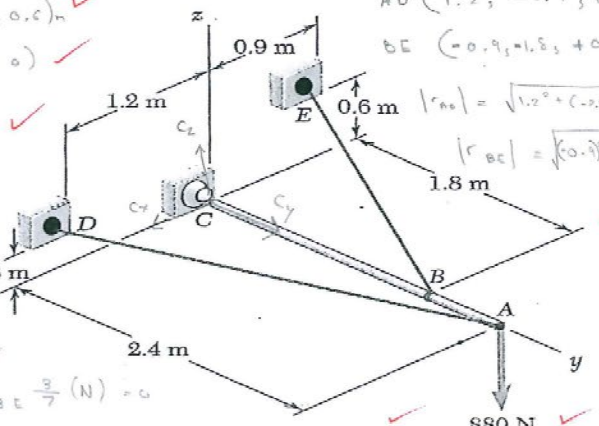
Samples of student work

BEST work

Problem No. 1 **(20 Points)**

A 2.4 meter long boom is held in equilibrium by a ball-and-socket at C and by two cables AD and BE. Determine the tension in each cable and the reaction at C.



$D(1.2, 0, 0.3)_m$ $E(-0.9, 0, 0.6)_m$ $A(0, 2.4, 0)_m$ $B(0, 1.8, 0)$

$\vec{r}_{AD} = (1.2, -2.4, 0.3)_m$ $\vec{r}_{BE} = (-0.9, -1.8, +0.6)_m$

$|r_{AD}| = \sqrt{1.2^2 + (-2.4)^2 + 0.3^2} = 2.7m$

$|r_{BE}| = \sqrt{(-0.9)^2 + (1.8)^2 + (0.6)^2} = 2.1$

$u_{AD} = \frac{r_{AD}}{|r_{AD}|} = \frac{4}{9}\hat{i} - \frac{8}{9}\hat{j} + \frac{1}{9}\hat{k}$

$BE = \frac{r_{BE}}{|r_{BE}|} = -\frac{3}{7}\hat{i} - \frac{6}{7}\hat{j} + \frac{2}{7}\hat{k}$

$\vec{T}_{AD} = |T_{AD}|\hat{u}_{AD}$ $\vec{T}_{BE} = |T_{BE}|\hat{u}_{BE}$

$\sum F_x = C_x + T_{AD}\frac{4}{9} - T_{BE}\frac{3}{7}(N) = 0$

$\sum F_y = C_y + T_{AD}\left(-\frac{8}{9}\right) - T_{BE}\frac{6}{7}(N) = 0$

$\sum F_z = C_z - 880 + T_{AD}\frac{1}{9} + T_{BE}\frac{2}{7} = 0\ (N)$

$r_{CB} \times T_{BE} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1.8 & 0 \\ -\frac{3}{7}T & -\frac{6}{7}T & \frac{2}{7}T \end{vmatrix} = 1.8\left(-\frac{2}{7}T\right)\hat{i} - 1.8\left(\frac{3}{7}T\right)\hat{k} =$

$0.514\,T_{BE}\,\hat{i} + 0\,\hat{j} + 0.771\,T_{BE}\,\hat{k}\ (N.m)$

$r_{CA} \times T_{AD} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2.4 & 0 \\ \frac{4}{9}T & -\frac{8}{9}T & \frac{1}{9}T \end{vmatrix} = 2.4\left(\frac{1}{9}T\right)\hat{i} - 2.4\left(\frac{4}{9}\right)T\,\hat{k} =$

$0.267\,T_{AD}\,\hat{i} - 1.667\,T_{AD}\,\hat{k}\ (N.m)$

$r_{CA} \times F = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2.4 & 0 \\ 0 & 0 & -880 \end{vmatrix} = -2112\,\hat{i}\ (N.m)$

$\sum M_x = 0.514\,T_{BE} + 0.267\,T_{AD} - 2112 = 0\ (N.m)$

$\sum M_y = 0$

$\sum M_z = 0.771\,T_{BE} - 1.067\,T_{AD} = 0$

$0.514(+1.389)\,T_{AD} + 0.267\,T_{AD} = 2112$

$0.9783\,T_{AD} = 2112$

$T_{AD} = 2158.68\,N$

$T_{BE} = 1.389\,T_{AD}$

$T_{BE} = -2987.6\,N$

$C_x + (2158.68)\left(\frac{4}{9}\right) + (-2987.6)\left(\frac{3}{7}\right) = 0$

$C_x = 321\,N$

$C_z - 880 + 2158.68\left(\frac{1}{9}\right) + (2987.6)\left(\frac{3}{7}\right) = 0$

$C_z = -213.45\,N$

$C_y + 2158.68\left(\frac{-8}{9}\right) + (-2987.6)\left(\frac{6}{7}\right) = 0$

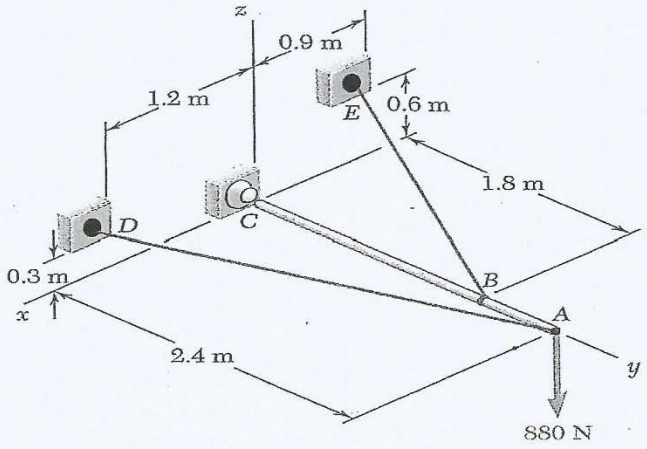
$C_y = 4479.63\,N$

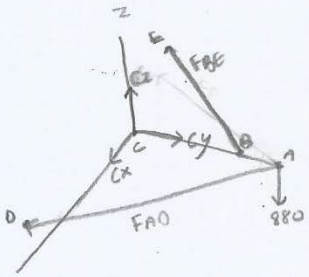
AVERAGE work

-6

Problem No. 1 **(20 Points)**

A 2.4 meter long boom is held in equilibrium by a ball-and-socket at C and by two cables AD and BE. Determine the tension in each cable and the reaction at C.





