College of Engineering and Petroleum
Office of Academic Assessment

TRAINING SESSION

Preparation of Assessment Data

by
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17 April 2023

Part 1: Overview of ABET Criteria & Assessment

Part 2: Formative Assessment

Part 3: Summative Assessment

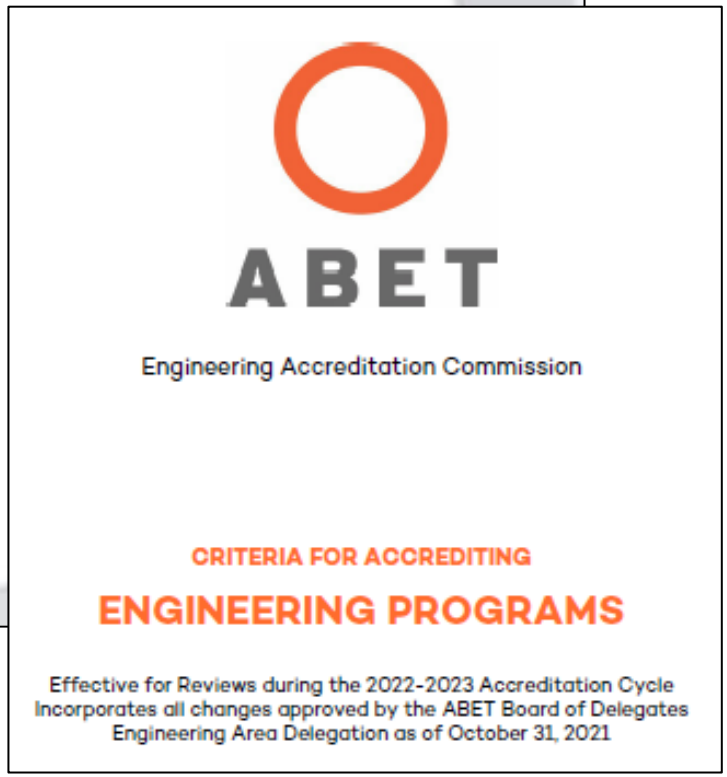
PART 1:
Overview of ABET Criteria & Assessment

ABET EAC Criteria

Criteria

1. Students
2. Program Educational Objectives
3. Student Outcomes
4. Continuous Improvement
5. Curriculum
6. Faculty
7. Facilities
8. Institutional Support

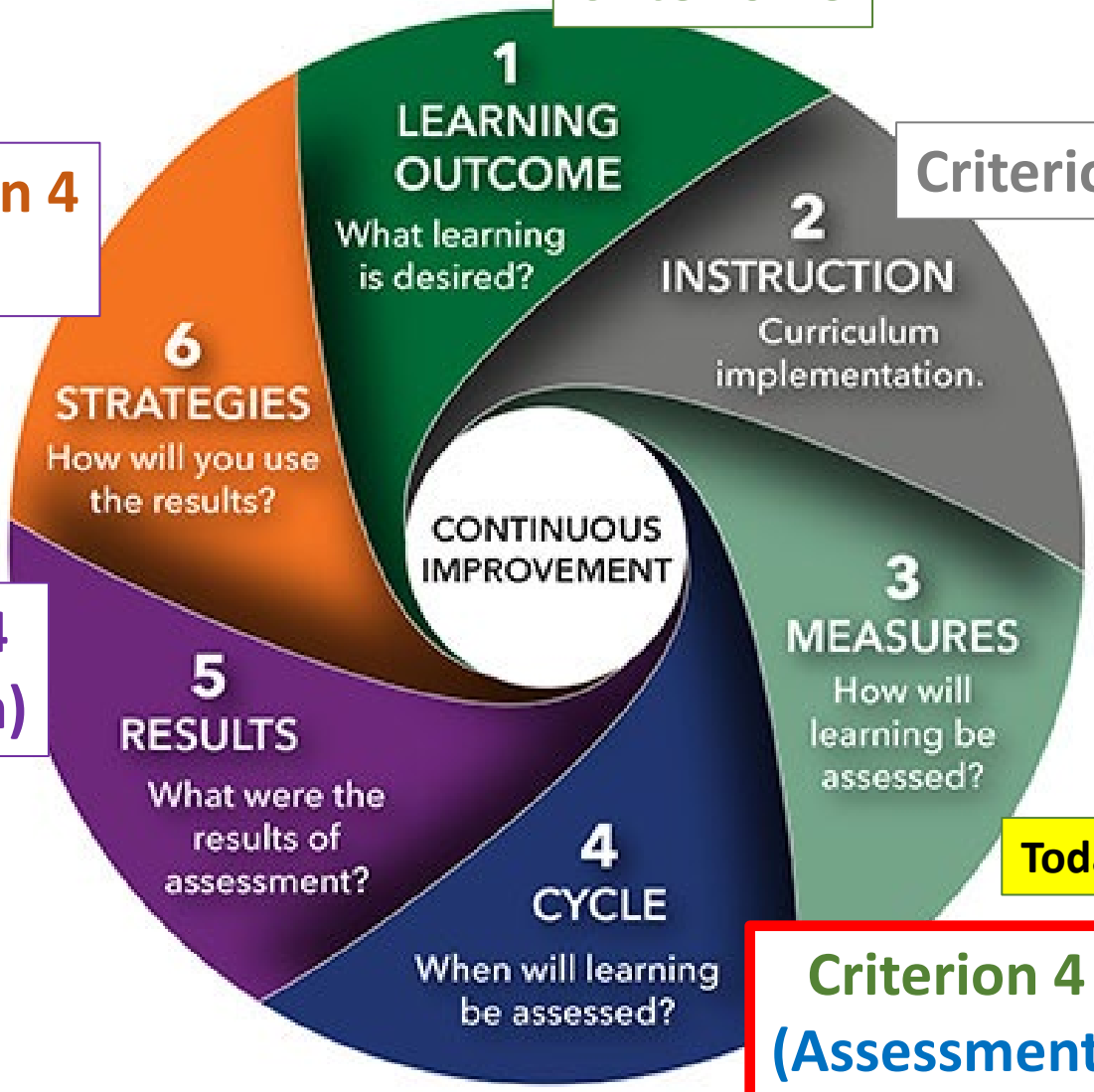
Part III – Program Criteria
(Discipline Specific)



Criterion 4. Continuous Improvement

The program must regularly use appropriate, documented processes for **assessing** and **evaluating** the extent to which the **student outcomes** are being attained. The results of these evaluations must be systematically utilized as input for the program's **continuous improvement** actions. Other available information may also be used to assist in the continuous improvement of the program.

Continuous Improvement (CI) Cycle



Criterion 3

Criterion 5

Criterion 4 (CI)

Criterion 4 (Evaluation)

Today's FOCUS

Criterion 4 (Assessment)

