

# Course and Program Learning Outcomes Assessment Processes

Office of Institutional Effectiveness®

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## Introduction

Learning outcomes assessment (LOA) is one of the keystones of the education process. It is essential for effectively reviewing and enhancing the alignment between the planned, delivered and experienced curriculum. The main purpose of the assessment processes is obtaining reliable information to answer the following questions:

- Are students achieving the intended outcomes?
- Are they learning the required skills to succeed in this field or profession?
- Is the program continuously improving the students learning experience?
- Should the curriculum or the teaching strategies be modified?
- Are there other techniques or additional resources that would help students learn more effectively?

Answering the above questions would help the program decide on the proper actions to take and the strategies to implement in order to ensure the continuous improvement of the student learning experience, and the achievement of the intended learning outcomes.

To streamline the learning outcomes assessment activities, an integrated infrastructure led by the Office of Institutional Effectiveness (OIE) has been established over the last few years at UAEU (see Figure 1). The OIE works closely with representatives from the UAEU colleges to ensure that learning outcomes are well defined, and aligned with both national and international accreditation guidelines. The OIE is also responsible for assuring the quality and the effectiveness of the assessment processes.

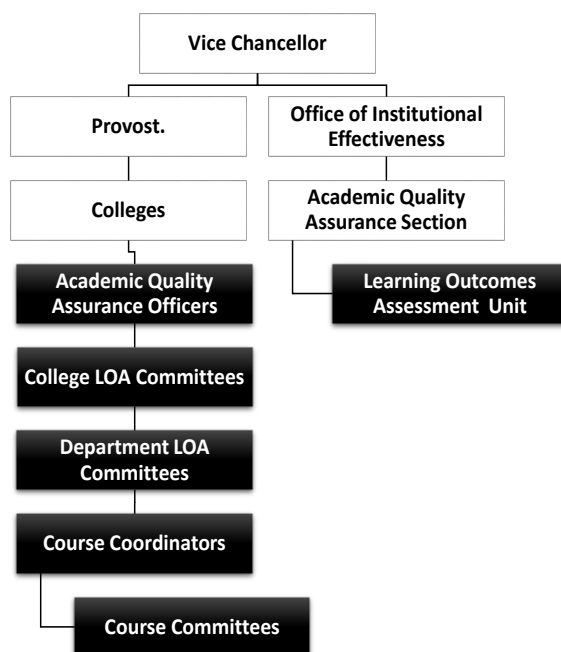


Figure 1: UAEU Assessment Infrastructure



*Figure 2: Learning Outcomes Assessment Management System (LOAMS)*

Standing learning outcomes assessment (LOA) committees at the department, the college, and the university levels are responsible for implementing the assessment processes as per the approved timelines. Each assessment committee has a set of rules and responsibilities detailed in the UAEU Quality Assurance Manual. Faculty work together to develop consensus on learning outcomes articulation, alignment, and assessment. Assessment committees regularly meet and engage program constituencies in the discussion regarding the assessment results and the remedial actions recommended to address discovered deficiencies.

To enhance the effectiveness of the continuous improvement cycle, a campus-wide Learning Outcomes Management System (LOAMS) has been implemented and deployed at UAEU since the fall of 2018 (Figure 2). The system provides administrators with detailed information regarding the execution of the assessment processes, as well as executive dashboards to track the submission of the assessment data and the associated analysis remarks, the progress in the implementation of the recommended remedial actions, and the associated impact of the implemented actions. The assessment management system is populated regularly with the latest information extracted from the learning management systems (Blackboard), the curriculum management systems (CurricUNET), and the student information system (BANNER).

## Course learning outcome assessment process

### CLO articulation and alignment

As per the UAEU QA manual, each offered course shall have a set of learning outcomes that state the knowledge, skills and competencies students will be able to demonstrate after completing the course successfully. The course learning outcomes (CLOs) must contribute to the achievement of the program learning outcomes (PLOs), while each course do that to a different degree and in a different way. Thus, individual courses serve different purposes, and it is the collective learning across all courses that enable

the student to achieve the overall PLOs. CLOs are defined, aligned and regularly assessed as per the guidelines and timeline provided by the UAEU QA Manual.

### CLO Assessment Process

Course instructors are responsible for collecting direct and indirect assessment data that gauge the achievement of the intended CLOs. Assessment data are collected throughout the semester and uploaded to LOAMS. For each submitted tool, the instructor should specify if the tool is direct or indirect, summative or formative, and assign the weight the tool has with respect to other tools used for the same CLO. The instructor should also specify the maximum score of the tool, and the score of each student as shown in Figure 3. The course instructors must submit the assessment data as per the order of the students IDs specified by the system. This allows the system to segregate the students' performance based on their majors.

