Program Learning Outcomes Assessment

#	Program Learning Outcomes	Assessment Methods (Direct and Indirect)	Performance Target	Results
Kno	wledge and Understanding			
K1	An ability to apply knowledge of computing and mathematics appropriate to the discipline	Direct Methods:1. Course LearningOutcomes assessment(Each Semester)2. Formative assessmentcycle for LearningOutcomes.	65% of the students at the accomplished or above levels	According to PLO assessment plan 2017-2021, recommendations of K1 were implemented in first semester 2020/2021.
K2 K3	An understanding of professional, ethical, legal, security and social issues and responsibilities An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices	Indirect Methods: 1. Exit Survey (Each Semester) 2. Current Student Survey (Each Semester)	According to PL plan, K2 not selv assessment durin year 2020/2021 65% of the students at the accomplished or above levels	LO/SO assessment ected for ng the academic According to PLO assessment plan 2017-2021, recommendations of K3 were implemented in second semester 2020/2021.
Skill	S			
S1	An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution	Direct Methods: 1. Course Learning Outcomes assessment (Each Semester)	65% of the students at the accomplished or above levels	According to PLO assessment plan 2017-2021, recommendations of S1 were implemented in second semester 2020/2021.

1. Program Learning Outcomes Assessment Results.

\$2 \$3	An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs	 2. Formative assessment cycle for Learning Outcomes. <u>Indirect Methods:</u> 1. Exit Survey (Each 	According to PI plan, S2 not sele during the acade 2020/2021	O/SO assessment exted for assessment emic year
22	local and global impact of computing on individuals, organizations, and society	Semester) 2. Current Student Survey (Each Semester)	plan, S3 not selected for assessmen during the academic year 2020/2021	
S4	An ability to use current techniques, skills, and tools necessary for computing practice.		65% of the students at the accomplished or above levels	According to PLO assessment plan 2017-2021, recommendations of S4 were implemented in the first semester 2020/2021.
S5	An ability to apply design and development principles in the construction of software systems of varying complexity.		According to PI plan, S5 not sele during the acade 2020/2021	O/SO assessment acted for assessment amic year
Valu	ies			
V1	An ability to function effectively on teams to accomplish a common goal	Direct Methods:1. Course LearningOutcomes assessment(Each Semester)2. Formative assessmentcycle for LearningOutcomes.	65% of the students at the accomplished or above levels	According to PLO assessment plan 2017-2021, recommendations of V1 were implemented in second semester 2020/2021.
V2	An ability to communicate effectively with a range of audiences	Indirect Methods: 1. Exit Survey (Each Semester) 2. Current Student Survey (Each Semester)	65% of the students at the accomplished or above levels	According to PLO assessment plan 2017-2021, recommendations of V2 were implemented in the second semester 2020/2021.

V3	An ability to recognize the
	need for and an ability to
	engage in continuing
	professional development

According to PLO/SO assessment plan, V3 not selected for assessment during the academic year 2020/2021

Comments on the Program Learning Outcome Assessment results.

The Department of Computer Science (CS) adopted the ABET CAC's (a-k) Student Outcomes (SO) for the Computer Science program as a Program Learning Outcome (PLO). According to the PLO assessment plan 2017-2021, recommendations of following two PLOs were selected to implement during the first semester 2020/2021. Also, data of these two PLOs were collected and evaluated during last year according to CS department PLO assessment plan.

- Knowledge and Understanding
- ✓ PLO (K₁) ≈ SO (a): An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- Skills
- ✓ PLO (S₄) ≈ SO (i): An ability to use current techniques, skills, and tools necessary for computing practice.

Moreover, the recommendations of following four PLOs were selected to implement during the second semester 2020/2021. Also, data of these two PLOs were collected and evaluated during last year according to CS department PLO assessment plan.

- Knowledge and Understanding
- ✓ PLO (K₃) ≈ SO (j): An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- Skills
- ✓ PLO (S₁) ≈ SO (b): An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- \checkmark
- Values
- ✓ **PLO** (V₁) ≈ **SO** (d): An ability to function effectively on teams to accomplish a common goal.

✓ PLO $(V_2) \approx$ SO (f): Ability to communicate effectively with a range of audiences.

