2020

ASSESSMENT PLAN OF LEARNING OUTCOMES

Version 1.20

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This plan was written to explain the theory behind assessing course learning outcomes (clos) and program learning outcomes (plos). the plan discussed here is implemented to all academic programs in BDCS.

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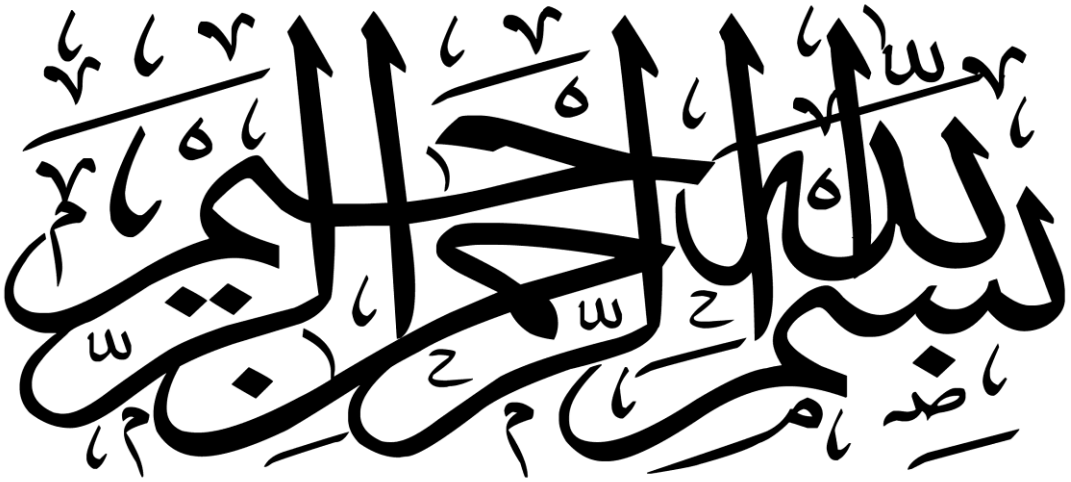


ASSESSMENT PLAN OF
CLOs and PLOs in BDFS

1. Introduction

Assessment is a process aimed understanding and improving students' learning in both course level and program level. The process involves:

1- Setting criteria for both course and program delivery, these criteria may include:
   (a) Aimed learning outcomes for course and their associated learning outcomes for the academic program,
   (b) Teaching strategy which may be implemented to deliver these outcomes through selected topics,
   (c) Assessment tools may be used for evaluating the outcomes, and
   (d) Level of achievement expected for the learning outcomes
2- Systematically gathering, analyzing, and interpreting evidence to determine how well student performance matches those criteria and standards
3- Using the resulting information to document, explain, and improve performance

The mechanism by which **BDCS** assess its LOs and evaluate their development against courses and academic programs are accurate and powerful since it is carried out automatically by means of Excel spreadsheet. It is worth to note that assessment of CLOs is conducted every semester, however assessment of PLOs is conducted annually.

2. Learning Outcomes (LOs)

They are the statements of what each student knows, understands and is able to do on completion of a learning process. They are defines in terms of

Knowledge: The outcomes of the assimilation of information through learning. It is the body of facts, principles, theories and practices that is related to the field of study.

Skills: The outcomes of applying the knowledge and using know-how to complete tasks and solve problems. They are the cognitive or practical.

Values: The outcomes of proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.

LOs in course level and program level are all defined in terms of the above category. First, the PLOs are defined according to the Accreditation Board for BIOLOGY (ABB) and the National Quality Framework (NQF) with two more outcomes to comprise "Knowledge" domain and enhance "Values" domain. The Students Outcomes (SOs) in Figure (1) shows how the PLOs encompass Program Educational Objectives (PEOs). Second, the following points are considered in defining CLOs:

1- CLOs are all aligned with PLOs.
2- CLOs are based on the learning achievements of an average student.
3- CLOs are described from the perspective of the student.
4- CLOS are all achievable, assessable, and reflect the Level of Learning (LoL), see Table (1).
5- CLOS are formulated to enable the students judge the results have actually been achieved.
6- CLOs are ranged from 4 to 8 outcomes.

Table (1): University, college, and department requirements for the AS degree

NQF	**Introductory**	**Proficient**	**Advanced**
Knowledge	Knowledge of facts, principles, processes and general concepts, in a field of work or study	Factual and theoretical knowledge in broad contexts within a field of work or study	Comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge
Skills	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems
Values	Take responsibility for completion of tasks in work or study; adapt own behavior to circumstances in solving problems	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others