Two tasks in Criterion 4

(1) Assessment

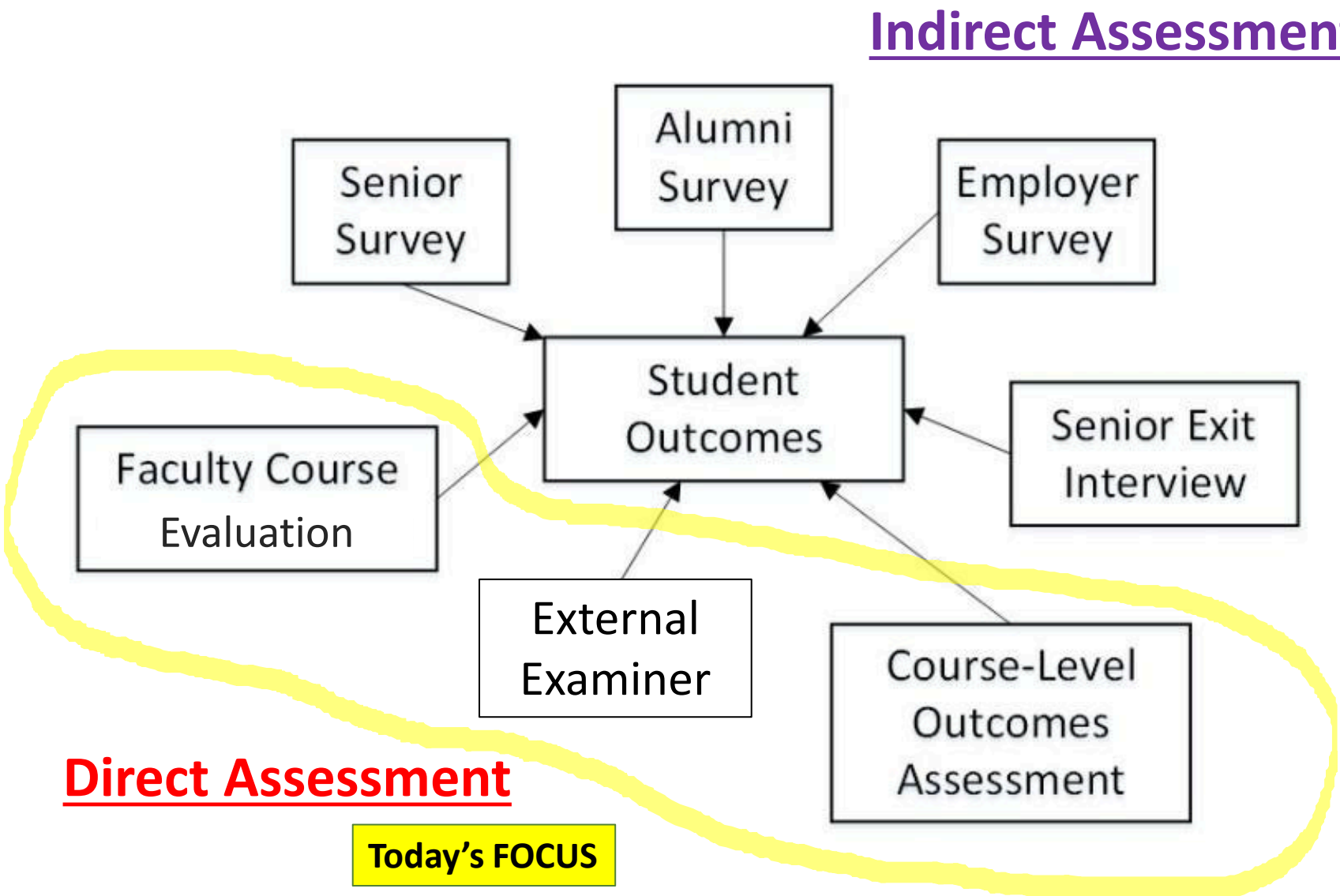
Today's FOCUS

Assessment offer a framework through which you can **identify, collect and prepare data** to evaluate the attainment of Student Outcomes and Program Educational Objectives.

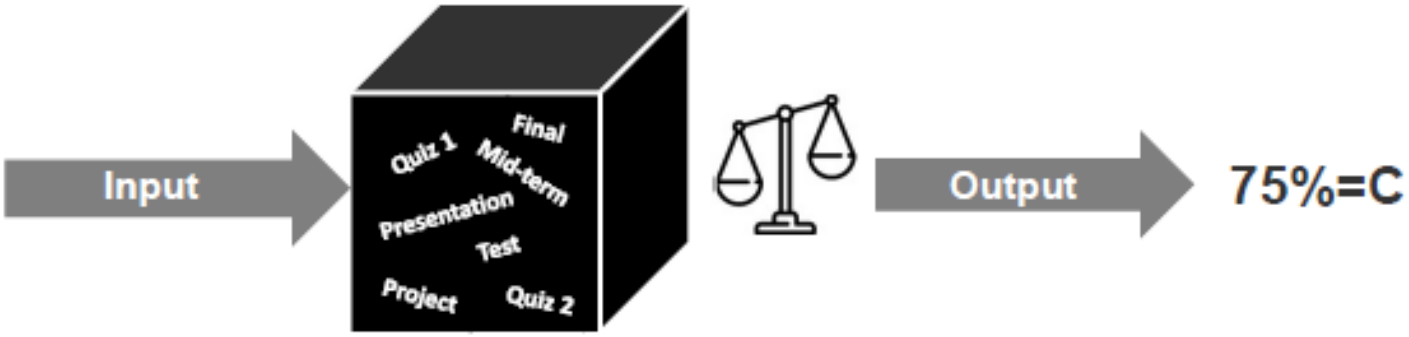
(2) Evaluation

One or more processes for **interpreting the data and evidence** accumulated through assessment practices. Evaluation determines the extent to which **Program Educational Objectives and Student Outcomes are being attained**. Evaluation results in decisions and actions regarding **program improvement**.

Student Outcomes Assessment Methods



Course Grades ≠ Assessment



Course grades are like a black box – the output is a grade that represents a set of aggregated outcomes with little to no diagnostic value related to specific strengths/weaknesses in student learning.

- 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].

Levels of Assessment

Course Vs Program Assessment

Course Assessment

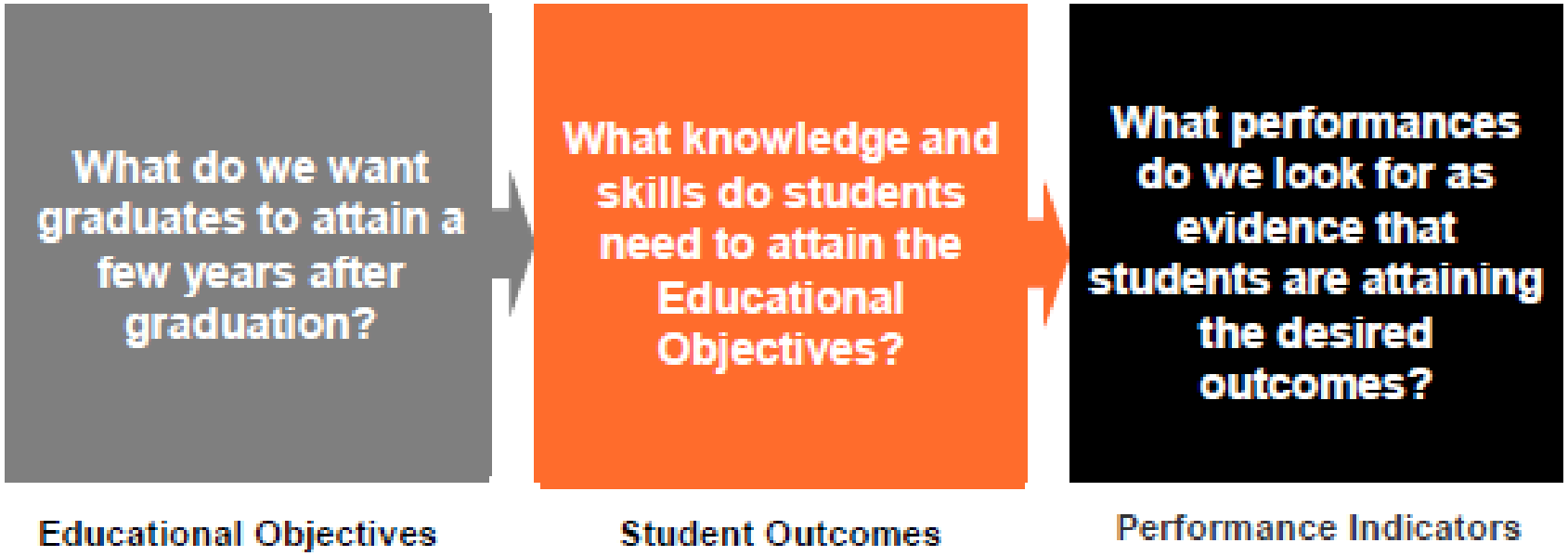
Mostly Formative Assessment

Course Example: Intro to Excel

Levels of Assessment

Mostly Summative Assessment

Program Assessment



Direct SO Assessment

Categories of Assessment Methods

Formative – those undertaken as students progress through the course/curriculum; the purpose is to identify areas of learning that need to be improved before the end of the course or their program of study.	**Summative** – obtained at the end of a course or program; the purpose of which is to document student learning; designed to capture students' achievement before program completion.

	First Year					Sophomore				Junior				Senior		
	CSCI 1301	CSCI 2200	CSCI 1302	CSCI 2611	CSCI 2210	CSCI 1730	CSCI 2200	CSCI 2720	CSCI 2920	CSCI 3270	CSCI 4270	CSCI 4210	CSCI 4230	CSCI 4235	CSCI 4910	CSCI 4911
WORK EFFECTIVELY ON A TEAM																
Participates in the establishment of goals and workplan of the team.					x			x					x			x
Contributes to the development of a collaborative team environment.					x			x					x			x
Encourages an inclusive team environment.					x			x					x			x
Exhibits dependability in the achievement of the team's goals.													x			x

Formative Assessment

- Used for assessing the **need for learning**.
- Mostly used for course assessment.
- Not required to be 100% quantitative. Can contain qualitative assessment.
- Provides **feedback for improving the course contents**, pre-reqs suitability, emphasis on certain learning topics etc.
- Rigorous use of an assessment tool is optional.
- Data can be derived from **homeworks, quizzes, exam problems** etc.
- Faculty is responsible for designing the assessment artifact but a teaching assistant can be part of the assessment process.
- Data can be collected from all courses including **electives**.
- Results of assessment can be used in conjunction with summative data for SO evaluation but not required.
- Collected data provides evidence for curricular coverage (Criterion 5).

Summative Assessment

- Used for assessing the **learning**.
- Mostly used for **Student Outcome** assessment.
- Required to be 100% quantitative.
- Provides **data for evaluation of Student Outcome**.
- Rigorous use of an assessment tool is **REQUIRED**.
- Data has to be derived from **exam problems, projects** etc. that are specifically designed to assess one or more aspects of a SO.
- **Faculty** is responsible for designing the assessment artifact and assessing the student work but a **teaching assistant** can be part of the data analysis and evidence preparation process.
- Data to be collected from **required courses (300 or higher level) only** according to the department assessment plan.
- Results are used for **SO evaluation** after aggregation of assessment data from various courses targeting the same SO.
- Collected data provides evidence for SO assessment (Criteria 3/4).