Implementation of recommendation on program learning outcome (PLO) assessment results for first semester 2020/2021

Knowledge and Understanding

Program Learning Outcome (K₁) \approx Student Outcome (a)

A rubric was designed to assess the SO (a) and was distributed to the graduation project II students. The rubric was based on the four performance indicators i.e. 1. Choose various algorithms used in computing to solve the problem, 2. Demonstrate knowledge of computing and mathematics to solve problems, 3. Illustrate the mathematical concepts that underlie computing and 4. Use various techniques and approaches to different components in computing. Each section was rated on a four-point scale (Exemplary, Accomplished, Developing, and unsatisfactory) Data were collected from both male and female campus and average of both campus is 3.14 out of 4 (in percentage, 3.14 out of 4 is equivalent to 78.5%). It shows that PLO (K1)/SO (a) achieved the target benchmark of 65%. Target benchmark is achieved but assessment group given some recommendations which are implement during first semester 2020/2021 to improve the achievement level.

Skills

Program Learning Outcome (S₄) \approx Student Outcome (i):

A rubric was designed to assess the SO (i) and was distributed to the graduation project II students. The rubric was based on the three performance indicators i.e. 1. apply current technique(s) to solve a real-life problem, 2. use current skills to conduct computing task and 3. practice current tools to accomplish the computational task. Each section should be rated on a four-point scale (Exemplary, Accomplished, Developing, and Beginning) in order to obtain a rationalized response from the students. The target achievement rate of the rubric is 2.6 (65%)

out of 4 for each section in the rubric. Data were collected from both male and female campus and overall PLO (S4)/SO(i) is achieved in both section where is the achievement ratio is 3.07. Target benchmark is achieved but Target benchmark is achieved but assessment group given some recommendations which are implement during first semester 2020/2021 to improve the achievement level.

Implementation of recommendation on program learning outcome (PLO) assessment results for second semester 2020/2021

Knowledge and Understanding

Program Learning Outcome (K₃) ≈ Student Outcome (j)

A rubric was designed to assess the SO (j), rubric was mainly based on following three performance indicators (PI);

PI j.1: Apply math foundations in the modeling and design of computer-based systems

PI j.2: Apply algorithmic principles in the modeling and design of computer-based systems PI j.3: Apply computer science theory in the modeling and design of computer-based systems

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with strong relationship with SO (j).

Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the SO (j). Assessment is based on the three-graduation project-I and 2 graduation project-II. Overall assessment result of SO (j) based on the data collected from both male and female campus. Assessment result shows that 90.04% students achieved the SO (j) in male campus and 91.56% students achieved in female campus. Average achievement rate in male and female campus is 90.03% which achieved the target of 65%. Target benchmark is

achieved but assessment group given some recommendations which are implement during second semester 2020/2021 to improve the achievement level.

Skills

Program Learning Outcome $(S_1) \approx$ Student Outcome (b)

A rubric designed to assess the SO (b), the rubric mainly based on the following three performance indicators (PI);

PI b.1: Breakdown a given problem into smaller components.

PI b.2: Identify tools, techniques and models to achieve the solution.

PI b.3: Define the requirements for a given computing problem

Since it was required to do the summative assessment, so courses were only selected from level 8 and 9 with a strong relationship with SO (b). Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the SO (b). Assessment is based on the four graduation project-I and four graduation project-II. The overall assessment result of SO (b) based on the data collected from both male and female campus. Assessment results show that 83.67% of students achieved the SO (b) in male campus and 89.94% students achieved on the female campus. Average achievement rate in male and female campus is 86.81% which achieved the target of 65%. Target benchmark is achieved but assessment group given some recommendations which are implement during second semester 2020/2021 to improve the achievement level.

Values

Program Learning Outcome (V1) ≈ **Student Outcome (d)**

A rubric was designed to assess the SO (d), the rubric was mainly based on the following three performance indicators (PI);

PI b.1: Share knowledge and ideas to achieve a common goal.

PI b.2: Adhere to team responsibilities to achieve a common goal.

PI b.3: Listen to other team members.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with a strong relationship with SO (f). Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the SO (d). Assessment is based on the three-graduation project-I and two graduation project-II. Overall assessment result of SO (d) based on the data collected from both male and female campus. Assessment result shows that 82.91% of students achieved the SO (d) in male campus and 93.01% students achieved in the female campus. Average achievement rate in male and female campus is 87.96% which achieved the target of 65%. Target benchmark is achieved but assessment group given some recommendations which are implement during second semester 2020/2021 to improve the achievement level.