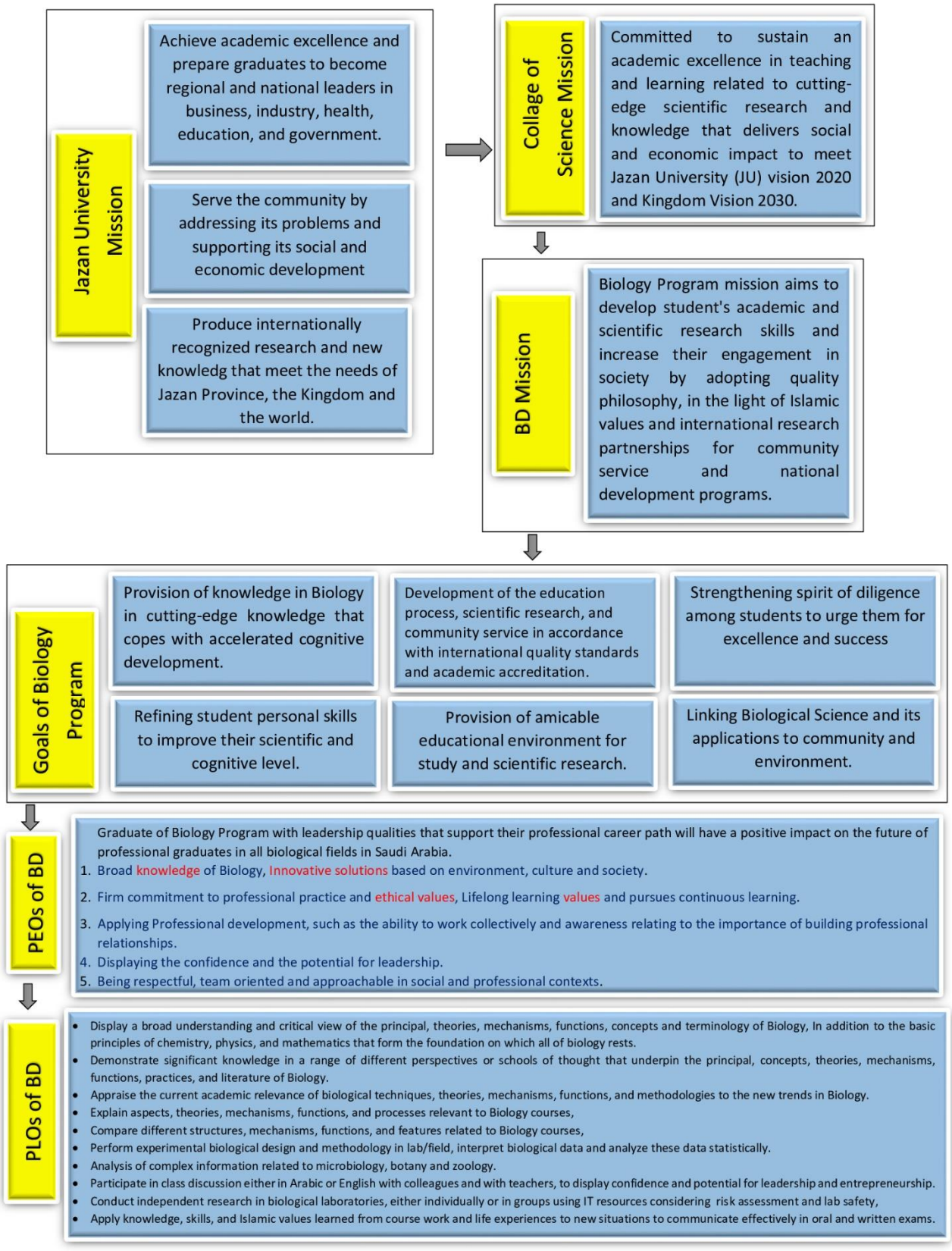


Figure – 1 Mission, Goals, PEOs, and PLOs of BD program as extracted from CS and JU Mission

3. Key Performance Indicators (KPIs)

It is worth noting that the KPIs used for assessing the CLOs are the assessment tools. In the other hand, the KPIs used for assessing PLOs are created by program coordinator and they are the attributes describe each PLO. The KPIs for CLOs assessment and the KPIs for PLOs assessment are both linked to rubrics of three levels of achievement; they are:

1- **Satisfactory**: if the percentage of the students who achieve 70% "C" or higher is more than 60% for each LO.

2- **Need Improvement**: if the percentage of the students who achieve 70% "C" or higher is less than 60% but the percentage of the students who achieve less than 60% "F" is less than 40% for each LO.

3- **Unsatisfactory:** if the percentage of the students who achieve less than 60% "F" or less is smaller than 60% for each LO.

This rubric of achievement is subject to change according to course and program coordinator.

4. Assessment Steps of CLOs

There are two types of assessments; they are:

1- **Direct Assessment:** Assessments that require students to demonstrate their learning such that observers can determine how well they are meeting learning outcomes. Examples may include: assignments, essays, term or capstone projects, lab experiments, portfolios, presentations, defenses, publications, theses, dissertations, exam questions, creative works.

2- **Indirect Assessment:** Assessments that imply the level or extent of learning or ascertain learner, Examples may include: surveys, questionnaires, interviews, focus groups.

Steps of direct assessment of CLOs:

1- Mapping "CLOs" of the course to the designated "PLOs" taking "LoL" into consideration.

2- Assign "Assessment Tools" to evaluate the "CLOs".

3- Mapping the questions of the "Assessment Tools" to their designated CLOs.

4- Map the marks of the questions of all "Assessment Tools" to their associated CLOs, then accumulating the marks of all CLOs for each student.

5- The two main values which used for assessment of each CLO are:

   (a) The percentage of students who achieved 60% or above for each CLO.

   (b) The percentage of average score of each CLO.

6- A comprehensive assessment of each CLO can then be evaluated and defined using a rubric of three levels of achievement; they are:

   (a) **Satisfactory**: if the percentage of the students who achieve 70% "C" or higher is more than 60% for each LO.

   (b) **Need Improvement**: if the percentage of the students who achieve 70% "C" or higher is less than 60% but the percentage of the students who achieve less than 60% "F" is less than 40% for each LO.

   (c) **Unsatisfactory:** if the percentage of the students who achieve less than 60% "F" or less is smaller than 60% for each LO.

The above steps are followed by Indirect Assessment by means of students' CLOs survey. It is worth noting that all of these steps and procedures are assembled and programmed using Excel spreadsheet for instructor convenient and accurate assessment. Writing the Course Report (CR) is possible now and the feedback for developing and improving can be implemented for the next semester, see Figure (2).