$F_{AD} = |F_{AD}| \times u_{AD}$

$u_{AD} = \frac{r_{AD}}{|r_{AD}|}$

$r_A = 0\hat{i} + 2.4\hat{j} + 0\hat{k}$ m

$r_D = 1.2\hat{i} + 0\hat{j} + 0.3\hat{k}$ m

$r_{AD} = 1.2\hat{i} - 2.4\hat{j} + 0.3\hat{k}$ m $\quad |r_{AD}| = 2.7$ m

-1

$F_{AD} = 0\hat{i} - 0.9|F_{AD}|\hat{j} + 0.11|F_{AD}|\hat{k}$ N

$F_{BE} = |F_{BE}| \times u_{BE}$

$r_B = 0\hat{i} + 1.8\hat{j} + 0\hat{k}$

$r_E = -0.9\hat{i} + 0\hat{j} + 0.6\hat{k}$

$r_{BE} = -0.9\hat{i} - 1.8\hat{j} + 0.6\hat{k}$ $\quad |r_{BE}| = 2.1$ m

$F_{BE} = |F_{BE}|0.4\hat{i} - 0.9|F_{BE}|\hat{j} + 0.3|F_{BE}|\hat{k}$ N

$C = C_x\hat{i} + C_y\hat{j} + C_z\hat{k}$ N

$F_A = 0\hat{i} + 0\hat{j} - 880\hat{k}$ N

$\Sigma M_C = 0$

$r_{CA} \times F_{AD} + r_{CB} \times F_{BE} + r_{CA} \times F_A = 0 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2.4 & 0 \\ 0 & -0.9F_{AD} & 0.11F_{AD} \end{vmatrix} + \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1.8 & 0 \\ -0.4F_{BE} & -0.9F_{BE} & 0.3F_{BE} \end{vmatrix}$

$+ \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 2.4 & 0 \\ 0 & 0 & -880 \end{vmatrix} = (0.264\hat{i}) + (0.54F_{BE}\hat{i} + 0.72F_{BE}\hat{k}) + (-2112\hat{i}) = 0.$

Final Answer?

-2

-3

$\hat{i}$: $0.264 + 0.54F_{BE} - 2112 = 0$

$F_{BE} = 3910$ N

$\Sigma F_x = 0$

$C_x + 1564 = 0$

$C_x = 1564$ N

$\Sigma F_y = 0$

$-0.9F_{AD} - 0.9F_{BE} + C_y = 0$

$\Sigma F_z = 0$

$0.11F_{AD} + 0.3F_{BE} + C_y = 0$

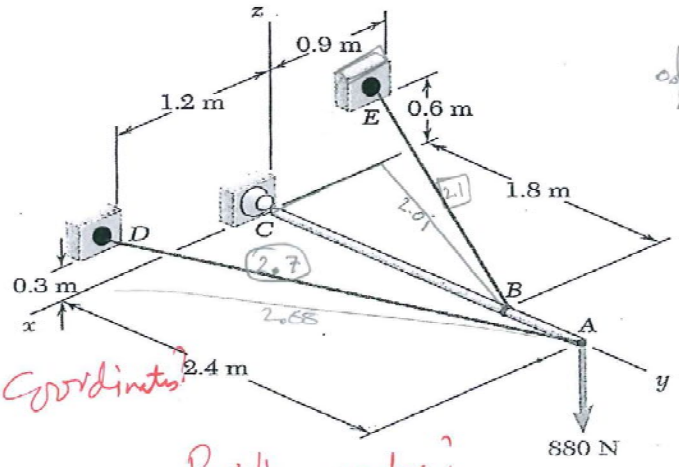
0.286 880

LOWEST work

-18

Problem No. 1 **(20 Points)**

A 2.4 meter long boom is held in equilibrium by a ball-and-socket at C and by two cables AD and BE. Determine the tension in each cable and the reaction at C.



Coordinates?

Position vectors?

Force vectors?

what about the 880N force?

$\Sigma F = 0$?

$\Sigma M = 0$?

Find answer?

$\Sigma M_z = (T_B)_z \times 1.8 + (T_A)_z \times 2.4 = 0$

$T_{Bz}\left(\frac{0.6}{2.1}\right) \times 1.8 + T_{Az}\left(\frac{0.3}{2.7}\right) \times 2.4 = 0$

$= T_{Bz}\, 0.51 + T_{Az}\, 0.267 = 0$

$\Sigma M_x = T_{Bz}\, 0.51 + T_{Az}\, 0.267 + T_{By}$

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APPENDIX - B

Blank Student Outcome Assessment Summary Form

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Department of Civil Engineering
Student Outcome Assessment

Summary Evaluation of Student Outcome

Year		**Semester**	
Outcome		**Course**	
Performance indicator			
Assessment information			
Evaluation Tool used			
Summary of student performance			
Measure	**Class average of students PASSING the course**		
Performance			
Outcome Indicator			
Instructor's Comments			
Attachments	☐ Assessment task ☐ Grading checklist ☐ Rubric ☐ Statistical data of student performance ☐ Samples of student work ☐ Others (_____)		

Outcome assessment indicator based on student average

Class average for students PASSING the course	Outcome assessment indicator	Performance Level
< 60%	1	Very weak
60% - 69%	2	Weak
70% - 79%	3	Satisfactory
80% - 89%	4	Very good
> 90%	5	Excellent