Program Learning Outcome (V₂) \approx Student Outcome (f)

A rubric was designed to assess the SO (f), the rubric was mainly based on the following three performance indicators (PI);

PI f.1: Prepare a scientific report.

PI f.2: Present scientific accomplishment verbally.

PI f.3: Utilize presentation skills and technology.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with a strong relationship with SO (f). Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the SO (f). Assessment is based on the four graduation project-I and four graduation project-II. The overall assessment result of SO (f) based on the data collected from both male and female campus. Assessment results show that 82.04% of students achieved the SO (f) in male campus and 91.09% students achieved in the female campus. Average achievement rate in male and female campus is 86.56% which achieved the target of 65%. Target benchmark is achieved but assessment group given some recommendations to implement during second semester 2020/2021 to improve the achievement level.

Note: Detailed analysis of PLOs/SOs is given below in section 2 (analysis of program learning outcome assessment)

Program learning Outcomes Mapping Matrix

Align the program learning outcomes with program courses, according to the following desired levels of performance (I = Introduced P = Practiced M = Mastered)

	Program Learning Outcomes										
Course code & No.	Knowledge and understanding		Skills					Values			
	K1	K2	К3	S1	S2	S 3	S4	S 5	V1	V2	V3

^{*} Include the results of measured learning outcomes during the year of the report according to the program plan for measuring learning outcomes

^{**} Attach a separate report on the program learning outcomes assessment results for male and female sections and for each branch (if any)

	PYP 1 (LEVEL 1)										
140TEC Computer Skills	Ι		Ι	Ι	Ι		Ι		Ι		Ι
140MATH-2 Introduction of Mathematics	Ι										Ι
140SKL-2 Learning, Thinking and Research Skills		Ι						Ι	Ι		
140ENGG-2 English Language: Reading Skills		Ι		Ι				Ι	Ι		
141ENGG-2 English Language: Writing Skills		Ι		Ι			Ι		Ι	Ι	
142ENGG-2 English Language: Listening and Speaking Skills									Ι		
143ENGG-2 English Language: Grammars	Ι								Ι		Ι
			PY	P 2 (L	EVEL	2)					
150MAN-1 Professional Ethics		Ι						Ι	Ι		
150MATH-4 Calculus 1	Ι							Ι			Ι
150SKL-2 Communication Skills		Ι						Ι	Ι		
150ENGG-3 General English	Ι	Ι				Ι	Ι	Ι	Ι		Ι
151ENGG-2 Report Writing		Ι					Ι	Ι	Ι		
150TEC-1 Computer Skills	Ι		Ι	Ι	Ι		Ι		Ι		Ι
				Lev	rel 3						
111ISL-2		Ι						Ι	Ι		

Introduction to Islamic Culture											
104PHIS-4 Fundamental of Physics		I									
111CSS-4, Programming Language 1	P		I		I		I	I			
106MATH-3 Introduction to Integration	Ι	Ι							Ι		
152MATH-3 Discrete Mathematics	Ι	Ι							Ι		Ι
				Lev	el 4					<u></u>	
201ARAB-2 Arabic Skills		Ι							Ι		
342MATH-3 Linear Algebra	Р										
113CSS-4, Object Oriented Programming	P		P	P	I		P	P	P	P	
324STAT-3 Probabilities and Engineering Statistics	Р								Р		
203MATH-3 Advanced Calculus	Р	Ι									
				Lev	el 5						
112ISL-2 Islamic Culture 2		Ι							Ι	Ι	
212CSS-3, Data Structures and Algorithms	P		I	P	I	P		I			

105PHIS-4	_	_									
Advanced Physics	Ι	Р									
222CSS-4,	I										
Computer Organization and	-		I	I	I		P	P			
Architecture											
330CSS-3,	_		-	_	_		_	_			
Programming Paradigms	P		I	P	P		P	P			
					• •						
				Lev	el 6						
227CSS-3, Operating Systems	I		P	P	P		P	I			
112151 2											
11515L-2		Ι							Ι	Ι	
Islamic Culture 3											
342CSS-3, Software	Р	Р	Р	Р	М	Р	Р	М	М	Р	Р
Engineering											
101BIOL-4		Ţ							T	T	
General Biology		1							1	1	
235CSS-3, Theory of	Р		Р	Р	Р		Р	Р		Р	
Computation											
				Lev	el 7						
281CSS-3,	Р		Ι	Ι	Р		Р	Р	Р	Ι	Ι
Computer Graphics											
361CSS-3, Artificial	Р		Р	Р	Р	Ι	Р	Р	Ι		
457CSS-3, Internet Technologies	Р	Р	Р	М	М	Р	М	М	Р	Р	Р
380055-3											
Fundamental of	Ι		Р		Ι		Р	Ι	Р		
Database Systems											
329CSS-3, Data											
Communication and	Р		Р	Р	Р		Р	Р			Ι
				Lev	el 8						
491CSS-4, Craduation Braiset	м	м	м	D	м	м	м	D	м	м	м
1	111	111	11/1	r	141	111	101	r	111	11/1	141