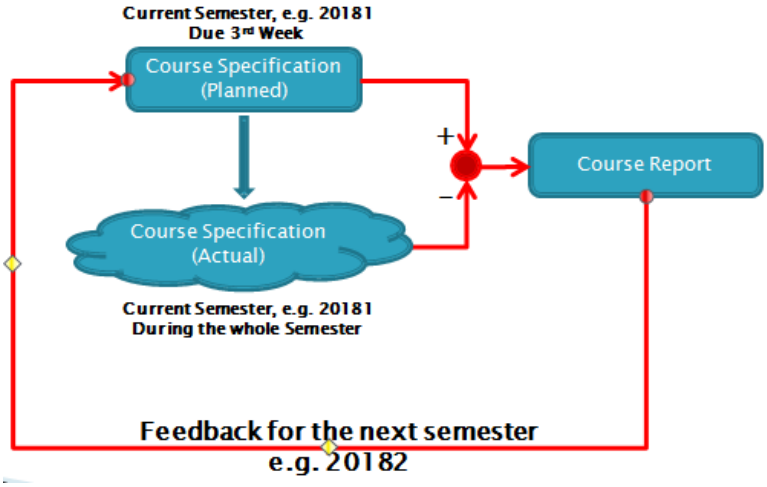
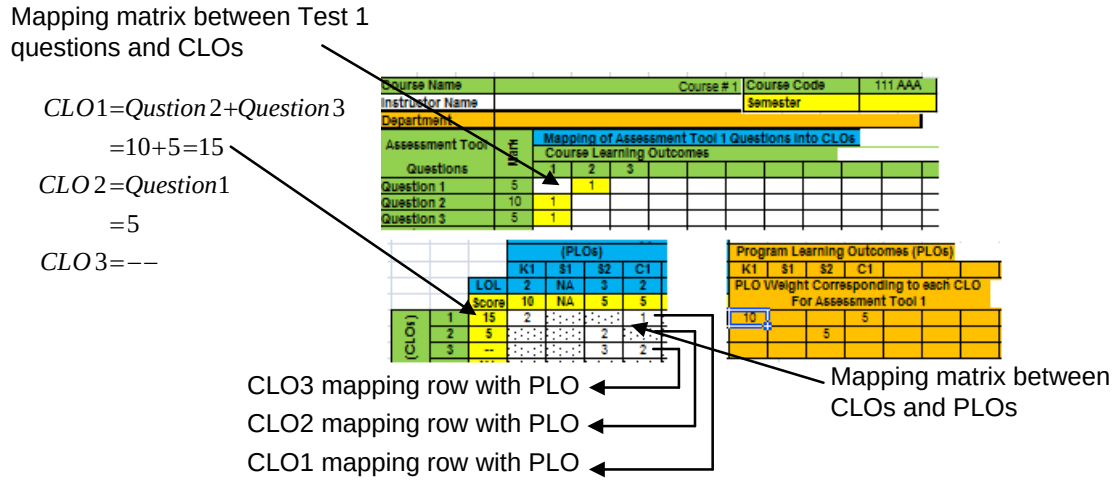


Figure – 2 Process of Course development

5. Assessment Steps of PLOs

The direct assessment of PLOs is carried out using the same Excel sheet, for which PLOs assessment is carried out for a specified course. Here, the CLOs of the course or the KPIs associated with these CLOs "attributes" are used for assessing PLOs associated to this course only. The mapping matrix between CLOs and PLOs is used for assessment process taking into consideration the Level of Learning (LoL) assigned. First the PLOs are assessed for each Assessment Tool. For the sake of clarifying the procedure of assessment for PLOs, consider that there are 3 assessment tools for a course; Figure (3) shows the equation used for PLOs assessment for Test 1. However, Figures (4) and (5) show the equation used for PLOs assessment for Test 2 and Test 3, respectively.



$$K1=\left(\frac{CLO1}{CLO1\text{ row}}\times\{CLO1\cap K1\}\right)+\left(\frac{CLO2}{CLO2\text{ row}}\times\{CLO2\cap K1\}\right)+\left(\frac{CLO3}{CLO3\text{ row}}\times\{CLO3\cap K1\}\right)$$

$$=\left(\frac{15}{(2+1)}\times 2\right)+\left(\frac{5}{2}\times 0\right)+\left(\frac{0}{3+2}\times 0\right)=10$$

$$S1=\left(\frac{CLO1}{CLO1\text{ row}}\times\{CLO1\cap S1\}\right)+\left(\frac{CLO2}{CLO2\text{ row}}\times\{CLO2\cap S1\}\right)+\left(\frac{CLO3}{CLO3\text{ row}}\times\{CLO3\cap S1\}\right)$$

$$=\left(\frac{15}{(2+1)}\times 0\right)+\left(\frac{5}{2}\times 0\right)+\left(\frac{0}{3+2}\times 0\right)=0$$

$$S2=\left(\frac{CLO1}{CLO1\text{ row}}\times\{CLO1\cap S2\}\right)+\left(\frac{CLO2}{CLO2\text{ row}}\times\{CLO2\cap S2\}\right)+\left(\frac{CLO3}{CLO3\text{ row}}\times\{CLO3\cap S2\}\right)$$

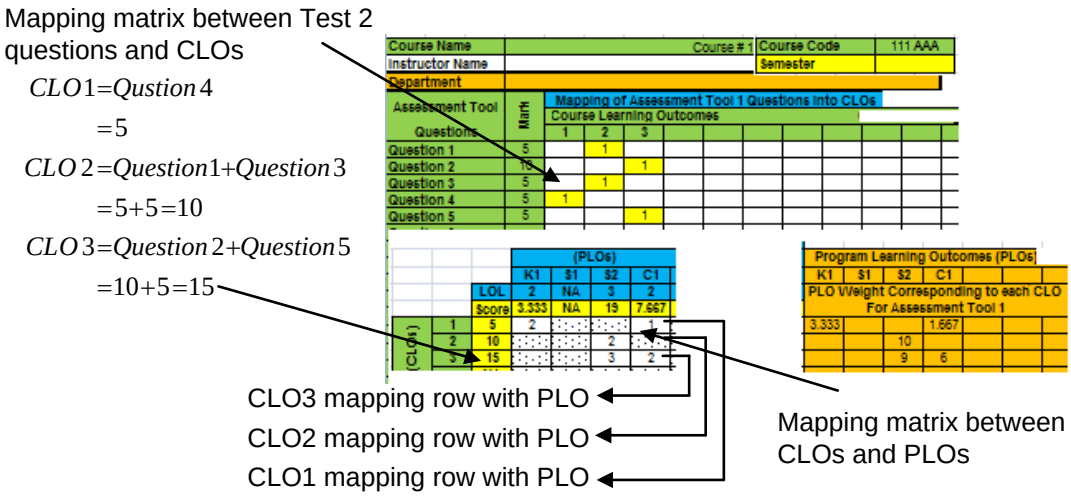
$$=\left(\frac{15}{(2+1)}\times 0\right)+\left(\frac{5}{2}\times 2\right)+\left(\frac{0}{3+2}\times 0\right)=5$$

$$C1=\left(\frac{CLO1}{CLO1\text{ row}}\times\{CLO1\cap C1\}\right)+\left(\frac{CLO2}{CLO2\text{ row}}\times\{CLO2\cap C1\}\right)+\left(\frac{CLO3}{CLO3\text{ row}}\times\{CLO3\cap C1\}\right)$$

$$=\left(\frac{15}{(2+1)}\times 1\right)+\left(\frac{5}{2}\times 0\right)+\left(\frac{0}{3+2}\times 2\right)=5$$