Formative and Summative Assessment Framework in KU College of Engineering

Kuwait University
College of Engineering & Petroleum
Office of Academic Assessment

INSTRUCTOR CLASS EVALUATION FORM

Submitted

Department	Civil Engineering Department
Instructor Name	Muhammad Tariq Chaudhary
Course Name	Strength of Materials
Course Num	0600 - 204 - 08A
Semester	22/23 Fall
Number of times that you taught th	

ICEF – Formative Assessment

- Grading

	Grading Scale
	25 %
Mid Exam 2	25 %
Homeworks	5 %
Quiz	5 %
Final Exam	40 %
	100%

- Grade Distribution:

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 Che		
Summary of			
Measure	Cl		ge
Performance			
Outcome Indicator			
Instructor's Comments	Cla students passing the course 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 (_____)		

SOAF – Summative Assessment

Formative and Summative Assessment

Where are these done?

Civil Engineering

No	Course Name	1	2	3	4	5	6	7
620-201	Introduction to Designs	M	H	H	M	M		M
620-236	Construction Surveying	M	L			M	H	L
620-252	Engineering Materials	L	M	L	L		H	
620-271	Structural Analysis I	H		H	L			
620-310	Fluid Mechanics	H	L					
620-311	Water Resources	H	M	L	L	M	H	
620-312	Environm	H	H	L	L	L	H	
620-350		H	L	L		L	H	L
620-366		H	M	L	L	L	M	L
620-371		H		M				L
620-373	ed Concrete I	M	H	H				L
620-430	Legal, Professional and Social Aspects of Engineering			H	H	H		H
620-435	Construction Engineering and Management	M	M	H		M		H
620-451	Foundation Engineering	H	H	L	L	M	L	L
620-473	Reinforced Concrete II	M	H	H				L
620-490	Capstone Design	L	H	H	M	M		M
	Total numbers of H or M courses	13	10	8	3	7	6	4

Formative Assessment – All courses

Formative and Summative Assessment

Where are these done?

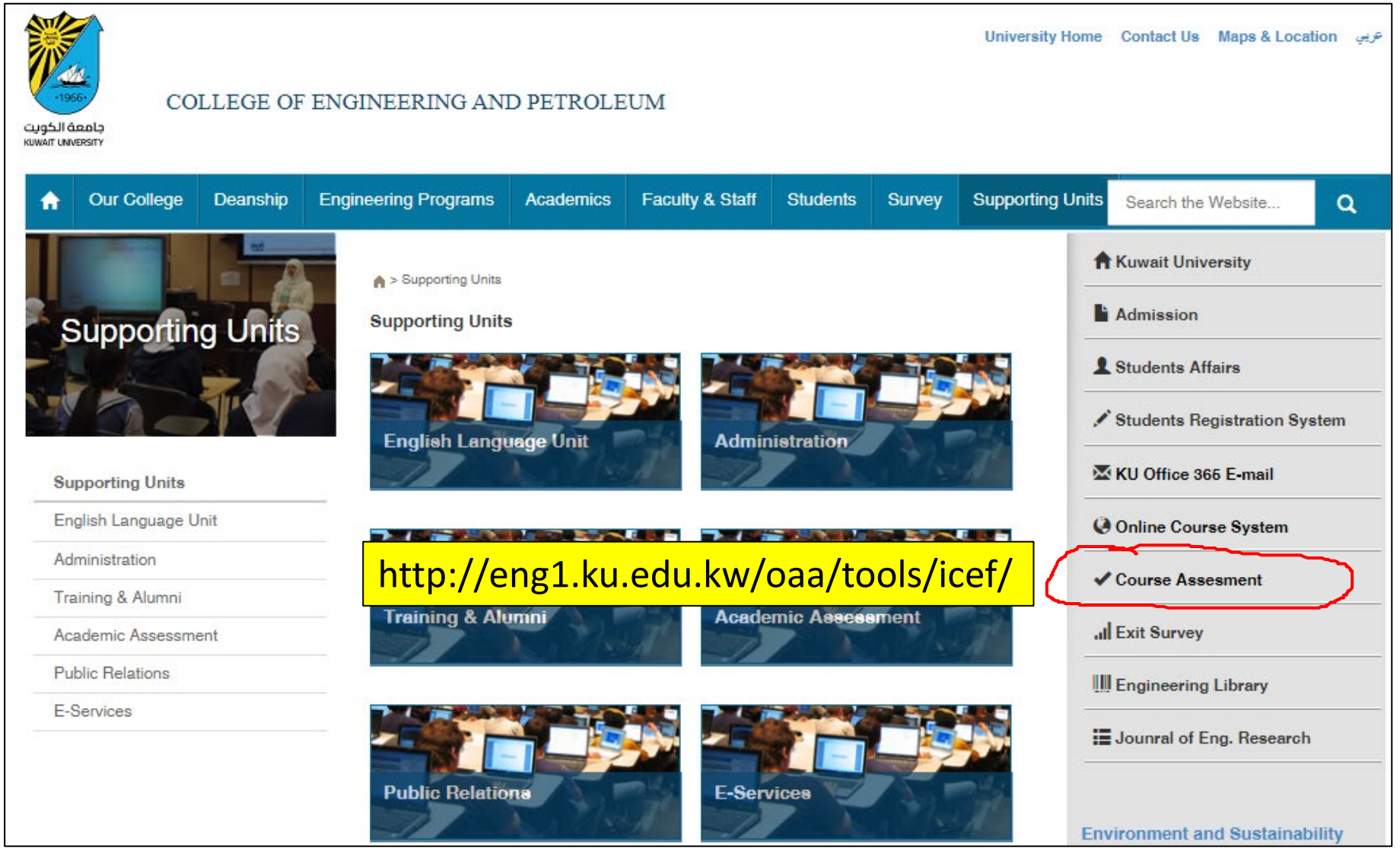
Course No.	Course Name	Student Outcomes						
		1	2	3	4	5	6	7
0620-201	Introduction to Designs				X			
0620-236	Construction Surveying						X	
0620-252	Engineering Materials						X	
0620-271	Structural Analysis I			X				
0620-310	Fluid Mechanics							
0620-311	Water Reso…	X				X		
0620-312	F…		X			X		
0620-350						X	X	
0620-366	…gineering	X						
0620-371	…al Analysis II	X						
0620-373	Reinforced Concrete I		X					
0620-430	Legal, Professional and Social Aspects of Engineering				X	X		
0620-435	Construction Engineering and Management							X
0620-451	Foundation Engineering		X					
0620-473	Reinforced Concrete II		X					
0620-490	Capstone Design		X	X		X		
	Total	3	5	2	2	5	3	1

Summative Assessment – Higher level required courses only

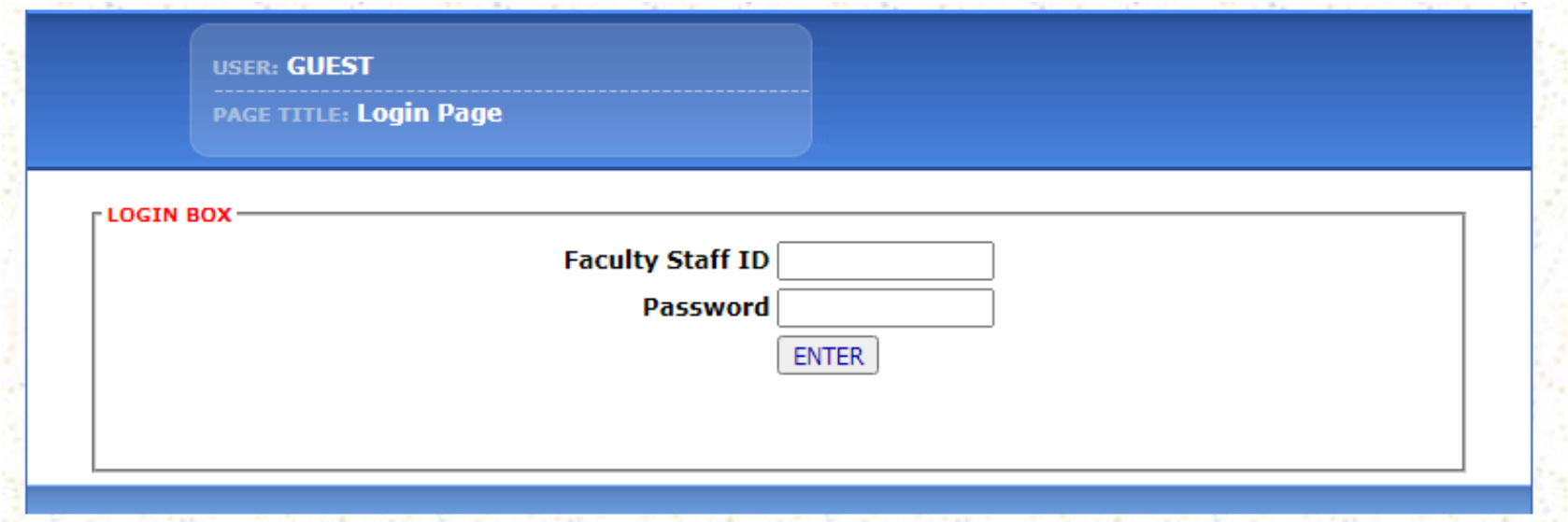
PART 2:
Formative Assessment

Formative Assessment

using web-based ICEF



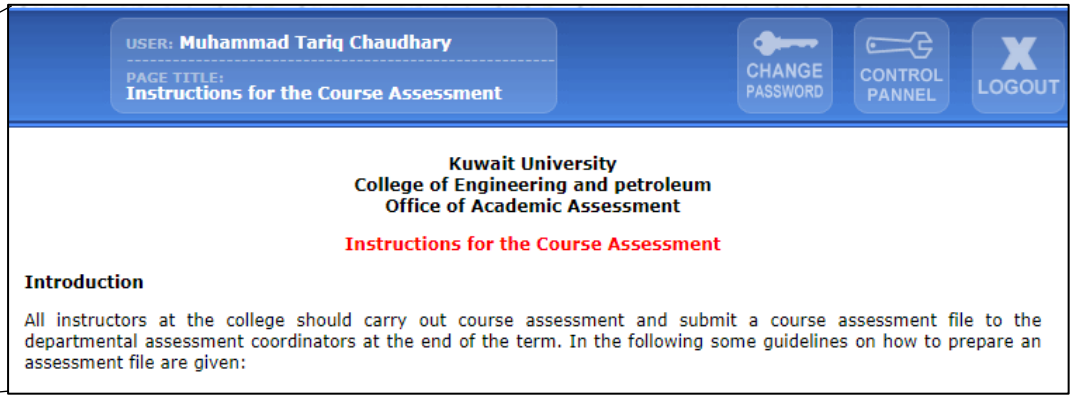
Step 1: Login to your account



TIP: New Users, please contact OAA for creating an account.
Email: oaa@eng.ku.edu.kw