456CSS-3, Parallel and Distributed Systems	Р	Р	Р	Р	Р		М	Р			
114ISL-2 Islamic Culture 4		Ι							Ι	Ι	
328CSS-3, Human and Computer Interaction	Р	Р		Р	Р		Р	М		Р	Р
474CSS-3, Algorithm Design and Analysis	Р			Р	Р		Ι	М			
Level 9											
492CSS-4, Graduation Project 2	М	М	М		М	М	М	М	М	М	М
345MATH-3, Operational Research	М		Р	М	М		М	М	Р		
440CSS-3, Social, Ethical, and Professional Issues`	Р	М			М				М	М	М
429CSS-3, Computer Security	Р	М	Р	М	Р	Р	М	Р			Р
202ARAB-2 Arabic Writing		Ι							Ι	Ι	

* Add a table for each track (if any)

2. Analysis of Program Learning Outcomes Assessment

(including strengths, Areas for Improvement:, and priorities for improvement)

Program learning outcomes (PLOs) or student outcomes (SOs) can be assessed by using both direct and indirect assessment methods. In this report, recommendations are implemented after

evaluating the PLOs/SOs by collecting the assessment data from the following direct assessment method:

• Assessment of student learning outcomes using performance indicators (PIs) and Rubrics

Assessment of student learning outcomes using performance indicators (PIs), Embedded Questions and Rubrics

This report is an overall assessment method to evaluate the attainment of SOs. A set of Performance Indicators were developed for each one of the SOs. PIs are then aligned to the curriculum to facilitate the collection of data. Data is then evaluated by using a set of rubrics. In this method, we collect data and evaluate each SO once in a complete assessment cycle.

The first cycle of PLOs or SOs assessment through PIs, embedded questions and rubrics started in 2012/2013 and finished in 2015/2016. Hence, the College of CSIS has planned a new cycle for the academic years 2017-2021 to assess the PLOs/ SOs. A new assessment plan is described below:

1. Assessment Types

- Direct assessment: It will be achieved through performance indicators (PIs) and by using course learning outcome (CLOs) for all CS SOs. Direct assessment methods are used for the direct examination or observation of student knowledge, skills and/or behaviors. e.g. Exams, Presentation, etc.
- Indirect assessment: It will be done through indirect methods, e.g. exit surveys, current student survey and meeting and survey with program advisory committee.

2. Assessment Methods

The formative and summative assessment methods which will be used in the assessment plan for the year 2017 - 2021 are:

• Formative Assessment.

- 1. Formative assessments are ongoing assessments, reviews, and observations in a classroom and or within an academic year or predetermined time.
- 2. We should use formative assessment to improve instructional methods and student feedback throughout the teaching and learning process.

- 3. The goal of formative assessment is to monitor student learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to enhance their learning.
- 4. Examples of formative assessment are quizzes, assignments, midterms, etc. It will be used in level 3 to 6.

• Summative Assessment.

- 1. Summative assessments are typically used to evaluate the effectiveness of instructional programs and services at the end of an academic year or at a predetermined time.
- 2. The goal of summative assessments is to make a judgment of student competency after an instructional phase is complete.
- 3. The goal of summative assessment is to evaluate student learning at the end of an instructional unit by comparing it against some standard or benchmark.
- 4. Example of summative assessment is final exams, nationwide Tests, and it will be done from levels 7, 8 and 9.

As it is mentioned above that according to the PLO assessment plan 2017-2021, recommendation of following two PLOs/SOs were selected to implement during the first semester 2020/2021.

- 1. **PLO** (K_1) \leftrightarrow **SO** (a): An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- PLO (S₄) ↔ SO (i): An ability to use current techniques, skills, and tools necessary for computing practice.