Figure – 3 Equations used to assess PLOs for Test 1

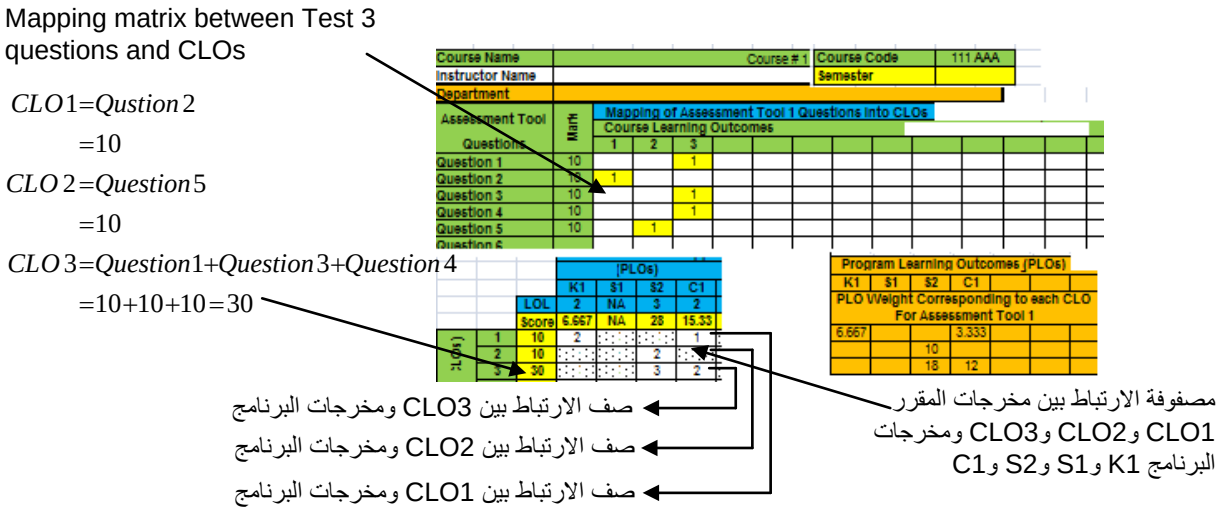
The equations shown in Figures (3), (4) and (5) are applied for each student to assess PLOs according to his grades in the assessment tools. Figure (6) shows, the PLOs have been assessed for the three assessment tools for each students.



$$K1=\left(\frac{5}{(2+1)}\times 2\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{15}{3+2}\times 0\right)=3.333 \qquad S1=\left(\frac{5}{(2+1)}\times 0\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{15}{3+2}\times 0\right)=0$$

$$S2=\left(\frac{5}{(2+1)}\times 0\right)+\left(\frac{10}{2}\times 2\right)+\left(\frac{15}{3+2}\times 3\right)=19 \qquad C1=\left(\frac{5}{(2+1)}\times 1\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{15}{3+2}\times 2\right)=7.667$$

Figure – 4 Equations used to assess PLOs for Test 2



$$K1=\left(\frac{10}{(2+1)}\times 2\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{30}{3+2}\times 0\right)=6.667 \qquad S1=\left(\frac{10}{(2+1)}\times 0\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{30}{3+2}\times 0\right)=0$$

$$S2=\left(\frac{10}{(2+1)}\times 0\right)+\left(\frac{10}{2}\times 2\right)+\left(\frac{30}{3+2}\times 3\right)=28 \qquad C1=\left(\frac{10}{(2+1)}\times 1\right)+\left(\frac{10}{2}\times 0\right)+\left(\frac{30}{3+2}\times 2\right)=15.333$$

Figure – 5 Equations used to assess PLOs for Test 3

#	Student Name	Student ID	Status	Absent %	Assessment Tool Results					Total	Score Status		(CLOs)			(PLOs)			
					Q1	Q2	Q3	Q4	Q5				15	5	--	10	NA	5	5
					5	10	5			20			CLO 1	CLO 2	CLO 3	PLO K1	PLO S1	PLO S2	PLO C1
1	A	11	OK	0.00	4.00	7.00	4.00			16	OK	P	11	4	--	7.33		4	3.67
2	B	12	OK	0.00	3.00	10.00	5.00			18	OK	P	15	3	--	10		3	5
3	C	13	Denied	100.00	2.00	9.00	3.00			14	OK	P	12	2	--	8		2	4
4	D	14	OK	0.00	5.00	5.00	5.00			15	OK	P	10	5	--	6.67		5	3.33
5	E	15	OK	0.00	4.00	6.00	4.00			14	OK	P	10	4	--	6.67		4	3.33
6	F	16	OK	0.00	4.50	7.00	3.00			14.5	OK	P	10	4.5	--	6.67		4.5	3.33
7	G	17	OK	0.00	3.50	10.00	2.50			16	OK	P	12.5	3.5	--	8.33		3.5	4.17
8	H	18	Withdrawn	0.00	2.00	5.00	2.00			9	OK	F	7	2	--	4.67		2	2.33
9	I	19	OK	0.00	5.00	9.00	4.00			18	OK	P	13	5	--	8.67		5	4.33
10	J	20	OK	0.00						Abs	OK	Abs	--	--	--	--		--	--
11	K	21	OK	0.00	2.00	8.00	5.00			15	OK	P	13	2	--	8.67		2	4.33
12	L	22	OK	0.00	3.00	9.00	4.50			16.5	OK	P	13.5	3	--	9		3	4.5