APPENDIX B

Assessment Tools

B.1 Instructor Course Evaluation Form (ICEF)

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Kuwait University
College of Engineering & Petroleum

Instructor Class Evaluation Form

COURSE

Program Code:

Course Name:

Section Num:

Semester:

Number of times that you taught this course at KU:

GRADING SYSTEM

Evaluation Method	Grading Scale
	%
	%
	%
	%
	%
	100%

GRADING DISTRIBUTION

	A	A–	B+	B	B–	C+	C	C–	D+	D	F *or* FA	Sum	I	W
Weight (W)	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.0	–	–	–
No. of Students (N)														

CLASS GPA = (S (W* N) / SN) = _____

CLASS GPA without (F or FA) = _____

Course Outcomes

#	STUDENT OUTCOMES	INDICATOR	RELEVANCE	PERFOMANCE	Explanation Activities and Practices	Interpretation & Evidence
1.	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.					
2.	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.					
3.	Communicate effectively with a range of audiences.					
4.	Recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.					
5.	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.					
6.	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions.					
7.	Acquire and apply new knowledge as needed, using appropriate learning strategies.					

Remarks and Suggestions:

B.2 Instructions for Course Assessment

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Kuwait University
College of Engineering and petroleum

Instructions Sheet for:
Instructor Class Evaluation Form

1. Fill out information box (course number, title, instructor, etc.).

2. State evaluation method used, and percentage grade assigned to each task in this course. The evaluation method includes exams, quizzes, projects, etc. The grades should add up to 100%.

3. Fill out the Grade distribution Table by stating the number of students who earned the letter grade A, A^-, B^+, etc.

4. Calculate the Class Grade Point Average (GPA)for this course.

5. Record the Class Overall GPA as given by the Registration Office on the grade submission form.

6. Comment on the student performance towards achieving course outcomes as well as relevant program and college outcomes. Write any suggestions that you feel will help improve this student and include any other remarks that you may have.

7. Complete the table on page 2 by indicating your judgement based on the student's performance in meeting college outcomes for this course:

   i) *Column 2 (Relevance)*

Normally, the Teaching Area Group (TAG) should have established this rating. If it is available, please copy the rating. Otherwise, the rate the level of importance of each outcome as it relates to the course using the following guidelines:

H (highly relevant): Demonstrating this outcome is critical for the students to perform successfully; or the students may benefit significantly from this course toward the outcome (formal instruction, practice, assessment).
M (Moderately relevant): Demonstrating this outcome has considerable impact on the overall performance of the student, or the students may benefit moderately from this course toward the outcome (informal instruction, practice, assessment).
L (Somewhat relevant): Demonstrating this outcome has only minor impact on the overall performance of the student. However, there are opportunities to observe this outcome(practice).

   ii) *Column 3 (Student Achievement)*

Consider what is normally expected of the students at this level and rate the degree of achievement for each outcome using the following scale:

1. Student's performance was very weak
2. Student's performance was unsatisfactory
3. Student's performance was barely acceptable
4. Student's performance met expectations
5. Student's performance exceeded expectations.

iii) *Column 4 (Justification or Evidence)*

Justify your ratings by stating the reasons why the outcomes and related goals were or were not achieved. Refer to evidence from student's work that demonstrates their performance for this class for each outcome. Evidence includes examples of student work such as exams, homework, reports, etc. Please attach examples of student work to demonstrate justification and evidence.

Example of Calculating Weighted Average

Year 2021-22		Performance (1-5)							Relevance (H=3|M=2|L=1)						
Course No.	**Course Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
0620-271	Structural Analysis I	4		4	4				3		3	1			
0620-271	Structural Analysis I	5		3	4				3		3	1			
0620-371	Structural Analysis II	4		3				3	3		2				1
0620-371	Structural Analysis II	4		5				5	3		2				1
0620-371	Structural Analysis II	4		5				5	3		2				1
0620-373	Reinforced Concrete I	4	4	4	4			3	2	3	3	2			1
0620-373	Reinforced Concrete I	4	3	3	4			4	2	3	3	2			1
0620-373	Reinforced Concrete I	3	3	3	4			4	2	3	3	2			1
0620-373	Reinforced concrete I	3	3	3	4			3	2	3	3	2			1
0620-373	Reinforced Concrete I	3	3	3	4			3	2	3	3	2			1
0620-473	Reinforced Concrete II	3	3	3				2	2	3	3				1
0620-473	Reinforced Concrete II	4							2	3	3				1
0620-476	Computer Applications in Structural Engineering	4	4	5	5	5		4	2	3	3	1	2		1
Total number of evaluations		**13**	**7**	**12**	**8**	**1**	**0**	**10**							
Simple average		**3.8**	**3.3**	**3.7**	**4.1**	**5.0**	**#DIV/0!**	**3.6**							
Weighted average		**3.8397**	**3.28577**	**3.606**	**4.0**	**5**	**#DIV/0!**	**3.6**							
# of evaluations with performance > 3		**9**	**2**	**5**	**8**	**1**	**0**	**5**							
Satisfaction Index		**69%**	**29%**	**42%**	**100%**	**100%**	**#DIV/0!**	**50%**							

#WEIGHTED AVERAGE=SUM(RELEVANCE*PERFORMANCE)/SUM OF RELEVANCE

#H=3/M=2/L=1

B.3 Rubrics and Checklists for Outcome Assessment

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Kuwait University
College of Engineering and Petroleum

Scoring Rubric for Laboratory Report (SRLR-2)