Moreover, the recommendations of following four PLOs were selected to implement during the second semester 2020/2021. Also, data of these four PLOs were collected and evaluated during last academic year according to CS department PLO assessment plan.

- 1. **PLO** (K_3) \leftrightarrow **SO** (j): An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- PLO (S₁) ↔ SO (b): An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

3. **PLO** (V_1) \leftrightarrow **SO** (d): An ability to function effectively on teams to accomplish a common goal.

4. **PLO** (V_2) \leftrightarrow **SO** (f): Ability to communicate effectively with a range of audiences.

College's development and quality unit (DQU) formed following five groups which were responsible for collecting the data and evaluating the PLOs/SOs according to the assessment plan.

Group No.	Coordinator	Member	Program Learning Outcome(PLO)/Stu dent Outcome (SO)
		Ms. Saira	
		Ms. Eman	
		Dr. Khairi	$\mathbf{PI} \cap (\mathbf{V}_1) \leftrightarrow \mathbf{SO}(\mathbf{a})$
Group 1	Dr. Fekri	Mr. Mohammed Basit	$PLO(K1) \leftrightarrow SO(a)$
		Mr. Omar	PLO (54) ↔50 (1)
		Mr. Mazen Gazzan	
		Mr. Khalid Makdi	
		Ms. Nazeema	
		Ms. Enam	
		Dr. Muniba	$\mathbf{D} \cup (\mathbf{S}^{1}) \leftrightarrow \mathbf{S} \cup (\mathbf{h})$
Group 2	Dr. Shargabi	Mr. Selim Reza	$PLO(S1) \leftrightarrow SO(0)$
		Mr. Muhammad Akram	$PLO(V2) \leftrightarrow SO(1)$
		Mr. Adlan Balola	
		Mr. Abdullah Al Qahtani	
		Ms. Rania	
Group 2	Dr Acadullah	Ms. Dalal	$PLO (V1) \leftrightarrow SO (d)$
Group 5	Dr. Asadullah	Dr. Addin Osman	$\text{PLO} \ (\text{K3}) \leftrightarrow \text{SO} \ (\text{j})$
		Mr. Shah Masud	

		Mr. Naif Mr. Saltan Al Azmei	
Group 4	Dr. Ghassan	Dr. Khairan Dr. Adel Rajab Dr. Samar Alqhtani Ms. Gulshan Ms. Suad Mr. Golam faruque Mr. Yahya Mr. Abdullah Abosaq Mr. Ali Zamnan	PLO (S2) \leftrightarrow SO(c) PLO (K2) \leftrightarrow SO (e)
Group 5	Dr. Abdurrahman	Mr. Muhammad Akram Ms. Nyla Khadem Ms. Sumaiya Dr. Anwar Dr. Aisha Dr. Mohammed Hamdi Mr. Haji Moinuddin Mr. Ahmad Al Musabi	PLO (S3) \leftrightarrow SO(g) PLO (V3) \leftrightarrow SO (h) PLO (S5) \leftrightarrow SO (k)

Implementation of recommendations of program learning outcome (PLO) during first semester 2020/2021

Program Learning Outcome (K₁) \approx Student Outcome (a):

An ability to apply knowledge of computing and mathematics appropriate to the discipline.

A rubric was designed to assess the PLO (K_1) /SO (a) and was distributed to the graduation project II students. The rubric was based on the four performance indicators i.e.

- 1. Choose various algorithms used in computing to solve the problem
- 2. Demonstrate knowledge of computing and mathematics to solve problems
- 3. Illustrate the mathematical concepts that underlie computing
- 4. Use various techniques and approaches to different components in computing.

Each section was rated on a four-point scale (Exemplary, Accomplished, Developing, and unsatisfactory). An assessment plan is shown in table C-2-1 and rubric for assessing is presented in table C-2-2.

Assessment Method	Assessment tools	Source of assessment	Threshold		
Survey using Rubrics	distribute survey	492CSS-4	65% of students at the accomplished or above level.		