(a) The PLOs have been assessed for Test 1 for each students

#	Student Name	Student ID	Status	Absent %	Assessment Tool Results					Total	Score Status		(CLOs)			(PLOs)			
					Q1	Q2	Q3	Q4	Q5				5	10	15	3.33	NA	19	7.67
					5	10	5	5	5	30			CLO 1	CLO 2	CLO 3	PLO K1	PLO S1	PLO S2	PLO C1
1	A	11	OK	0.00	4.00	9.00	4.50	4.00	2.50	24	OK	P	4	8.5	11.5	2.67		15.4	5.93
2	B	12	OK	0.00	3.00	8.00	5.00	3.00	3.00	22	OK	P	3	8	11	2		14.6	5.4
3	C	13	Denied	100.00						Abs	OK	Abs	--	--	--	--		--	--
4	D	14	OK	0.00	5.00	0.00	5.00	3.00	4.00	17	OK	F	3	10	4	2		12.4	2.6
5	E	15	OK	0.00	4.00	2.00	1.00	2.00	1.00	10	OK	F	2	5	3	1.33		6.8	1.87
6	F	16	OK	0.00	3.00	4.00	5.00	1.00	2.00	15	OK	F	1	8	6	0.67		11.6	2.73
7	G	17	OK	0.00	2.00	8.00	4.00	5.00	3.00	22	OK	P	5	6	11	3.33		12.6	6.07
8	H	18	Withdrawn	0.00						Abs	OK	Abs	--	--	--	--		--	--
9	I	19	OK	0.00	5.00	4.00	4.00	4.00	2.50	19.5	OK	P	4	9	6.5	2.67		12.9	3.93
10	J	20	OK	0.00	4.00	6.00	3.00	3.00	1.50	17.5	OK	F	3	7	7.5	2		11.5	4
11	K	21	OK	0.00	4.50	6.00	4.00	5.00	3.00	22.5	OK	P	5	8.5	9	3.33		13.9	5.27
12	L	22	OK	0.00	5.00	8.00	5.00	4.00	2.00	24	OK	P	4	10	10	2.67		16	5.33

(b) The PLOs have been assessed for Test 2 for each students

#	Student Name	Student ID	Status	Absent %	Assessment Tool Results					Total	Score Status		(CLOs)			(PLOs)			
					Q1	Q2	Q3	Q4	Q5				10	10	30	6.67	NA	28	15.3
					10	10	10	10	10	50			CLO 1	CLO 2	CLO 3	PLO K1	PLO S1	PLO S2	PLO C1
1	A	11	OK	0.00	8.00	4.00	4.00	7.00	6.00	29	OK	F	4	6	19	2.67		17.4	8.93
2	B	12	OK	0.00	9.00	7.00	7.00	6.00	8.00	37	OK	P	7	8	22	4.67		21.2	11.1
3	C	13	Denied	100.00						Abs	OK	Abs	--	--	--	--		--	--
4	D	14	OK	0.00	10.00	5.00	8.00	2.00	9.00	34	OK	P	5	9	20	3.33		21	9.67
5	E	15	OK	0.00	8.00	8.00	7.00	4.00	8.00	35	OK	P	8	8	19	5.33		19.4	10.3
6	F	16	OK	0.00	7.00	3.00	7.00	8.00	9.00	34	OK	P	3	9	22	2		22.2	9.8
7	G	17	OK	0.00	2.00	7.00	2.00	10.00	7.00	28	OK	F	7	7	14	4.67		15.4	7.93
8	H	18	Withdrawn	0.00						Abs	OK	Abs	--	--	--	--		--	--
9	I	19	OK	0.00	6.00	6.00	3.00	8.00	7.00	30	OK	P	6	7	17	4		17.2	8.8
10	J	20	OK	0.00	3.00	3.00	8.00	2.00	8.00	24	OK	F	3	8	13	2		15.8	6.2
11	K	21	OK	0.00	2.00	4.00	9.00	3.00	9.00	27	OK	F	4	9	14	2.67		17.4	6.93
12	L	22	OK	0.00	8.00	5.00	4.00	4.00	9.00	30	OK	P	5	9	16	3.33		18.6	8.07

(c) The PLOs have been assessed for Test 3 for each students

Figure – 6 The PLOs assessed for each assessment tool for each student

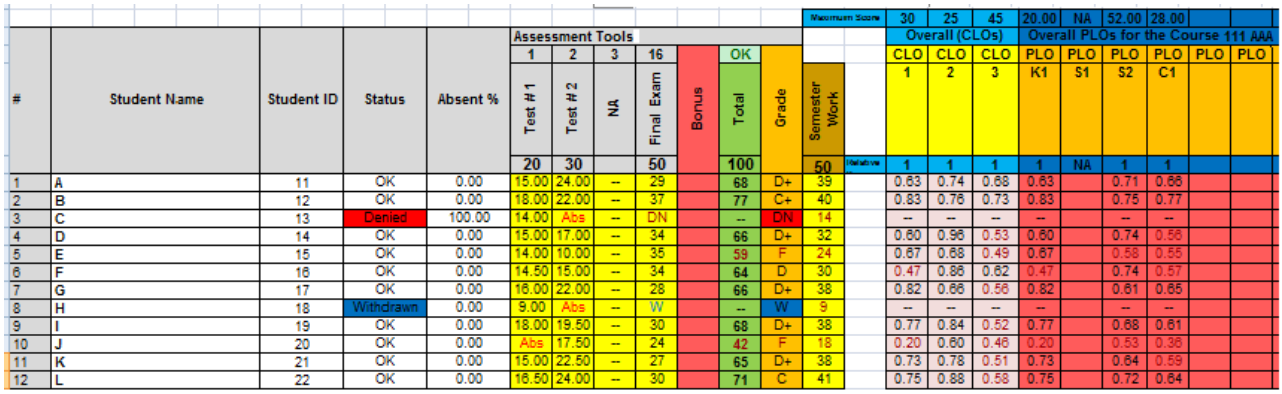
The PLOs assessed for each assessment tool for each student are summed up to provide a comprehensive assessment for PLOs for this course as shown in Figure (7). It is worth noting that after summing up, a normalization to unity is applied for better comparison and analysis.

The comprehensive assessment of PLOs for this course can then be evaluated and defined using the same rubric of three levels of achievement; they are:

(a) **Satisfactory**: if the percentage of the students who achieve 70% "C" or higher is more than 60% for each LO.

(b) **Need Improvement**: if the percentage of the students who achieve 70% "C" or higher is less than 60% but the percentage of the students who achieve less than 60% "F" is less than 40% for each LO.

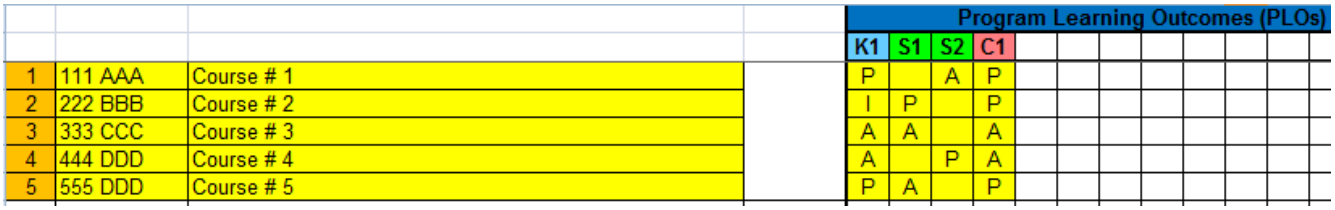
(c) **Unsatisfactory:** if the percentage of the students who achieve less than 60% "F" or less is smaller than 60% for each LO.