Step 2: Edit or start new ICEF

Help for new users



Instructions for Course Assessment

USER: Muhammad Tariq Chaudhary

PAGE TITLE: Control Pannel

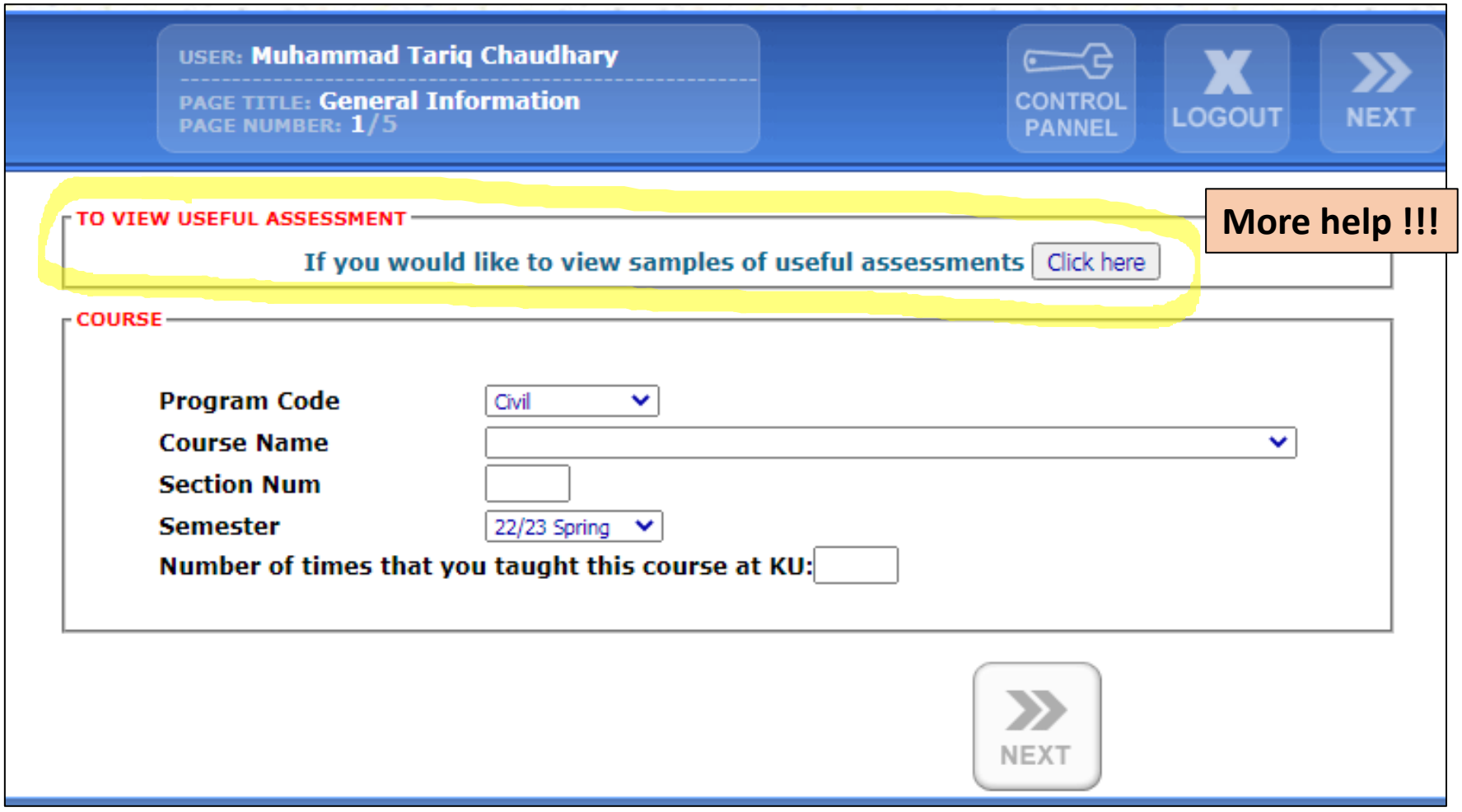
CHANGE PASSWORD | ACCOUNT DETAILS | LOGOUT

ACTIVE ASSESSMENTS

Course Number	Course Name	Status	Last Modification	Action
22/23 Fall				
0600-204-08A	Strength of Materials	DONE	2023-01-12 08:57:17	VIEW EDIT
0620-371-03A	Structural Analysis II	DONE	2023-01-12 08:43:55	VIEW EDIT
21/22 Spring				
0620-490-08A	Capstone Design Course	DONE	2022-06-18 18:02:44	VIEW EDIT
0600-202-05A	Statics	DONE	2022-06-13 03:59:16	VIEW EDIT

Start a New Assessment

Step 3: Add course info as listed



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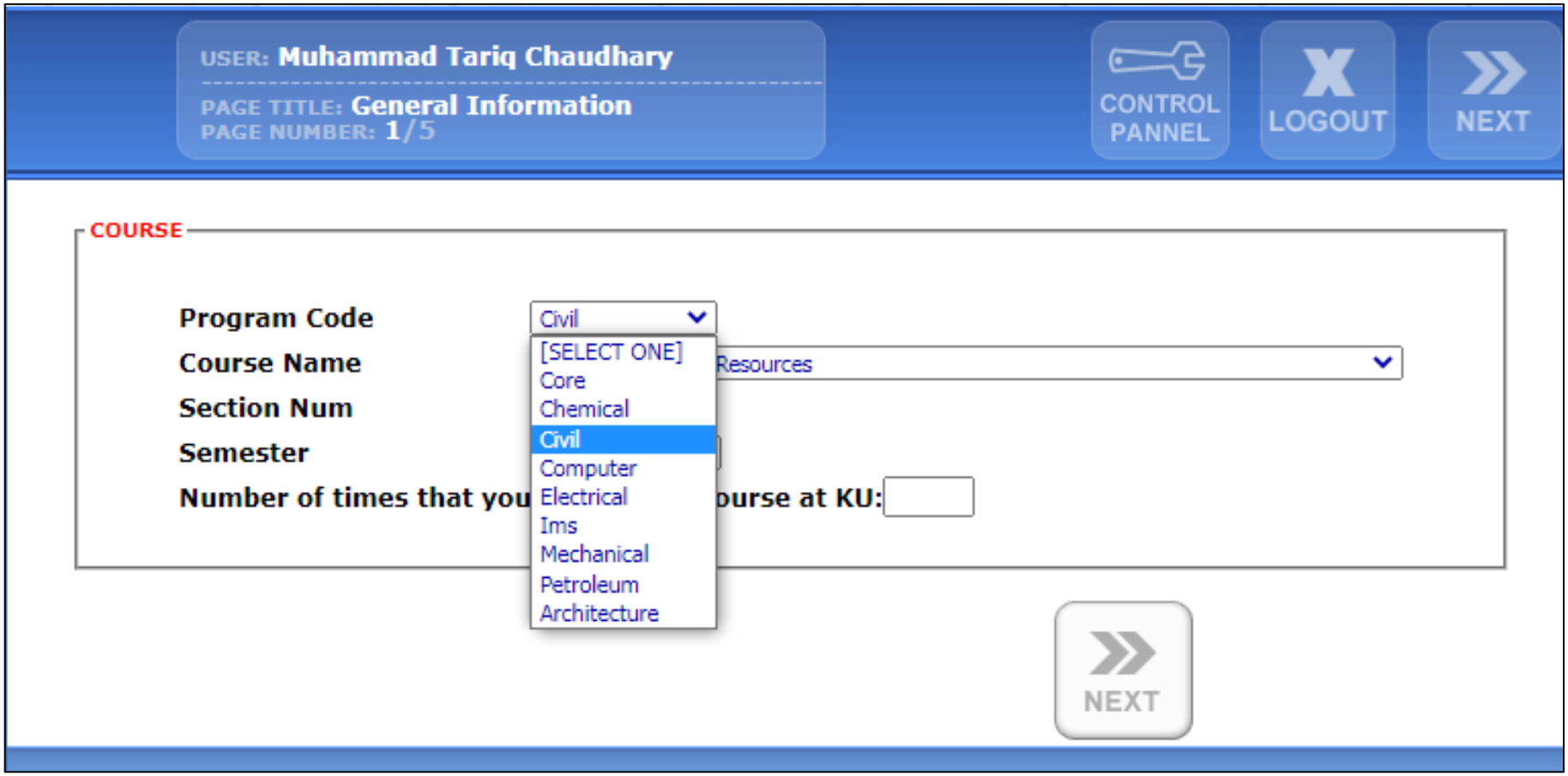