Course: _____ **Experiment:** _____ **Date:**

Student Name(s): 1. _____ **2.** _____ **3.** _____ **4.**

Weight	Criteria	4 (Excellent)	3 (Good)	2 (Fair)	1 (Poor)	Score
3	**Introduction, Background and Theory**	Discusses why the study was done, and clearly states the hypothesis tested. Presents background information or theoretical model concisely. No procedural or conceptual errors	Gives general description of the purpose of the study, but some relevant background information may be missing. Only minor procedural errors	Some information on the purpose of the study is given, but no background information is provided. Occasional conceptual and procedural errors.	Provides little or no information on why the study was done. No background information given.	
2	**Experimental Procedure /Data acquisition**	Concisely describes procedure, methods or gives references to sources of methods used. Equipment handling well described.	Methods generally are well described or referenced, but some items may be insufficiently described or left out.	Methods insufficiently explained or described in too little detail. Large gaps in information.	No description of materials and methodology used. and references to methods are not provided.	
5	**Results and data analysis**	Data are presented in tables or figures, with appropriate captions and text. Figures and tables are used to illustrate key comparisons or trends. No calculation errors.	Data are presented with some inconsistent captions or text, some data may be missing, or figures may be insufficient to show trends or comparisons, but some errors in calculations	Insufficient data presented to illustrate comparisons or to show trends, accompanying tables or figures are missing, major errors in calculations	Summarized data are missing. No text to present the results. No figures or tables are presented.	
10	**Discussion of Results**	Clearly discusses what results mean and what conclusions may be drawn from them. Cites published literature to support results. Demonstrate significant higher-order thinking ability	Good understanding of the theoretical interpretation. Good evidence of reading, other than that required. Demonstrate some higher-order thinking	Limited understanding of the theoretical interpretation Limited discussion of results and conclusions. Little or no reference to published literature.	Little or no discussion of results. No reference to previous studies. Reader can gain very little about why the project was done and what the results may mean.	
1	**References**	Includes references to methods and related studies, all complete and in appropriate style.	Appropriate references are generally present, but some may be incomplete or in incorrect style.	Few references are given. Style is incorrect and/or incomplete.	No references provided.	
4	**Use of English**	Writing is free of errors in grammar, punctuation, capitalization, and spelling. Flows smoothly. Logical connection of points. Follows standard journal paper style.	Writing is generally error-free. Sentence flow is generally smooth and logical. Contains few grammatical and rhetorical errors	Writing has some errors, but these are not too distracting. Flow is not consistently smooth; appears disjointed.	No evidence of relevant knowledge. Errors are frequent and distracting, so that it is hard to determine meaning. No logical connection of ideas of flow of sentences.	
					Grade = □ weight □ score	

Oral Presentation Evaluation Form

Presentation Title:
Course Number and Title:
Date:
Student Name(s):
Evaluator:

Rank each criterion by assigning a numerical grade from lowest 1 to highest 4.

Weight		4	3	2	1	Score
	Organization	Student presents information in logical, interesting sequence which audience can follow.	Student presents information in logical sequence which audience can follow.	Audience has difficulty following presentation because student jumps around	Audience cannot understand presentation because there is no sequence of information.	
	Subject knowledge	Student demonstrates full knowledge by answering all questions with explanations and elaboration.	Student is at ease with expected answers to all questions but fails to elaborate.	Student is uncomfortable with information and is able to answer only rudimentary questions.	Student does not have grasp of information; student cannot answer questions about subject.	
	Visual aids and surface features	Student's graphics explain and reinforce screen text and presentation. Screen text is error-free.	Student's graphics relate to text and presentation. Screen text has few errors.	Student occasionally uses graphics that rarely support text and presentation. Screen text contains errors.	Student uses superfluous graphics or no graphics and erroneous text	
	Eye contact	Student maintains eye contact with audience, seldom returning to notes.	Student maintains eye contact most of the time but frequently returns to notes.	Student occasionally uses eye contact, but still reads most of report.	Student reads all of report with no eye contact.	
	Elocution	Student uses a clear voice and correct, precise pronunciation of terms. All audience members can hear presentation	Student's voice is clear. Student pronounces most words correctly. Most audience members can hear presentation.	Student's voice is low. Student incorrectly pronounces terms. Audience members have difficulty hearing presentation.	Student mumbles, incorrectly pronounces terms, and speaks too quietly for students in the back of class to hear.	
	Kinesthetic features	Student moves easily before the audience and invites and answers questions	Student incorporates positive body language and answers questions	Student uses minimum physical gestures, poor posture, avoids questions	Student fidgety, hands in pockets, slouched, stationary posture, no engagement with audience, deflects questions	
25	**Total points:**					

Comments:

_____

_____

_____

Kuwait University
College of Engineering and Petroleum

Teamwork Scoring Rubric (SR-5) (Reference??)

SO5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

	This self and peer evaluation form assesses your ability to function effectively as a team. Be consistent when evaluating yourself and each team member's performance by using the following rubric. **Write the names of the team members →**		Your name				
Participation in the establishment of goals and workplan of the team	**1 (Beginning)**	Fails to provide input to the development of the team's goals and workplan.	1	1	1	1	1
	2 (Developing)	Makes contributions but generally depends on others to develop the goals and workplan.	2	2	2	2	2
	3 (Meets Expectations)	Consistently provides contributions to the development of the goals and workplan of the team.	3	3	3	3	3
	4 (Exemplary)	Demonstrates leadership in the development of the goals and workplan, keeping the team focused throughout the planning.	4	4	4	4	4
Contribution to the development of a collaborative team environment	**1 (Beginning)**	Has to be encouraged to participate in the team's work beyond individual assignment.	1	1	1	1	1
	2 (Developing)	Works with others when requested but not actively engaged in seeking out collaboration.	2	2	2	2	2
	3 (Meets Expectations)	Actively involved in engages other team members to develop a collaborative team environment.	3	3	3	3	3
	4 (Exemplary)	Collaborates actively in the work of the team and often seeks out others for advice on strategies to meet team goals.	4	4	4	4	4
Encouragement of an inclusive team environment	**1 (Beginning)**	Does not actively encourage other team members to participate to team discussions or share their opinions.	1	1	1	1	1
	2 (Developing)	Asks others to participate in the discussion and to share opinions but only on a selective basis.	2	2	2	2	2
	3 (Meets Expectations)	Actively engages others to sharing their opinions and participate in discussions to be sure all voices are heard and considered	3	3	3	3	3
	4 (Exemplary)	Actively engages others for their opinion and participation in team discussions acknowledging the importance of their contribution.	4	4	4	4	4
Dependability in the achievement of the team's goals	**1 (Beginning)**	Does not consistently complete assigned tasks.	1	1	1	1	1
	2 (Developing)	Completes assigned tasks but misses the deadline.	2	2	2	2	2
	3 (Meets Expectations)	Completes all assigned tasks in a timely manner.	3	3	3	3	3
	4 (Exemplary)	Completes own assigned tasks in a timely manner, while also assisting other team members to meet the overall goals.	4	4	4	4	4