					Assessment Tools								Maximum Score	30	25	45	20.00	NA	52.00	28.00		
					1	2	3	16		OK				Overall (CLOs)			Overall PLOs for the Course 111 AAA					
#	Student Name	Student ID	Status	Absent %	Test # 1	Test # 2	NA	Final Exam	Bonus	Total	Grade	Semester Work		CLO 1	CLO 2	CLO 3	PLO K1	PLO S1	PLO S2	PLO C1	PLO	PLO
					20	30		50		100		50	Relative	1	1	1	1	NA	1	1		
1	A	11	OK	0.00	15.00	24.00	--	29		68	D+	39		0.63	0.74	0.68	0.63		0.71	0.66		
2	B	12	OK	0.00	18.00	22.00	--	37		77	C+	40		0.83	0.76	0.73	0.83		0.75	0.77		
3	C	13	Denied	100.00	14.00	Abs	--	DN		--	DN	14		--	--	--	--		--	--		
4	D	14	OK	0.00	15.00	17.00	--	34		66	D+	32		0.60	0.96	0.53	0.60		0.74	0.56		
5	E	15	OK	0.00	14.00	10.00	--	35		59	F	24		0.67	0.68	0.49	0.67		0.58	0.55		
6	F	16	OK	0.00	14.50	15.00	--	34		64	D	30		0.47	0.86	0.62	0.47		0.74	0.57		
7	G	17	OK	0.00	16.00	22.00	--	28		66	D+	38		0.82	0.66	0.56	0.82		0.61	0.65		
8	H	18	Withdrawn	0.00	9.00	Abs	--	W		--	W	9		--	--	--	--		--	--		
9	I	19	OK	0.00	18.00	19.50	--	30		68	D+	38		0.77	0.84	0.52	0.77		0.68	0.61		
10	J	20	OK	0.00	Abs	17.50	--	24		42	F	18		0.20	0.60	0.46	0.20		0.53	0.36		
11	K	21	OK	0.00	15.00	22.50	--	27		65	D+	38		0.73	0.78	0.51	0.73		0.64	0.59		
12	L	22	OK	0.00	16.50	24.00	--	30		71	C	41		0.75	0.88	0.58	0.75		0.72	0.64		

Figure – 7 The comprehensive PLOs assessment for each student in this course

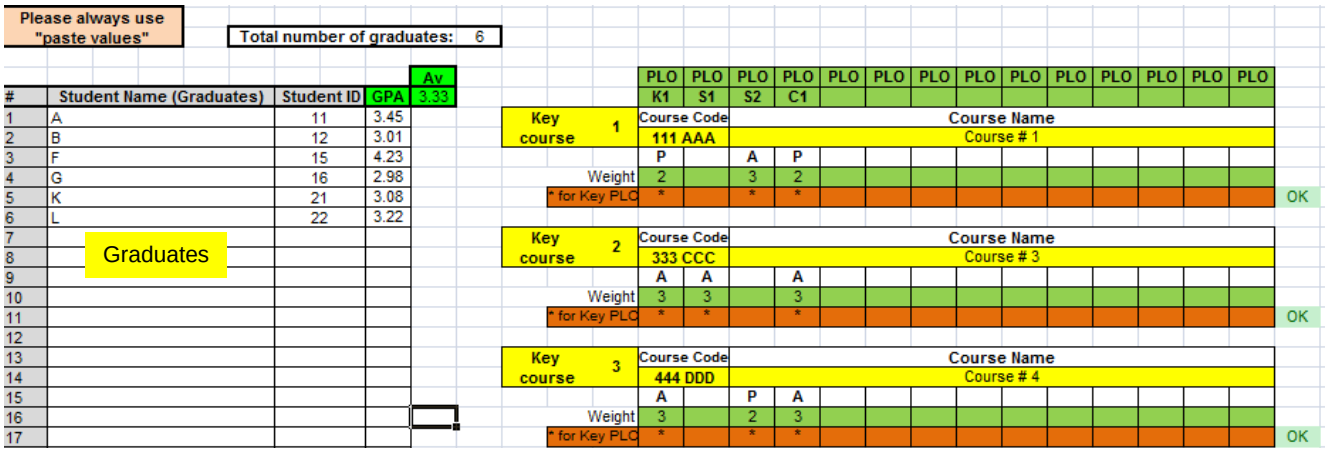
The final stage is that assembling the assessed PLOs for the key courses, i.e. the courses of the highest two or three levels. In order to understand this stage, consider an academic program with 5 courses only and the mapping of these courses with the 4 PLOs is shown in Figure (8).



			Program Learning Outcomes (PLOs)			
			K1	S1	S2	C1
1	111 AAA	Course # 1	P		A	P
2	222 BBB	Course # 2	I	P		P
3	333 CCC	Course # 3	A	A		A
4	444 DDD	Course # 4	A		P	A
5	555 DDD	Course # 5	P	A		P

Figure – 8 Figure shows an academic program with 5 courses and their mapping with PLOs

Also consider that the PLOs assessment of this academic program will based upon the 3 key courses "111AAA", "333CCC", and "444DDD", and there are only 6 graduates of this academic program, they are: A, B, F, G, K, and L. Here, another complementary excel spreadsheet is created for total PLOs assessment. The data shown in Figure (9) are given to this complementary file.