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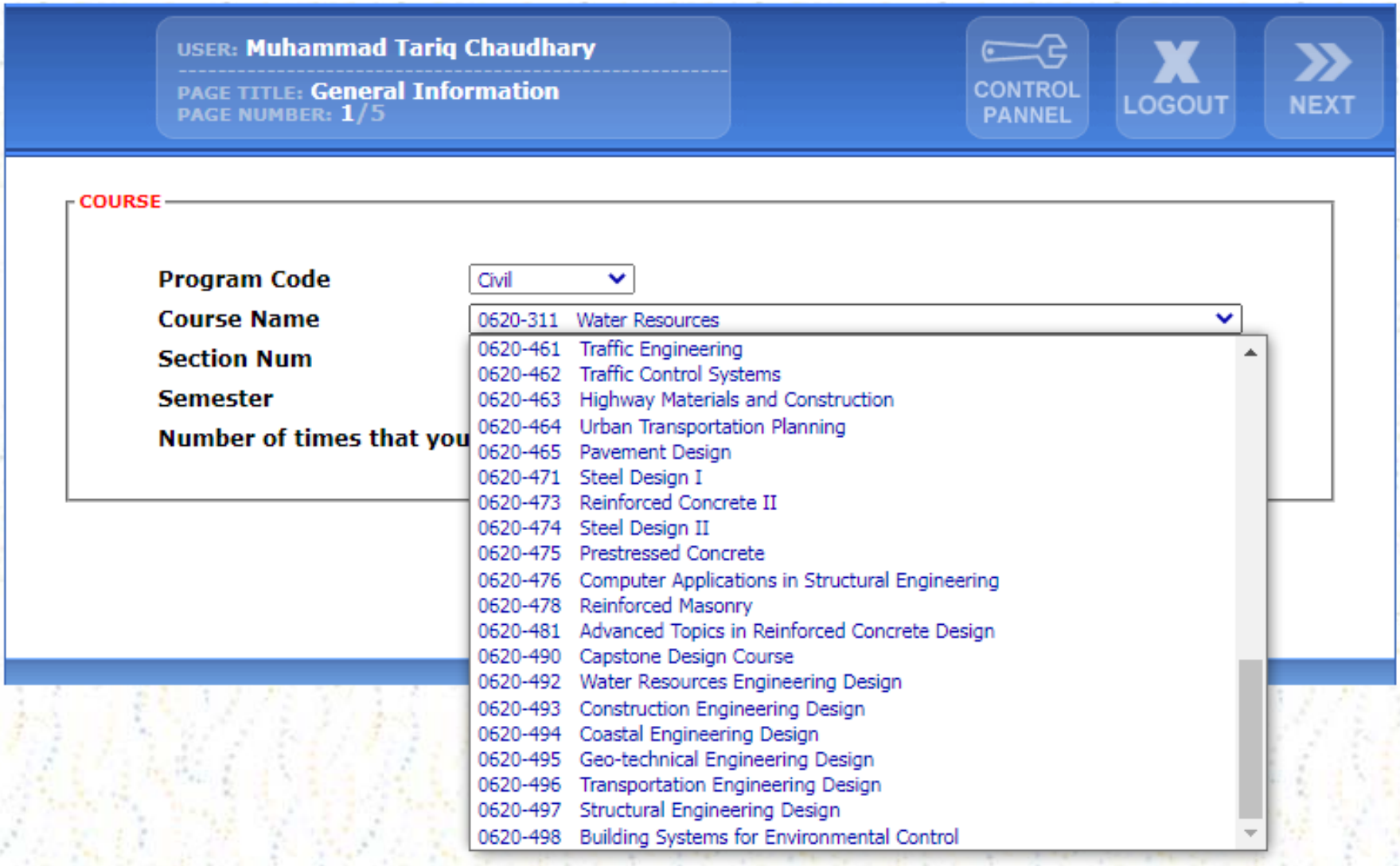


Step 4: Add info about assessment methods and class performance

Grading System

Evaluation Method	Grading Scale
	%
	%
	%
	%
	%
	100%

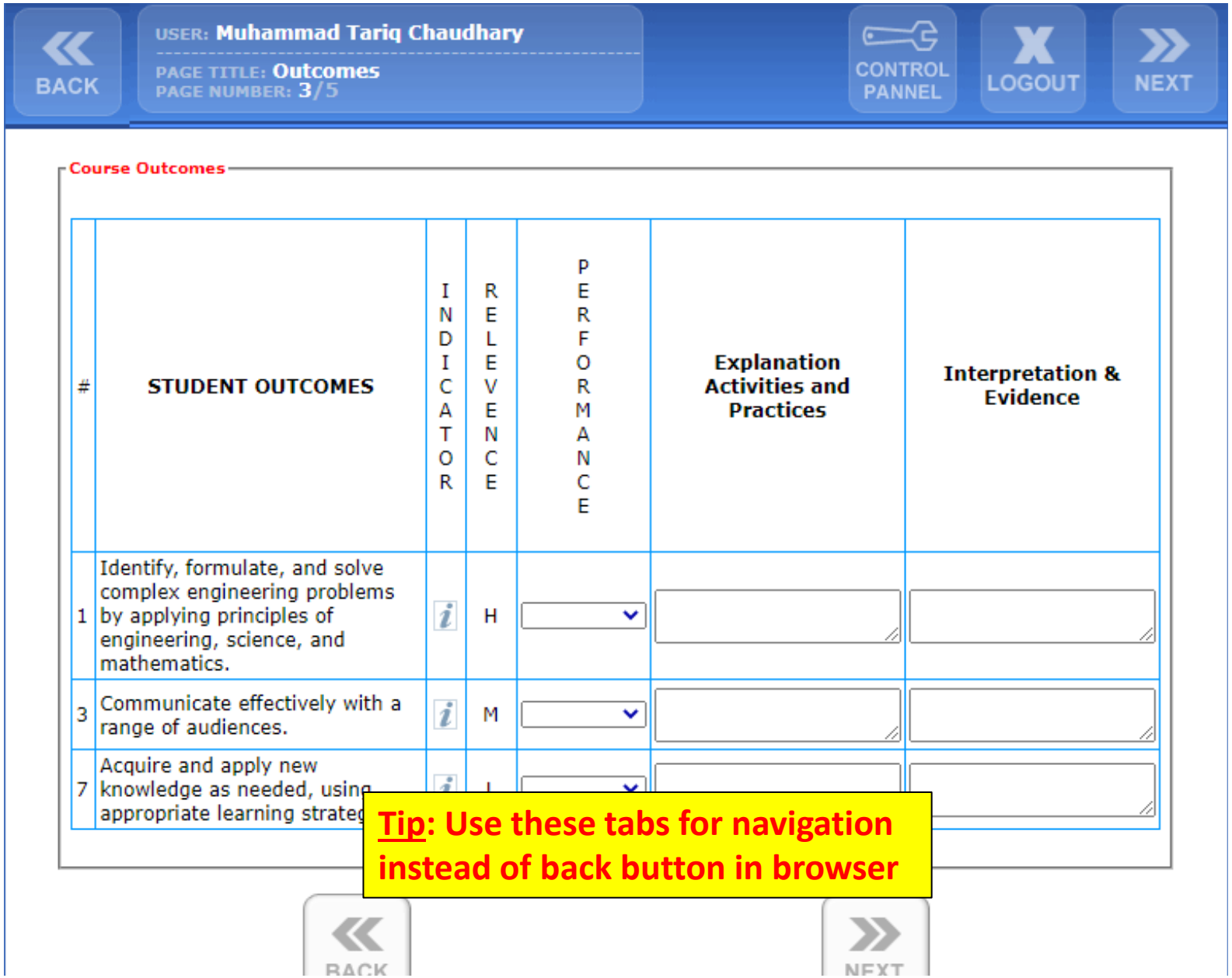
Grade Distribution

	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)												0		

Class GPA = (S(W*N)/SN) =

Class GPA Without (F or FA) =

Step 5: Enter a numeric value for student performance – use PIs as needed



Performance Indicators for Student Outcome 1

1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.		L		

1-Develop models describing the behavior of systems or processes
2-Obtain solutions to predict behavior of systems or processes
3-Evaluate and interpret model predictions
4-Identify an engineering problem or an opportunity for an engineering solution
5-Opportunities to identify, formulate, solve, and validate solutions to complex engineering problem through open-ended problems, assignments and projects

TIP: Additional information on PIs of a course can be found in the Course Specification form where SOs are related to the course objectives and relevant activities.