Comments:

Kuwait University
College of Engineering and Petroleum

Teamwork Scoring Rubric (SR-5) (Reference??)

SO5: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

	This self and peer evaluation form assesses your ability to function effectively as a team. Be consistent when evaluating yourself and each team member's performance by using the following rubric. **Write the names of the team members →**		Your name				
Participation in the establishment of goals and workplan of the team	**1 (Beginning)**	Fails to provide input to the development of the team's goals and workplan.					
	2 (Developing)	Makes contributions but generally depends on others to develop the goals and workplan.					
	3 (Meets Expectations)	Consistently provides contributions to the development of the goals and workplan of the team.					
	4 (Exemplary)	Demonstrates leadership in the development of the goals and workplan, keeping the team focused throughout the planning.					
Contribution to the development of a collaborative team environment	**1 (Beginning)**	Has to be encouraged to participate in the team's work beyond individual assignment.					
	2 (Developing)	Works with others when requested but not actively engaged in seeking out collaboration.					
	3 (Meets Expectations)	Actively involved in engages other team members to develop a collaborative team environment.					
	4 (Exemplary)	Collaborates actively in the work of the team and often seeks out others for advice on strategies to meet team goals.					
Encouragement of an inclusive team environment	**1 (Beginning)**	Does not actively encourage other team members to participate to team discussions or share their opinions.					
	2 (Developing)	Asks others to participate in the discussion and to share opinions but only on a selective basis.					
	3 (Meets Expectations)	Actively engages others to sharing their opinions and participate in discussions to be sure all voices are heard and considered					
	4 (Exemplary)	Actively engages others for their opinion and participation in team discussions acknowledging the importance of their contribution.					
Dependability in the achievement of the team's goals	**1 (Beginning)**	Does not consistently complete assigned tasks.					
	2 (Developing)	Completes assigned tasks but misses the deadline.					
	3 (Meets Expectations)	Completes all assigned tasks in a timely manner.					
	4 (Exemplary)	Completes own assigned tasks in a timely manner, while also assisting other team members to meet the overall goals.					

Comments:

Kuwait University
College of Engineering and Petroleum

Title:
Course:
Date:
Student(s):

Evaluation Form for Written Work

Weight		4	3	2	1	Score
	Content	Information is correct/original/ creative/relevant/ unified/focused. Clear topic, main points and sufficient supporting detail. Correctly labeled and referenced visual tools as appropriate.	Information is mainly correct, etc., but contains minor errors, omissions or unrelated material. Visual tools show some minor deficiencies.	Gaps and/or errors in information and visual tools. Some digressions, and/or extraneous material.	Fails to present adequate or correct information. Insufficient, incorrect or inappropriate visuals.	
	Organization	Topic and supporting material (Including visuals) are presented logically. Correct paragraph organization. Headings and sub-headings well-chosen and placed.	Minor errors in organization, logical presentation and paragraphing. Headings and sub-headings adequate.	Not well planned. Logic is not always easy to follow. Organization and paragraphing are haphazard. Headings inconsistent.	Order of presentation jumbled and confused. Ideas disconnected. No evidence of planning. Poor paragraphing and headings.	
	Conventions	Mostly correct grammar, spelling, punctuation and capitalization. Layout is good.	Several minor and major mechanical errors but mistakes do not confuse reader. Layout mainly good.	Minor and major mistakes. Mechanical errors confuse reader in parts. Adequate layout.	Too many minor and major mechanical errors. Errors interfere with readability. Careless layout.	
	Word Choice/ Vocabulary	Appropriate vocabulary and terms.	Word choice is not always correct or appropriate.	Several wrong word choices and inappropriate usage.	A lot of words are misused, vague or repetitive. Meaning often unclear.	
	Comprehensibility/ Fluency	Good clarity and readability. Sentences flow smoothly and are varied and concise. Smooth transitions.	Mostly readable. Most sentences are smooth and clear but some are awkward. Meaning mainly clear.	Sentence patterns are awkward and repetitive. Incomplete and run-on sentences. Meaning does not flow. Needs some rereading.	Sentences are jumbled and confused. Meaning is obscured and much rereading is necessary.	
	Total					

Department of _____ Engineering

ABET Capstone Design Project Checklist

Semester: _____

Project Name:
Done by:
Supervised by:

S.No.	Item	Response	Page #
1.	What is the end product of your Capstone project?		
	Select from: (a) system, (b) component, (c) an artifact, or (d) process and give a brief description.		
2.	Please explain how the following aspects of the design process were considered in the capstone project.		
	a. Iterative process		
	b. Creativity		
	c. Decision making		
3.	How were the following processes included in the Capstone project?		
	a. Identify opportunities		
	b. Develop requirements		
	c. Perform analysis and synthesis		
	d. Generate multiple solutions		
	e. Evaluate solutions against requirements		
	f. Consider risks		
	g. Make trade-offs		
4.	Explain how and where did you apply basic sciences, mathematics and engineering sciences in the Capstone project?		
5.	Explain whether you utilized knowledge and skills acquired in earlier courses in the Capstone design project and how?		
6.	Did you apply appropriate Engineering standards in your capstone project? Please give details.		