Please always use "paste values"

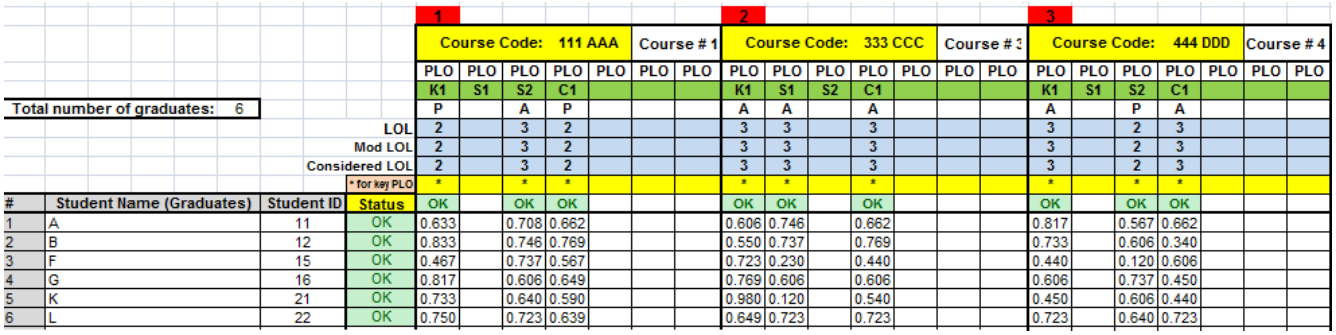
Total number of graduates: 6

#	Student Name (Graduates)	Student ID	GPA	Av 3.33
1	A	11	3.45	
2	B	12	3.01	
3	F	15	4.23	
4	G	16	2.98	
5	K	21	3.08	
6	L	22	3.22	
7				
8	Graduates			
9				
10				
11				
12				
13				
14				
15				
16				
17				

		PLO K1	PLO S1	PLO S2	PLO C1	PLO	PLO	PLO	PLO	PLO	PLO	PLO	PLO	PLO	PLO	
Key course	1	Course Code: 111 AAA		Course Name: Course # 1												
		P		A	P											
	Weight	2		3	2											
	* for Key PLO	*		*	*											OK
Key course	2	Course Code: 333 CCC		Course Name: Course # 3												
		A	A		A											
	Weight	3	3		3											
	* for Key PLO	*	*		*											OK
Key course	3	Course Code: 444 DDD		Course Name: Course # 4												
		A		P	A											
	Weight	3		2	3											
	* for Key PLO	*		*	*											OK

Figure – 9 Figure shows the data given to the complementary Excel spreadsheet for total assessment of PLOs for the academic program

The same complementary file shown in Figure (9), accepts the PLOs assessed before for each course for each student, as shown in Figure (10).



Total number of graduates: 6

			1 Course Code: 111 AAA					Course # 1		2 Course Code: 333 CCC					Course # 3		3 Course Code: 444 DDD					Course # 4	
			PLO K1	PLO S1	PLO S2	PLO C1	PLO	PLO	PLO	PLO K1	PLO S1	PLO S2	PLO C1	PLO	PLO	PLO	PLO K1	PLO S1	PLO S2	PLO C1	PLO	PLO	PLO
			P		A	P				A	A		A				A		P	A			
		LOL	2		3	2				3	3		3				3		2	3			
		Mod LOL	2		3	2				3	3		3				3		2	3			
		Considered LOL	2		3	2				3	3		3				3		2	3			
		* for key PLO	*		*	*				*	*		*				*		*	*			
#	Student Name (Graduates)	Student ID	Status																				
1	A	11	OK	OK		OK	OK			OK	OK		OK				OK		OK	OK			
2	B	12	OK	0.633		0.708	0.662			0.606	0.746		0.662				0.817		0.567	0.662			
3	F	15	OK	0.833		0.746	0.769			0.550	0.737		0.769				0.733		0.606	0.340			
4	G	16	OK	0.467		0.737	0.567			0.723	0.230		0.440				0.440		0.120	0.606			
5	K	21	OK	0.817		0.606	0.649			0.769	0.606		0.606				0.606		0.737	0.450			
6	L	22	OK	0.733		0.640	0.590			0.980	0.120		0.540				0.450		0.606	0.440			
				0.750		0.723	0.639			0.649	0.723		0.723				0.723		0.640	0.723			

Figure – 10 Figure shows the PLOs assessed for each student for each key course

As shown in Figure (10), the PLO-K1 will be assessed from the 3 key courses with weight equals to "8", the PLO-S1 will be assessed from only 1 key course with weight equals to "3", the PLO-S2 will be assessed from a 2 key courses with weight equals to "5", and the PLO-C1 will be assessed from the 3 key courses with weight equals to "8". Each PLO, for each student and for each key course, is now normalized according to the LoL defined in Figure (8), for which "Introductory" corresponds to LoL=1, "Proficient" corresponds to LoL=2, and "Advanced" corresponds to LoL=3. Here, each PLO for each student for each key course is multiplied by LoL of this LO, see Figure (11).

Total number of graduates:	6

#	Student Name (Graduates)	Student ID
1	A	11
2	B	12
3	F	15
4	G	16
5	K	21
6	L	22

	number of courses used to evaluate each PLO								
	3	1	2	3					
	PLOs Evaluation for Key Courses								
	PLO	PLO	PLO	PLO	PLO	PLO	PLO	PLO	P
Considered LOL	K1	S1	S2	C1					
(sub total)	8	3	5	8					
	Relative Weight for each PLO								
	1	1	1	1					
	0.692	0.746	0.651	0.662					
	0.690	0.737	0.690	0.608					
	0.553	0.230	0.490	0.534					
	0.720	0.606	0.658	0.558					
	0.720	0.120	0.627	0.515					
	0.702	0.723	0.690	0.702					

$$K1_{\text{Student A}} = \frac{\left\{K1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 1}}\ \substack{of\ K1 \\ \text{at Course 1}}}\right\} + \left\{K1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 3}}\ \substack{of\ K1 \\ \text{at Course 3}}}\right\} + \left\{K1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 4}}\ \substack{of\ K1 \\ \text{at Course 4}}}\right\}}{\text{Weight of } K1}$$

$$S1_{\text{Student A}} = \frac{\left\{S1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 1}}\ \substack{of\ S1 \\ \text{at Course 1}}}\right\} + \left\{S1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 3}}\ \substack{of\ S1 \\ \text{at Course 3}}}\right\} + \left\{S1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 4}}\ \substack{of\ S1 \\ \text{at Course 4}}}\right\}}{\text{Weight of } S1}$$

$$S2_{\text{Student A}} = \frac{\left\{S2 \times LoL_{\substack{\text{Student A} \\ \text{at Course 1}}\ \substack{of\ S2 \\ \text{at Course 1}}}\right\} + \left\{S2 \times LoL_{\substack{\text{Student A} \\ \text{at Course 3}}\ \substack{of\ S2 \\ \text{at Course 3}}}\right\} + \left\{S2 \times LoL_{\substack{\text{Student A} \\ \text{at Course 4}}\ \substack{of\ S2 \\ \text{at Course 4}}}\right\}}{\text{Weight of } S2}$$

$$C1_{\text{Student A}} = \frac{\left\{C1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 1}}\ \substack{of\ S1 \\ \text{at Course 1}}}\right\} + \left\{C1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 3}}\ \substack{of\ S1 \\ \text{at Course 3}}}\right\} + \left\{C1 \times LoL_{\substack{\text{Student A} \\ \text{at Course 4}}\ \substack{of\ S1 \\ \text{at Course 4}}}\right\}}{\text{Weight of } C2}$$