Performance Indicators for Student Outcomes 2 & 3

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.		H		

1-Establish objectives of a design project based on needs
2-Formulate the design problem based on objectives and constraints
3-Generate ideas and alternative solutions for a given problem
4-Evaluate alternatives and be able to choose the best
5-Create a prototype or model that embodies or represents the chosen solution

3	Communicate effectively with a range of audiences.		M		

1-Communicate effectively in written form
2-Communicate effectively in oral form
3-Communicate effectively in graphical form

Performance Indicators for Student Outcomes 4 & 5

4	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.		L		

1-Demonstrate knowledge of professional codes of ethics
2-Evaluate ethical dimensions of a problem/case
3-Identify possible impact of engineering solutions
4-Recognize the responsibilities towards society and the environment
5-Identify relevant socio- political, economical or technological issues
6-Discuss ways engineers might contribute to solving society s problems

5	Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.		L		

1-Recognize essential requirements of effective teams
2-Function effectively in teams to complete a given task

Performance Indicators for Student Outcomes 6 & 7

6	Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.		H		

1-Design experiments or experimental procedure
2-Conduct experiments
3-Analyze and interpret experimental data

7	Acquire and apply new knowledge as needed, using appropriate learning strategies.		M		

1-Recognize the need for life-long learning as an essential requirement
2-Acquire knowledge/skills independently
3-Reflect on own understanding and learning

Step 5: Assigning a value to student performance

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

Course Outcomes

#	STUDENT OUTCOMES	INDICATOR	RELEVENCE	PERFORMANCE	Explanation Activities and Practices	Interpretation & Evidence
1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	i	H	Excellent Very Good Satisfactory Weak Very Weak		
3	Communicate effectively with a range of audiences.	i	M			
7	Acquire and apply new knowledge as needed, using appropriate learning strategies.	i	L			

Step 5: Assigning a value to student performance

CE 271 - Spring 2017 - Structural Analysis I — Assessment of ABET outcomes

	ABET outcome	a							
S.No.	Student Number	in-class #1	quiz 1	Exam 1	Quiz 2	Exam 2	Exam 2	Quiz 3	FINAL
			Q-1	Q2	Q1, Q3	Q2	Q4	Q3	Q1
		28-02-17	02-03-17	19-03-17	18-04-17	23-04-17	23-04-17	14-05-17	29-05-17
	Max. points	1	25	35	40	30	20	20	20
1	2121116197		0	5	0	7	12	17	20
2	2122123601								
3	2131110372								
4	2131110932	1	23	19	38	20	10	8	19
5	2131111057	1	23	28	40	17	10	13	14
6	2131112023		20	24	20	18	15	15	16
7	2131117451	1	25	24	18	12		14	13
8	2131119875	0.9	22	12	40			16	13
9	2132131635	0.8	25	12	10			10	13
10	2132132759	0.65	0	21				3	14
11	2141112651	0.8	19					0	6
12	2141112731		20				8	14	18
13	2141112904						0	4	14
14	2141114950					10	18	10	17
15	2141116581				30	30	20	11	19
16	2141117061				38	10	20	12	17
17	2141117532			28	0	20	5	19	17
18	2141120347	0	22	13	15	12	5	12	11
19	2141120558	0.8	25	31	30	30	19	10	15
20	2142127693	0.8	22	26	28	25	20	8	15
21	2142128942	1.1	25	35	40	30	18	18	19
22	2151115302	0.95	19	26	25	20	0	4	15
23	2151116429	0.6	5	13	24	14	0	5	5
24	2151119150	1.1	22	29	30	20	16	5	18
25	2151120849	0.8	21	21	30	10	15	15	12
	Average	0.88	19.61	22.43	22.74	16.96	12.83	10.57	14.78
		87.9%	78.4%	64.1%	56.8%	56.5%	64.1%	52.8%	73.9%
	max	1.1	25	35	40	30	20	19	20
	min	0.6	0	5	0	7	0	0	5
	median	0.9	22	24	24	15	15	11	15

	a
Average	66.8%
Median	64.1%

A very detailed assessment example based on multiple assessment artifacts

Step 6: Explanation of Activities & Practices and Evidence - Examples

#	STUDENT OUTCOMES	RELEVENCE	PERFORMANCE	Explanation Activities and Practices	Interpretation & Evidence
1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	H	4	Formulate and solve indeterminate structural analysis problems using classical and matrix methods. Course required the use of Excel for organizing calculations and solving matrix operation problems (upto 18x18 matrix) using Excel. Computer applications also included use of STAAD for comparing answers for manually solved problems.	Homeworks, exams.

Step 6: Explanation of Activities & Practices and Evidence - Examples

#	STUDENT OUTCOMES	LEVENCE	FORMANCE	Explanation Activities and Practices	Interpretation & Evidence
1	Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	H	2	Classwork, homeworks, quizzes and exams targeting application of calculus, physics and concepts of equilibrium of rigid bodies learned in statics and strength of materials courses to solve structural analysis problems. This included finding reactions, internal forces and deflections in determinate beams, trusses and frames. Flexibility method for solving indeterminate beams, frames and trusses was also covered in preparation for structural analysis 2 course.	Final exam problems 1 to 5.
3	Communicate effectively with a range of audiences.	H	3	Preparation of calculations and internal forces diagrams.	Final exam problem 4.
4	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.	L	3	No activity was planned in this semester except for introduction to roles and responsibilities of structural engineers.	None

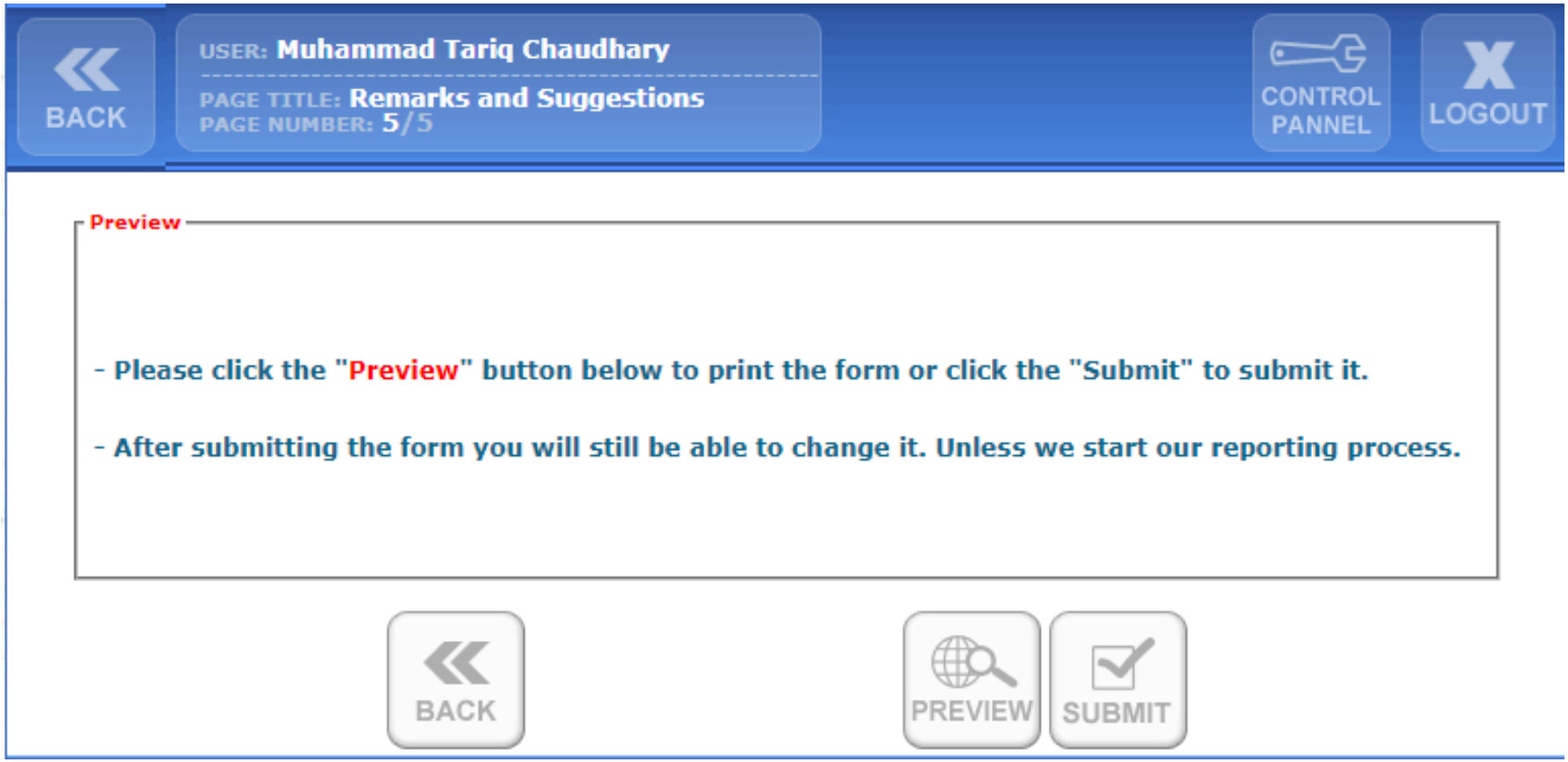
Step 7: Provide Feedback

Example

- Remarks and Suggestions:

Students are capable of performing the mathematical calculations needed in the course. Students came to the course with little knowledge of computer based tools i.e., Excel and STAAD. However, most of the students learned these tools through classwork and homework assignments. Report writing required as part of the computer based assignments was the toughest challenge for the students. Majority of the students improved in this respect with feedback from the instructor. However, there is need to improve the report writing skills of the students.