7.	Did your capstone design project include any of the following? Please provide details of applicable item(s) [minimum one item is required].		
	a. wide-ranging or conflicting technical issues		
	b. having no obvious solution		
	c. addressing problems not encompassed by current standards and codes		
	d. involving diverse groups of stakeholders		
	e. including many component parts or sub-problems		
	f. involving multiple disciplines		
	g. significant consequences in a range of contexts		
8.	How did you take into account the following in your capstone design project?		
	a. public health, safety, and welfare		
	b. global, cultural and social impact		
	c. environmental considerations		
	d. economic factors		
9.	Which realistic constraints did you consider in your capstone design project? Select minimum two from the list and provide a brief summary how each constraint was considered in the design with a description of its impact on the final design. **Possible constraints:** accessibility, aesthetics, codes, constructability, cost, ergonomics, extensibility, functionality, interoperability, legal considerations, maintainability, manufacturability, marketability, policy, local regulations, schedule, standards, sustainability, usability, or OTHER.		
	Constraint 1		
	Constraint 2		

Appendix B. The Engineering Professional Skills (EPSA) Rubric (one-page version - March 2014)

	0 - Missing	1 - Emerging	2 - Developing	3 - Practicing	4 - Maturing	5 - Mastering
ABET Skill 3f Understanding of professional and ethical responsibility						
Stakeholder Perspective	Students do not identify stakeholders	Students identify few and/or most obvious stakeholders, perhaps stating their positions in a limited way and/or misrepresenting their positions.		Students explain the perspectives of major stakeholders and convey these with reasonable accuracy.		Students thoughtfully consider perspectives of diverse relevant stakeholders and articulate these with great clarity, accuracy, and empathy.
Problem Identification	Students do not identify the problem(s) in the scenario.	Students begin to frame the problem but have difficulty separating primary and secondary problems. If approaches to address the problem are advocated, they are quite general and may be naive.		Students are generally successful in distinguishing primary and secondary problems with reasonable accuracy and with justification. There is evidence that they have begun to formulate credible approaches to address the problems.		Students convincingly and accurately frame the problem and parse it into sub-problems, providing justification. They suggest detailed and viable approaches to resolve the problems.
Ethical Consideration	Students do not give any attention to ethical considerations	Students give passing attention to related ethical considerations. They may focus only on obvious health and safety considerations and/or fair use of funds involving primary stakeholders.		Students are sensitive to relevant ethical considerations and discuss them in context of the problem(s). Students make linkages between ethical considerations and stakeholder interests. Students may identify ethical dilemmas and discuss possible tradeoffs.		Students clearly articulate relevant ethical considerations and address these in discussing approaches to resolve the problem(s). Students make linkages between ethical considerations and stakeholder interests and incorporate them into their analysis and resolutions. Students may discuss ways to mediate dilemmas or suggest tradeoffs.
ABET Skill 3g Ability to communicate effectively						
Group Interaction	Students do not interact as a group.	Students pose individual opinions, without considering other student's ideas.		Students try to balance everyone's input and build on/clarify each other's ideas. The majority of students give thoughtful input and attempt to build on and/or clarify other's ideas with some success.		Students clearly encourage participation from all group members, generate ideas together and actively help each other clarify ideas.
Group Self-Regulation	There is no evidence of group self-regulation.	Some students may dominate (inadvertently or on purpose) or become argumentative. Students may attempt to regulate the discussion, but without success. There may be some tentative, but ineffective, attempts at reaching consensus.		Students regulate the discussion by identifying unproductive communication. Students attempt to reach consensus but may find it challenging to implement strategies that equitably consider multiple perspectives. The majority of students work to achieve consensus in order to frame the problem and propose approaches.		Students use self-regulation strategies to ensure a productive discussion. Students clearly work together to reach a consensus in order to clearly frame the problem and develop appropriate, concrete ways to resolve the problem.
ABET Skill 3h Broad Understanding of the impact of engineering solutions in global, economic, environmental, and cultural/societal contexts.						
Impact/ Context	Students do not consider the impacts of potential solutions	Students give cursory consideration to how their proposed solutions impact contexts. Contexts considered may not be relevant. Students don't seem to understand the value or point of considering impacts of technical solutions or the contexts within which the solution is proposed.		Students consider how their proposed solutions impact major relevant contexts, and possibly re-think their understanding of the problem(s) themselves, justify possible solutions with reasonable accuracy. Impacts considered may be associated with relevant secondary problems.		Students clearly examine and weigh how their proposed solutions impact major relevant contexts, justify possible solutions with reasonable accuracy. Impacts considered may be associated with relevant secondary problems and understand how different contexts can affect solution effectiveness.
ABET Skill 3i Recognition of the need for and ability to engage in life-long learning.						
Scrutinize Information	Students do not refer to or scrutinize information presented in the scenario.	Students refer to the information presented in the scenario (e.g., "it says"). Students begin to examine information presented in the scenario. Examples include, but are not limited to questioning the validity of information sources, distinguishing fact from opinion		Students examine information presented in the scenario, and potentially the information sources. Examples include, but are not limited to questioning the validity and potential biases of information sources, distinguishing fact from opinion, recognizing what is implied and what is explicit		Students examine not only information, but also information sources. Examples include, but are not limited to: discussing potential and probable biases of the information sources, distinguishing fact from opinion in order to determine levels of information validity, analyzing implied information.
Identify Knowledge Status	Students do not differentiate between what they do and do not know.	Students begin to identify the boundaries of their knowledge of the issues raised in the scenario. Examples include, but are not limited to: recognizing information that is new to them, beginning to ask questions, injecting their own life experiences, possibly without questioning the validity in relationship to other sources		Students identify the limits of their knowledge of the issues raised in the scenario. Examples include, but are not limited to connecting personal experiences or information read/heard elsewhere, recognizing that personal experiences may or may not benefit analysis of the issues, considering related historical events, identifying specific knowledge gaps and reliable sources to consult		Students identify the specific limits of their knowledge of the issues raised in the scenario and how those limitations affect their analysis. Examples include, but are not limited to: checking assumptions related to personal experiences or information read/heard elsewhere, considering related historical events, acknowledging that they learned from the scenario, each other and the discussion, identifying specific knowledge gaps and a variety of reliable sources to consult
ABET Skill 3j Knowledge of contemporary issues.						
Non-Technical	Students do not consider contemporary political or geo-political issues.	Students give limited consideration to contemporary political and/or geo- political issues. Non-technical issues may be treated in a condescending manner, or without understanding of why an engineer may need to consider non-technical issues.		Students give meaningful contemporary political and/or geo-political issues. Students show some accurate understanding of how non-technical issues may affect framing the problem(s) and possible solutions.		Students give extensive meaningful consideration to contemporary political and/or geo-political issues. Students fully understand the importance of how the non-technical issues considered impact framing the problem(s) and possible solutions.
Technical Issues	Students do not consider modern methods, technologies and/or tools.	Students give passing consideration to modern methods, technologies and/or tools. Students may not show awareness that certain methods, technologies and/or tools are not relevant in framing and/or solving the problem(s).		Students give relevant consideration to modern methods, technologies and/or tools in framing and/or solving the problems(s).		Students give extensive relevant consideration to modern methods, technologies and/or tools in framing and/or solving the problems(s).