Once the assessment tool is uploaded, the system calculates the tool's attainment result, as well as the attainment results for each major attending the class. This provides course instructors with the opportunity to provide corrective interventions while the course is still running.

The attainment scores of CLO 'c' when tool 't' is applied in section 's' ( $A_{t,c,s}$ ) is calculated as the percentage of students scored 70% or above of the tool's maximum score (i.e.  $\frac{std(i,t)}{max(t)} \geq 0.7$ ), where  $std(t,i)$  is the score of student  $i$  in tool  $t$ , and  $max(t)$  is the maximum score for tool  $t$ .

By the end of the semester, course instructors complete the upload of assessment tools, and confirm the

<b>Method</b>	Direct
<b>Summative</b>	Yes
<b>Tool</b>	Quiz 2
<b>Weight</b>	1.00
<b>Out OF</b>	8.0

Students IDs	Scores
202021550	6
201723269	4
201803209	4
201806964	4
201804932	4
201810369	2
201803590	4
201909123	4
201703834	6
202008408	4
201806392	4
201901026	4
201804037	2
201906478	8
201800846	4

Figure 3: Submitting a Course Assessment Tool

submission of the assessment tools. The system calculates the attainment result for each CLO 'c' in section 's' as:

$$A_{c,s} = \frac{\sum_t A_{t,c,s} \times w_{t,c,s}}{\sum_t w_{t,c,s}}$$

where  $w_{t,c,s}$  is the weight assigned by the instructor of section 's' when for tool 't' is applied to assess CLO 'c'. The tool's weight is used to calibrate the influence of the tools on the attainment score of the CLO, such that the weighted average score reflects the actual attainment of the outcome. For example, assume that a CLO was assessed in a section using three different tools (a quiz, a question in the midterm exam, and a question in the final exam). Assume also that 16, 14, and 12 out of the 20 students enrolled in the section scored 70% or higher in the three assessment tools respectively. Hence, the achievement scores of the three tools ( $A_{t,c,s}$ ) are 80%, 70%, and 60% respectively. If the instructor decided to assign the same weight to the three tools, the attainment score of the CLO is calculated as:

$$A_{c,s} = \frac{80 + 70 + 60}{3} = 70\%$$

The instructor could also give more emphasize to the midterm and the final exams questions by assigning weights 0.5, 1, and 2 to the three tools respectively. Accordingly, the achievement score of the CLO is calculated as:

$$A_{c,s} = \frac{80 \times 0.5 + 70 + 60 \times 2}{0.5 + 1 + 2} = 65\%$$

If multiple sections are offered for a given course, after calculating the achievement score of each section, the system calculates the overall attainment score of the CLO as

$$A_c = \frac{\sum_s A_{c,s} \times n_s}{\sum_s n_s}$$

Figure 4 shows the attainment results for a course which has seven CLOS as presented by LOAMS. The

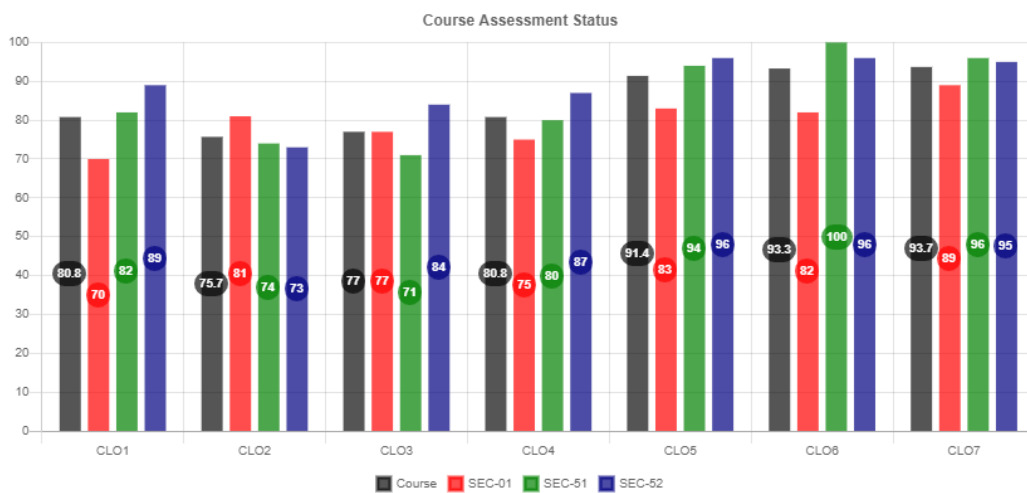


Figure 4: CLO Attainment Results

figure shows the overall attainment result of each CLO, as well as the attainment result for each of the three offered sections.