Step 8 – Preview & Submit



This concludes the preparation of Formative Assessment data.

PART 3:
Summative Assessment

Summative Assessment

Recall that summative assessment is to be done:

1- Towards the end of the program **in 300/400 level REQUIRED DEPARTMENT courses**.

2- The **assessment artifact** should be specifically designed to assess one or more aspects of a SO as needed by the outcome assessment plan.

3- Use **Performance Indicators** based on **course objectives related to the SO for quantitative assessment**.

4- Preferably to be an **exam problem or a project**.

5- **Use of UNIFIED assessment tools** (Rubrics or checklist) is **required**.

6- **Evidence of student work** is to be compiled showing a variety of achievement levels.

7- Data related to **F or F/A students** is to be removed for statistical analysis.

Summative Assessment – Current COEP Practice

- Currently done individually by each department.
- No **centralized system** of Summative assessment data collection.
- No uniform procedure of summative assessment data collection.
- In most departments, **Summative assessment is the same as Formative assessment** done through ICEF.

Summative Assessment – Proposed Procedure

Step 1: TAGs to **develop Performance Indicator (PI)** for the SO based on course objectives.

Step 2: Design an **assessment artifact** (quiz, exam problem, project, presentation etc.) related to the PI.

Step 3: Assess student work using an **assessment tool** (checklist, rubric).

Step 4: Compile **quantitative evidence** of student performance.

Step 5: Find **statistical parameters** (average, max, min) of student performance excluding the F and F/A students.

Step 6: **Evaluate student performance** against the chosen threshold. The threshold could be minimum average, a certain percentage of the class attaining a certain performance level or a certain percentage of the class passing the course etc.

NOTE: This step is the beginning of the **evaluation process**.

Summative Assessment – EXAMPLE

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.

Summative Assessment – EXAMPLE

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 CE 271:

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

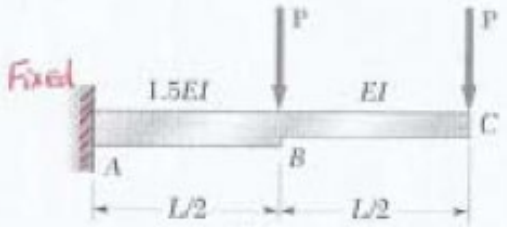
The PI related to this outcome is tested through Q1 on the Final exam as shown in Fig. 1 on the next page.

Step 2: Assessment Artifact **Step 3: Assessment Tool (Checklist)**

Q.1: **(16 points)**

Determine slope at point C for the shown beam by the virtual work method.

Take origin @ 'C'



M-System

Real system

Virtual system

1) Segment CB $0 < x < L/2$

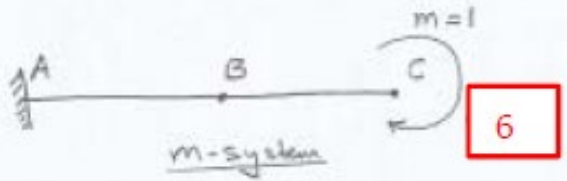
$M = -Px$ EI $m = -1$

4

2) Segment BA $L/2 < x < L$

$M = -Px - P(x - \frac{L}{2})$ $1.5EI$ $m = -1$

$M = -2Px + \frac{PL}{2}$



m-system

6

2

$$\theta_C = \frac{1}{EI}\int_0^{L/2} -1\,x - Px\,dx + \frac{1}{1.5EI}\int_{L/2}^{L}\left(-2Px + \frac{PL}{2}\right)x - 1\,dx$$

$$= \frac{1}{EI}\left|P\frac{x^2}{2}\right|_0^{L/2} + \frac{1}{1.5EI}\left|2P\frac{x^2}{2} - \frac{PL}{2}x\right|_{L/2}^{L}$$

$$= \frac{1}{EI}\left(\frac{P}{2}\cdot\frac{L^2}{4}\right) + \frac{1}{1.5EI}\left|PL^2 - \frac{PL^2}{2} - P\frac{L^2}{4} + \frac{PL^2}{4}\right|$$

$$= \frac{1}{EI}\left(\frac{PL^2}{8}\right) + \frac{1}{1.5EI}\left(\frac{PL^2}{2}\right)$$

4

$$= 0.125\frac{PL^2}{EI} + 0.33\frac{PL^2}{EI}$$

$$\theta_C = 0.4583\frac{PL^2}{EI}$$

Step 4: Compile quantitative student performance data

Table 1: Points obtained by each student on Q1

S.No.	Student Number	FINAL Q1
		29-05-17
	Max. points	16
1	2121116197	16
2	2122123601	
3	2131110372	
4	2131110932	15
5	2131111057	11
6	2131112023	13
~~7~~	~~2131117451~~	~~10~~
8	2131119875	8
9	2132131635	10
10	2132132759	11
~~11~~	~~2141112651~~	~~5~~
12	2141112731	14
13	2141112904	11
14	2141114950	10
15	2141116581	12
16	2141117061	14
17	2141117532	7
~~18~~	~~2141120347~~	~~9~~
19	2141120558	12
20	2142127693	10
21	2142128942	16
22	2151115302	12
~~23~~	~~2151116429~~	~~4~~
24	2151119150	9
25	2151120849	10
	Average of ALL students	10.83
		68%
	Average of students PASSING the course	11.63
		73%

Data for students # 7, 11, 18 and 23 (who failed the course) is deleted for these computations.

Step 5: Find statistical parameters of student performance

Class average – All = 68%

Class average – passing = 73%

Step 6: Evaluate student performance against a threshold

Class average – All =	68%
Class average – passing =	73%

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

Therefore, Student performance for this SO is satisfactory.

NOTE: This step is not part of assessment. It belongs to Evaluation.

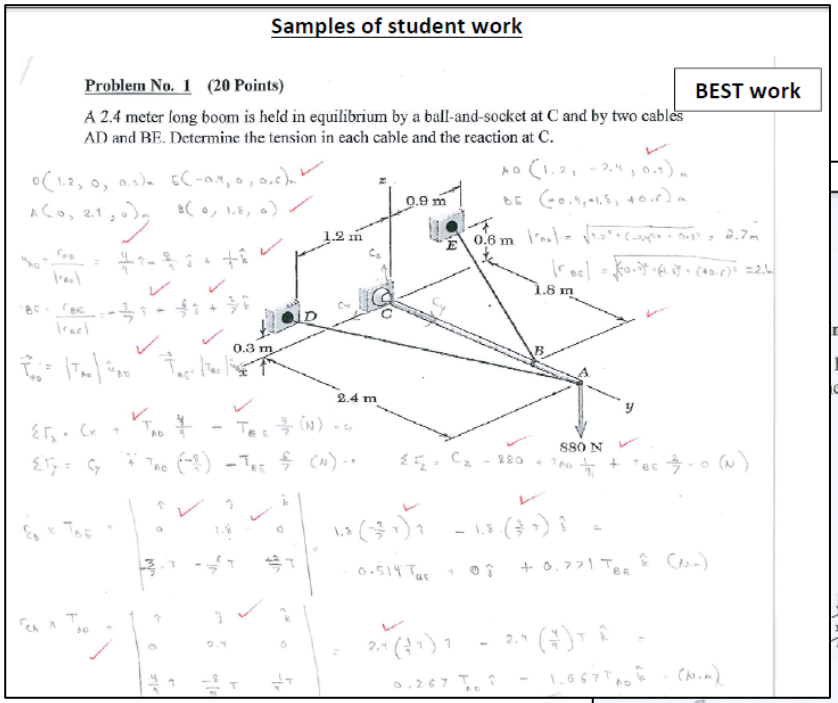
Step 7: Complete the Student Outcome Assessment Form (SOAF)