Kuwait University
College of Engineering and Petroleum

Lab Report Evaluation Form

Experiment:
Course Number and Title:
Date:
Student Name(s):

Assign a weight (W) for each criterion to be evaluated. Sum of weights is 20.
Rank each criterion by assigning a numerical grade (G) from lowest 1 to highest 5.

	Weight (W)	Grade (G)	W*G
1. Mathematical Modeling. *Formulation and solution of experimental problems.*		1 2 3 4 5	
2. Design and setup experiments, conduct and data analysis.			
a. Objectives and Experimental Setup with Layout.		1 2 3 4 5	
b. Data Acquisition and Observations.		1 2 3 4 5	
c. Sample Calculations.		1 2 3 4 5	
d. Results and Data Analysis.		1 2 3 4 5	
e. Discussion.		1 2 3 4 5	
f. Conclusion.		1 2 3 4 5	
3. Team Building Skills for a Group Report.		1 2 3 4 5	
4. Written Communication.			
a. Structure/Organization.		1 2 3 4 5	
b. Grammar/Rhetoric.		1 2 3 4 5	
c. Visuals and Illustrations.		1 2 3 4 5	
d. Graphs/Plots.		1 2 3 4 5	
5. Innovative and Creative Recommendations.		1 2 3 4 5	

GRADE = Σ (W* G) = _____%

Comments:

_____

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_____

Kuwait University
College of Engineering and Petroleum

Oral Presentation Evaluation Form

Presentation Title:
Course Number and Title:
Date:
Evaluator's Name:
Student Name(s):

Assign a weight (W) for each criterion to be evaluated. Sum of weights is 20.
Rank each criterion by assigning a numerical grade (G) from lowest 1 to highest 5.

	Weight (W)	Grade (G)					W*G
1. Presentation style. *Presenter's voice is clear and audible.* *Presenter has good control of gestures and motions.* *Presenter exhibits self-confidence.*		1	2	3	4	5	
2. Use of audio-visual aids. *Audio-visual aids are used to support the presentation.* *Quality of audio-visual aids is appropriate.*		1	2	3	4	5	
3. Content of the presentation. *Main ideas are presented logically.* *Objectives are stated clearly and are met.* *Allotted time is used efficiently.*		1	2	3	4	5	
4. Audience. *Content and style is appropriate to audience level.* *Competent response to questions and comments.*		1	2	3	4	5	
5. Quality of technical information presented. *Quality of recommendations and discussion is appropriate.* *Ideas presented reflect originality and innovative thinking.*		1	2	3	4	5	
6.__		1	2	3	4	5	

GRADE = $\sum$(W* G) = _____ %

Comments:

_____

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_____

AT-WREF

Kuwait University
College of Engineering and Petroleum

Written Report Evaluation Form

Report Title:
Course Number and Title:
Date:
Student Name(s):

Assign a weight (W) for each criterion to be evaluated. Sum of weights is 20.
Rank each criterion by assigning a numerical grade (G) from lowest 1 to highest 5.

	Weight (W)	Grade (G)					W*G
1. Ease of understanding. *Correct usage of grammar, spelling, and punctuation.* *Concise and cohesive sentence structures.* *Appropriate vocabulary for subject matter.* *Report is well structured.*		1	2	3	4	5	
2. Appropriate use of visual tools. *Clear diagrams, photos, and graphs are used when needed.* *Visuals are correctly labeled and referenced.*		1	2	3	4	5	
3. Logical presentation of ideas. *Ideas are developed and supported in a logical manner.* *Supporting material is clearly referenced.*		1	2	3	4	5	
4. Quality of technical information presented. *Precise technical information is presented.* *Engineering principles are well developed.*		1	2	3	4	5	
5. Quality of outcomes presented. *The material presented supports outcomes.* *Quality of recommendations and discussion is appropriate.*		1	2	3	4	5	
6. Overall report quality. *Intended objectives are met.* *The material is covered in a comprehensive manner.* *Ideas presented reflect originality and innovative thinking.*		1	2	3	4	5	
7.__		1	2	3	4	5	

GRADE = $\sum$(W* G) = __ %

Comments:

_____

_____

DEPARTMENT OF CIVIL ENGINEERING

Proposed Civil Engineering Curriculum - Credits 132
(2023/2024)

I. PRELIMINARY REMEDIAL COURSES

ENGL	098	Remedial English* (10 Units)	

II. UNIVERSITY REQUIREMENTS (18 Credits)

*A. Compulsory Courses (9 Credits) ***

ENGL	123	Intermediate Writing Skills	3
ENGL	221	Technical Writing	3
HIST	100	Modern History of Kuwait	3

B. General Education Electives (9 Credits)

Students choose a minimum of 9 credits from the general education offerings approved by the College.