After completing the submission of the assessment data, the course instructor could browse the attainment result for each CLO as well as the attainment result for each submitted tool. Course instructors are then required to analyze the attainment results and provide their remarks regarding the following points:

- the attainment result for each CLO
- the appropriateness of course learning outcomes
- the appropriateness of the textbook and other learning resources
- the appropriateness of the utilized assessment instruments
- the appropriateness of the course prerequisites
- the extent to which the syllabus was covered
- general comments on any problems encountered with the course during the semester

After submitting the assessment remarks, course instructors are required to recommend remedial actions to address any discovered deficiencies. Remedial actions could be recommended at either the course or the instructor levels. Instructor level remedial actions are actions the instructors will implement individually during their next offering. These actions does not affect other instructors offering the same course, and does not require any approval from the course coordinator or the department curriculum committee. Instructor remedial actions may include updating the course material, adding new lab or exercise, etc. Implementing a course level remedial actions, on the other hand, will affect each offering of the course, and could require multiple approvals up to the University Curriculum Committee. Course level remedial actions could include changing the course learning outcomes, course catalogue description, textbook, credit hour, prerequisites, etc.

To ensure that the assessment process is followed by all instructors, LOAMS prevent course instructors from generating the required assessment report until the course assessment data, analysis remarks, and remedial actions are submitted correctly.

In order to close the assessment loop, instructors are required to submit a periodic progress report for each remedial action until the action is successfully closed. For each report, the instructor should provide the progress details and update the status of the remedial action using one of the following:

- **New**, no progress so far towards the implementation of the remedial action.
- **In progress**, the implementation of the remedial action is underway. For instance, the new learning outcomes, or the new textbook is submitted to the curriculum committee for approval.
- **Implemented**, the remedial action item is implemented, but its impact is not measured yet.
- **Closed**, the impact of the remedial action is measured (Positive, Negative, Neutral).

The chair of the department assessment committee, and the department chair could use LOAMS to browse the status of all submitted remedial action, and follow up on their implementation with the concerned faculty.

# Program learning outcome assessment

## Outcomes articulation and alignment

As per the UAEU QA manual, each offered program shall have a set of learning outcomes (Student Outcomes) that state the knowledge, skills and competencies students will be able to demonstrate by the time of graduation. Each program should provide detailed information regarding the alignment between the program learning outcomes (PLOs) and

- the program objectives,
- the institutional learning outcomes (ILOs), and
- the UAE national qualification framework.

The program should also provide a curriculum map that shows how each outcome is introduced, developed and mastered by the offered courses.

## PLO Assessment Process

PLOs are regularly assessed and analyzed according to the assessment plan developed by the program using LOAMS. For each PLO, the program specifies the assessment timeline, and the direct and indirect tools that will be used to collect the attainment evidences (see Figure 5). Assessment data is collected for each PLO and uploaded to LOAMS by the end of each semester. Assessment results of relevant CLOs are automatically extracted by LOAMS as per the CLO/PLO alignment specified by the program. Figure 6 shows a screenshot of the LOAMS system page used for submitting the PLO assessment data. After uploading all assessment data to LOAMS, the system calculates the attainment result for each tool. It then aggregates the attainment results of the submitted tools to calculate the overall attainment result of each PLO as per the weight assigned to each tool. Figure 7 shows a screenshot of the PLO attainment results.

PLO-1: Identify, formulate, and solve complex civil engineering problems by applying principles of engineering, science, and mathematics.		
Tool	Select	Weight
Course Assessment	<input checked="" type="checkbox"/>	2.0
Graduation Project	<input checked="" type="checkbox"/>	1.0
Capstone	<input type="checkbox"/>	1.0
Internship Experience	<input checked="" type="checkbox"/>	1.0
Exit Exam	<input checked="" type="checkbox"/>	0.5
Exit Survey	<input checked="" type="checkbox"/>	1.0
Other, please specify:		
<input type="text"/>	<input type="checkbox"/>	1.0
<input type="text"/>	<input type="checkbox"/>	1.0