Figure – 11 Figure shows normalizing process of each PLO for each student

The following statics can be extracted from the table existed in Figure (11),

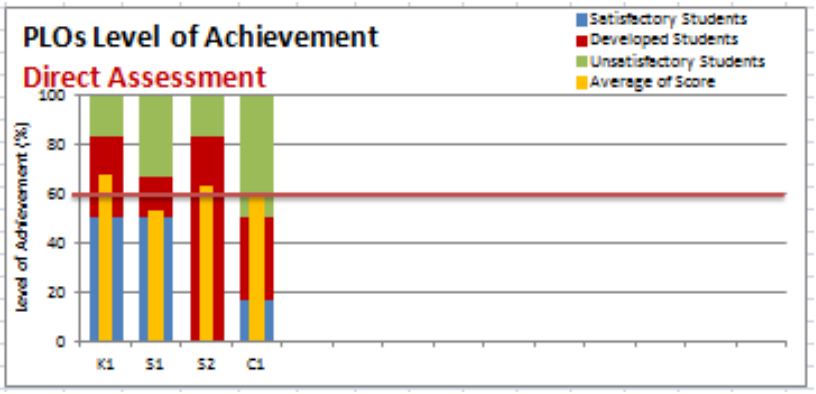
	Overall Direct Assessment of each PLO								
	K1	S1	S2	C1					Overall
No. of Graduates achieved each PLO	5	4	5	3					4
% of Graduates achieved each PLO	83.3	66.7	83.3	50.0					66.7
Average of each PLO	0.679	0.527	0.634	0.597					0.609

The total assessment of PLOs for this academic program, according to the selected key courses, can then be evaluated and defined using the same rubric of three levels of achievement; they are:

(a) **Satisfactory**: if the percentage of the students who achieve 70% "C" or higher is more than 60% for each LO.

(b) **Need Improvement**: if the percentage of the students who achieve 70% "C" or higher is less than 60% but the percentage of the students who achieve less than 60% "F" is less than 40% for each LO.

(c) **Unsatisfactory:** if the percentage of the students who achieve less than 60% "F" or less is smaller than 60% for each LO.



It is obvious that PLOs (K1, S1, and S2) need improvement, however PLO-C1 is unsatisfactory.

The above steps are followed by Indirect Assessment by means of students' PLOs survey, SES survey, and PES survey. It is worth noting that all of these steps and procedures are assembled and programmed using Excel spreadsheet for instructor convenient and accurate assessment.

Writing the Program Report (PR) is possible now and the feedback for developing and improving can be implemented for the next cycle/academic year, see Figure (12).

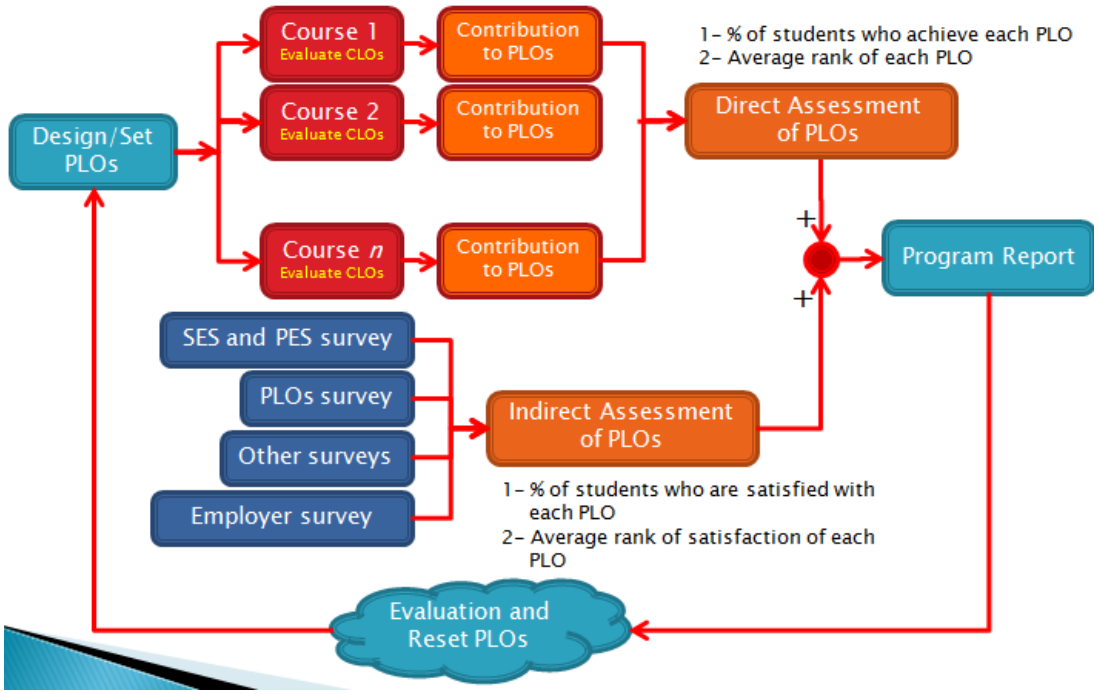


Figure – 12 Process of Academic Program development

6. References

1- Riza Atiq Abdullah O.K Rahmat, Achievement of Program Outcomes Using Assessment Plan, Procedia Social and Behavioral Sciences 18 (2011) 87–93, ELSEVIER.

2- Rose Grace Grose, Program Learning Outcomes Analysis in Higher Education (An Introductory Tutorial), University of California, Santa Cruz (CSASS), 2016.

3- Program Assessment handbook – Guidelines for Planning and Implementing "Quality Enhancing Efforts" of Program and Student Learning Outcomes, University of Central Florida, 2008.

4- Student Learning Outcomes Assessment Handbook, Montgomery College, 2010.