III. BASIC SCIENCES COURSES (27 Credits)

MATH	101	Calculus I	3
MATH	102	Calculus II	3
MATH	111	Linear Algebra	3
MATH	211	Calculus III	3
MATH	240	Ordinary Differential Equations	3
CHEM	101	General Chemistry I	3
CHEM	105	General Chemistry Lab I	1
PHYS	101	Physics I	3
PHYS	105	Physics I Lab	1
PHYS	102	Physics II	3
PHYS	107	Physics II Lab	1

IV. CORE ENGINEERING COURSES (23 Credits)

ENGR	104	Engineering Graphics and Design	2
ENGR	202	Statics	3
ENGR	204	Strength of Materials	3
ENGR	203	Dynamics	3
ENGR	208	Engineering Thermodynamics	3
ENGR	209	Engineering Economy	3
ENGR	304	Engineering Probability & Statistics	3
ENGR	307	Applied Numerical Methods & Programming in Engineering	3

V. DEPARTMENT REQUIREMENTS (64 Credits)

A. Compulsory Courses (55 Credits)

CE	201	Introduction to Design	3
CE	236	Geomatics Engineering	3
CE	252	Engineering Materials	3
CE	271	Structural Analysis I	3
CE	310	Fluid Mechanics	3
CE	311	Water Resources	4
CE	312	Environmental Engineering	3
CE	350	Soil Mechanics	4
CE	366	Transportation Engineering	4
CE	371	Structural Analysis II	3
CE	373	Reinforced Concrete I	3
CE	430	Legal, Professional & Social Aspects of Engineering	3
CE	401	Coastal Engineering Fundamentals	3
CE	435	Construction Eng. & Management	4
CE	451	Foundation Engineering	3
CE	473	Reinforced Concrete II	3
CE	490	Engineering Design (Capstone)	3

*B. Elective Courses (9 Credits) ***

I. Students must complete 3 credits from the list of restricted electives offered by the department.

II. Students choose 3 credits from departmental free electives.

III. Students choose 3 credits from a list of science electives offered by CE Department or the College of Science.

TOTAL REQUIREMENTS: 132 CREDITS

* Must be taken by students requiring Remedial English.

** Non-Arab speaking students must take ARAB 190. They will be exempted from requirements taught in Arabic up to a maximum of 9 credits.

*** Refer to the list of elective courses attached.

List of CE Restricted Elective Courses

CE 403	Coastal Processes and Modeling	(3 credits)
CE 411	Water and Wastewater Treatment	(3 credits)
CE 412	Open Channel Hydraulics	(3 credits)
CE 414	Hydraulic Engineering	(3 credits)
CE 434	Construction Estimation & Cost Control	(3 credits)
CE 452	Earth & Earth Retaining Structures	(3 credits)
CE 461	Traffic Engineering	(3 credits)
CE 463	Highway Materials & Construction	(3 credits)
CE 476	Computer Applications in Structural Eng.	(3 credits)

List of CE Free Electives

CE 395	Engineering Training (Managed by Engineering Training and Alumni Center)	(3 credits)
CE 405	Fundamentals of Oceanographic Engineering	(3 credits)
CE 413	Groundwater Hydraulics	(3 credits)
CE 454	GIS and Remote Sensing in Engineering Applications	(3 credits)
CE 456	Sustainability and Green Engineering	(3 credits)
CE 419	Environmental Pollution Control	(3 credits)
CE 425	Computer Applications in Water Resources & Environmental Engineering	(3 credits)
CE 429	Groundwater Contamination	(3 credits)
CE 436	Construction Work Improvement	(3 credits)
CE 437	Concrete Construction & Technology	(3 credits)
CE 449	Civil Engineering Systems	(3 credits)
CE 455	Computer Applications in Geotechnical Engineering	(3 credits)
CE 462	Traffic Control Systems	(3 credits)
CE 464	Urban Transportation Planning	(3 credits)
CE 465	Pavement Design	(3 credits)
CE 471	Steel Design I	(3 credits)
CE 475	Pre-stressed Concrete	(3 credits)

List of Science Electives offered by CE Department or the College of Science (3 credits)

CE 206	Introduction to Material and Earth Sciences	(3 credits)
CE 210	Ecology and Environmental Systems	(3 credits)
0490-101	Physical Geology	(3 credits)
0490-105	Microbiology	(3 credits)

List of Restricted General Education Electives

Law	0200-102	Legal Culture
Law	0200-105	Human Rights
Law	0200-106	Constitutional Law in Kuwait
Philosophy	0360-104	Public Service & Professional Ethics
Philosophy	0360-108	Ethics & Modern Society
Sharia & Islamic Studies	0900-102	Islamic Culture
Comparative Jurisprudence & Policy of Sharia	0940-142	Islam & Modern Society
Comparative Jurisprudence & Policy of Sharia	0940-145	Islam, Science & Technology Issues
Political Sciences	1360-103	Government & Politics of Kuwait
Political Sciences	1360-108	Culture of Peace & Social Coexistence