Figure 5: Using LOAMS to Specify the PLO Assessment Tools

### Specify the Measurement Details

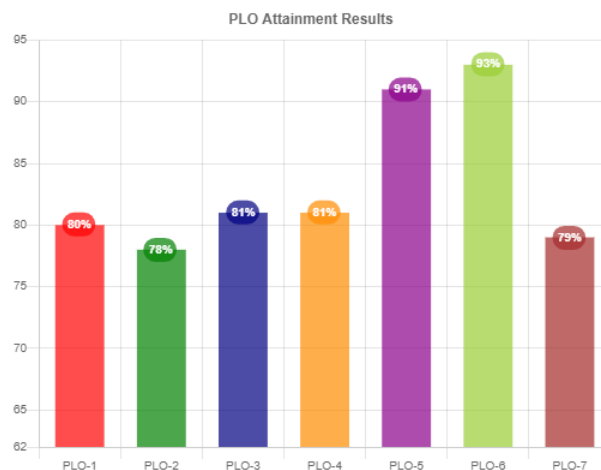
Select Tool Type	Graduation Project	Measurement Description	Aggregated student performance in Graduation Project II activities
Semester	FA2019	Measurement Method	Direct
Anonymous		<input type="checkbox"/>	
Students IDs	201203186 201301095 201402476 201402486 201403190 201407170 201409076 201450053 201501676 201503556	Students' Scores	8.8 9.1 9.4 9.4 9.4 9.4 8.6 8.6 9.4 9.4

Submit
Cancel
Act  
Go 1

*Figure 6: Submitting the PLO assessment data*

The assessment committee is responsible for calling the program constituencies for a meeting(s) to review and discuss the following information for each assessed PLO

- 1- PLO articulation
  - a. The alignment and the relevance of the PLO articulation to the program objectives, market needs, national priorities, and the discipline's international trends.
  - b. Is the PLO articulation Specific, Measurable, Attainable, Relevant, and Time-bound (SMART)?
- 2- PLO Alignment
  - a. PLO curriculum map



*Figure 7: PLO Attainment Results*



PLO-1: Identify, formulate, and solve complex civil engineering problems by applying principles of engineering, science, and mathematics.							
Attainment target	70% of enrolled students achieve 70% or higher in summative assessment tools						
Results	Attained: Yes	Direct Attainment: 77.5%			Indirect Attainment: 82.8%		
Assessment Tools							
1: Course Assessment	Weight: 2.0	Direct Attainment: 82.3%		Indirect Attainment: 86.9%		#Aligned Courses: 25	#Aligned CLOS: 77
	Measurements	Method	Semester	Result	#Students	Attained	Measurement Description
		Direct	FA2019	82.0%	76	Yes	Number of assessed CLOs = 49 Number of attained CLOs = 45
		Direct	SP2020	81.0%	70	Yes	Number of assessed CLOs = 45 Number of attained CLOs = 38
		Direct	SU2020	100.0%	6	Yes	Number of assessed CLOs = 2 Number of attained CLOs = 2
		Indirect	SP2020	85.0%	40		Number of assessed CLOs = 45 Number of attained CLOs = 36
		Indirect	FA2019	88.0%	73		Number of assessed CLOs = 22 Number of attained CLOs = 21
2: Graduation Project	Weight: 1.0	Direct Attainment: 100.0%					
	Measurements	Method	Semester	Result	#Students	Attained	Measurement Description
		Direct	FA2019	100.0%	35	Yes	GPII
		Direct	FA2019	100.0%	31	Yes	GPI
		Direct	SP2020	100.0%	33	Yes	GPII
		Direct	SP2020	100.0%	28	Yes	GPI
3: Exit Exam	Weight: 0.5	Direct Attainment: 13.0%					
	Measurements	Method	Semester	Result	#Students	Attained	Measurement Description
		Direct	SP2020	0.0%	9	No	Male
		Direct	SP2020	26.1%	23	No	Female
		Direct	FA2019	8.7%	31	No	Female
		Direct	FA2019	0.0%	4	No	Male
4: Exit Survey	Weight: 1.0	Direct Attainment: ---		Indirect Attainment: 74.6%			
	Measurements	Method	Semester	Result	#Students	Attained	Measurement Description
		Indirect	SP2020	78.0%	9		Male Student survey results for SP2020 semester
		Indirect	SP2020	70.0%	23		Female Student survey results for SP2020 semester
		Indirect	FA2019	75.0%	4		Male Student survey results for SP2020 semester
		Indirect	FA2019	77.0%	31		Female Student survey results for SP2020 semester

Figure 8: Detailed Attainment Result

- b. PLO alignment with the institutional learning outcomes
  - c. PLO alignment with the course learning outcomes
- 3- Assessment tools
- a. The utilization of the assessment tools defined in the assessment plan
  - b. The effectiveness and accuracy of the assessment tools in measuring the PLO attainment
- 4- Attainment results for each utilized tool (See Figure 8).

The assessment committee is responsible for recording the analysis remarks and remedial actions during the meeting and uploading them to LOAMS along with the meeting minutes. The committee is also responsible for updating the system with progress reports regarding the implementation of remedial actions recommended in previous assessment cycles. The assessment committee should then submit the annual report for the Dept. Chair approval.