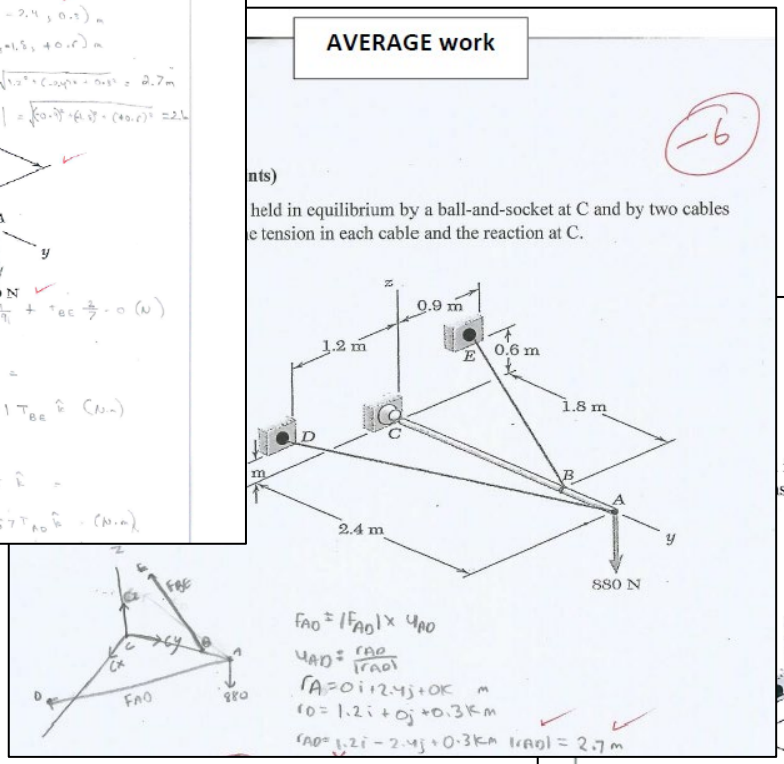
Summary Evaluation of Student Outcome

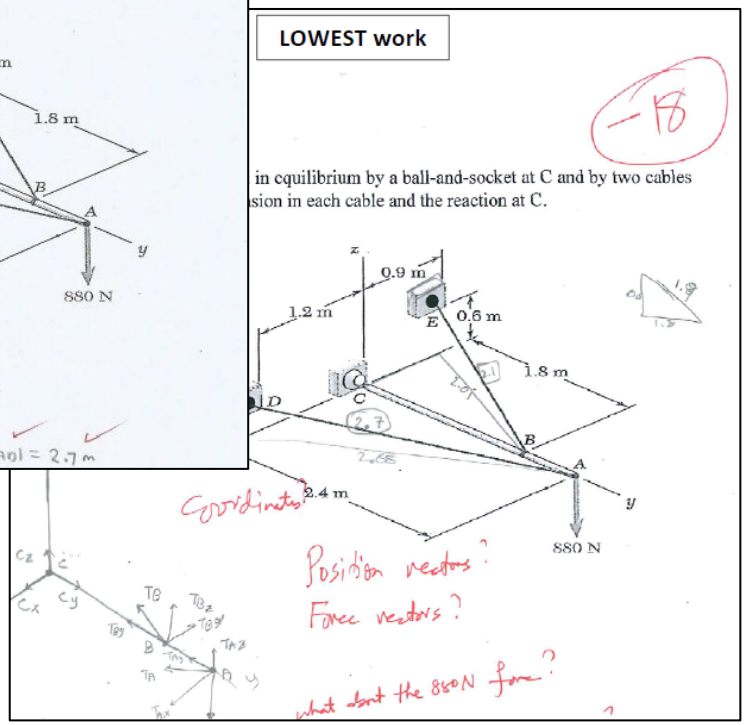
Year	2016-17	Semester	Spring
Outcome	1	Course	CE 271
Performance indicator	Students will be able to use integration for computing beam slope/deflection.		
Assessment information	Q1 on the Final exam.		
Evaluation Tool used	Grading Checklist		
Summary of student performance			
Measure	**Class average of students PASSING the course**		
Performance	73%		
Outcome Indicator	3		
Comments	Student performance on the outcome meets the criteria		
Attachments	☐ Assessment task ☐ Grading checklist ☐ Rubric ☐ Statistical data of student performance ☐ Samples of student work ☐ Others (_____)		

Step 8: Compile SO evidence

One sample of graded student work representing **high, medium and low** performance.







Assessment using Rubrics – Examples
SO 6 – Lab work

Numerical rubric with no descriptors.

Only include performance in Part 1 for SO 6 assessment.

How grades (1 to 5) are defined is not clear. Therefore, better to use descriptors.

Lab Report Evaluation Form (Informal)

Experiment: **Pressure Measurement and Calibration**

Date:

Student Name(s):

	Weight (W)	Grade (G)	W×G
1. Design and setup experiments, conduct and data analysis.			
a. Objectives.	1	1 2 3 4 ~~5~~	5
b. Data Acquisition and Observations.	1	1 2 3 4 ~~5~~	5
c. Sample Calculations.	1	1 2 3 4 5	ZERO
~~5~~ 5/10 8/20 *d. Results and Discussion*	6	1 2 3 4 5	13.5
e. Conclusion.	3	1 2 3 4 5	15 *
2. Written Communication.			
a. Structure/Organization.	3	1 ~~2~~ 3 4 5	6
b. Grammar/Rhetoric.	2	1 2 ~~3~~ 4 5	7
c. Graphs/Plots.	3	1 2 ~~3~~ 4 5	9

GRADE = Σ (W×G) = 60.5 %

Comments:

Assessment using Rubrics – Examples

Rubric with descriptors

SO 6 – Lab work

Only include performance in the first 4 items for SO 6 assessment.

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 $= \sum \text{weight} \times \text{score}$	

Use of Rubrics – Examples
SO 5 – Teamwork

Rubric with descriptors

Teamwork Scoring Rubric

Project Title:	Sustainable Villa
Course Number and Title:	0620490, Capstone Design
Date:	April 28th, 2022
Evaluator's Name:	Rana Al-Nuemi

Names of Individual Evaluated:		Self	Razan	Maj	Laila	
A. Quality of Work						
Work could be used by the instructors as a model for other students	4		✓			
May require minor improvements, but generally is of high standard	3	✓		✓		
Some major flaws, but flaws are fixable (and fixed)	2				✓	
Work was not useable by the team	1					
B. Quantity of Work						
Does considerable extra work	4	✓	✓	✓		
Does his or her share of the work	3					
Sometimes falls behind in his or her work effort	2				✓	
Is a slacker	1					
C. Creativity						
Contributes many ideas to the Project	4	✓	✓			
Contributes a few ideas to the Project	3			✓		
Occasionally gives a few ideas or suggestions	2					
Never contributes ideas	1				✓	
D. Reliability						
Always follows through on commitments; attends and is on time for team meetings	4	✓	✓	✓		
Follows through on commitments; occasionally late for team meetings	3					
Completes tasks if reminded; may occasionally be late or miss team meetings	2				✓	
Cannot be counted on	1					
E. Teamwork						
Excellent leadership role or provides high quality contribution to the team	4	✓	✓			
Engages in constructive discussion, encourages other to speak	3			✓		
Lets others take control of the project, yet is respectful to others	2				✓	
Is rude or disrespectful of others	1					
F. Conflict Resolution						
Leads in giving solutions and resolving conflicts	4	✓	✓	✓	✓	
Open to compromise and recognizes that sometimes, for the common benefit, it's better to give in	3					
Neither flexible nor aggressive, stay passive during arguments and conflicts	2					
Is uncompromising, always right, never wrong	1					
G. Overall Evaluation						
I have maximum trust in this individual and would definitely work with him/her again	4		✓	✓		
I would be pleased to work with this individual again	3					
I would not mind working with this individual again	2					
I would rather not work with this individual again	1				✓	
Total		23	28	25	14	

Use of Rubrics – Examples SO 7 – Lifelong Learning

Rubric with descriptors

Student Outcome 7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

weight	Performance indicator	1 (Beginning)	2 (Developing)	3 (Proficient)	4 (Exemplary)	Score
20	Identify necessary techniques, skills and tools needed to acquire the needed new knowledge	•Identifies a small-subset of necessary techniques, skills and tools to acquire new knowledge. •Includes unrelated techniques, skills and tools. •Unable to identify the scope of knowledge to be acquired or incorrect identification of the knowledge to be acquired.	•Identifies minor techniques, skills and tools, but missing some important items. •Includes some unrelated techniques, skills and tools. •Basic scope of the knowledge to be acquired is identified but some major items are missing.	•Identifies almost all of the relevant techniques, skills and tools with some minor omissions. •Includes a few unrelated techniques, skills and tools. •Scope of the knowledge to be acquired is almost fully identified with some minor items missing.	•Identifies all relevant techniques, skills and tools. •Includes only related techniques, skills or tools. •Scope of the knowledge to be acquired is fully identified..	16.75
40	Acquire new knowledge and information	•No clue how to use the identified techniques and tools to acquire new knowledge. •Unable to distinguish between already learned and new knowledge/information. •Acquisition of unrelated new knowledge/information.	•The identified minor techniques are used incorrectly to acquire new knowledge. •Partially able to distinguish between already learned and new knowledge/information. •Acquisition of partially related new knowledge/information.	•The identified relevant techniques are applied correctly to acquire almost all the required new knowledge. •Able to distinguish to a great extent between the already learned and new knowledge. •The majority of the acquired knowledge is related new knowledge/information.	• The identified relevant techniques are applied correctly to acquire all the required new knowledge. •Able to distinguish clearly between the already learned and new knowledge. •All of the acquired knowledge is related new knowledge/information.	27
40	Apply new knowledge and information to the project	•Has difficulty in comparing, contrasting and integrating new information with the previous knowledge. •Applies a small subset of the new knowledge/information/technique to the project. •Unable to correctly utilize the new knowledge/information/technique in the provided scenario.	•To some extant, able to compare, contrast and integrate new information with the previous knowledge. •Applies minor techniques partially related to the project. •Able to utilize part of the new knowledge/information/technique in the provided scenario.	•To great extant, able to compare, contrast and integrate new information with the previous knowledge. •Correctly applies the relevant techniques to the project with some items are left uncovered. •Able to utilize almost all of the new knowledge/information/technique in the provided scenario.	•Able to compare, contrast and integrate new information with the previous knowledge with no issues. •Correctly applies the relevant techniques to the project covering all the important items. •Able to utilize all of the new knowledge/information/technique in the provided scenario.	11.5
					Total	55.25

Thank you !!!!

Questions / Comments ??????