Table C-2-1: Assessment plan

Table C-2-2: Rubric for assessing PLO (K1)/SO (a)

	PI _No	Unsatisfac tory 1	Developin g 2	Satisfacto ry3	Exemplary 4	Decision
PI a.1	Choose various algorithms used in computing to solve the problem	Unable to choose various algorithms used in computing	Choose various algorithms used in computing appropriate ly, major errors in selection	Choose various algorithms used in computing appropriat ely, minor errors in selection	Choose various algorithms used in computing appropriatel y, no errors	 1.Unsatisfacto ry 2 Developing 3. Satisfactory 4.Exemplary

		2	2	2	2	
PI a.2	Demonstrate	Unable to	Able to	Able to	Able to	1.Unsatisfacto
	knowledge of	demonstrat	demonstrat	demonstrat	demonstrate	ry
	computing and	e any	e very little	e some	all	2 Developing
	mathematics to	knowledge	knowledge	knowledge	knowledge	2. Developing
	solve problems	of	of	of	of	3. Satisfactory
		computing	computing	computing	computing	
		and	and	and	and	4.Exemplary
		mathematic	mathematic	mathemati	mathematic	
		s to solve	s to solve	cs to solve	s to solve	
		problems	problems	problems	problems	
PI a 3	Illustrate the	Unable to	Able to	Able to	Able to	1 Unsatisfacto
114.5	mathematical	illustrate	illustrate	illustrate	illustrate all	rv
	concepts that	anv	very little	some	mathematic	- 5
	underlies	mathematic	mathematic	mathemati	al concepts	2. Developing
	computing	al concepts	al concepts	cal	that	3 Satisfactory
	1 0	that	that	concepts	underlies	5. Buildide of y
		underlies	underlies	that	computing	4.Exemplary
		computing	computing	underlies		
				computing		
DI 4	TT T	XX 11 /	A11 /		A11 /	
PI a.4	Use various	Unable to	Able to use	Able to	Able to use	1.Unsatisfacto
	techniques and	use any	few	use most	various	ry
	approaches of	techniques	techniques	OI to chairman	techniques	2. Developing
	annerent	and	and	techniques	and	
	components in	approaches	approaches	anu	approaches	3. Satisfactory
	computing.	or different	or different	approaches	or different	4.Exemplary
		component	component	component	in	······································
		sill	sill		apputing	
		computing.	computing.	s III	without onv	
				computing.	error	

The rubric consists of 4 sections to get the whole assessment of SO(a) like:

- Choose various algorithms used in computing to solve the problem
- Demonstrate knowledge of computing and mathematics to solve problems
- Illustrate the mathematical concepts that underlie computing
- Use various techniques and approaches to different components in computing.

Each section should be rated on a four-point scale (Unsatisfactory, Developing, Satisfactory, and Exemplary) to obtain a rationalized response from the students.

The target achievement rate of the rubric is 2.60 out of 4 for each section in the rubric. The achievement rate in the following table C-2-4 is calculated by counting the number of responses in each scale then divided into the total number of response.

PI		Exemplary 4	Satisfactory 3	Developing 2	Unsatisfactory 1	Average out of 4
PI a.1	Male	1	1	4		2.5
	Female	1	3			3.25
PI a.2	Male	2	3	1		3.5
	Female	1	3			3.25
PI a.3	Male	1	4		1	2.8
	Female		3	1		2.75
PI a.4	Male	5	1			3.8
	Female	1	3			3.25
Total	М	9	9	5	1	3 14
	F	3	12	1	0	J.14

Table C-2-3: Assessment of PLO $(K_1)/SO$ (a)

Above table, C-2-3 shows that first PI (Choose various algorithms used in computing to solve the problem) the achievement ratio is 2.50 in the male section not achieved and 3.25 in the female is achieved as the target benchmark is 2.6. The second PI is achieved for both sections and also in third and fourth PI are achieved.

The overall SO(a) is achieved in both section is the achievement ratio is 3.14.

Program Learning Outcome (S₄) \approx Student Outcome (i):

An ability to use current techniques, skills, and tools necessary for computing practice

A rubric was designed to assess the PLO (S_4) /SO (i) and was distributed to the graduation project II students. The rubric was based on the three performance indicators i.e. 1. apply current technique(s) to solve a real-life problem, 2. use current skills to conduct computing task and 3. practice current tools to accomplish the computational task. Each section should be rated on a four-point scale (Exemplary, Accomplished, Developing, and Beginning) to obtain rationalized response from the students. An assessment plan is shown in table C-2-24 and rubric for assessing is presented in table C-2-5.

Table C-2-4: Assessment plan

Assessment Method	Assessment tools	Source of assessment	Threshold
Survey using Rubrics	distribute survey	492CSS-4	65% of students at the accomplished or above level.

Table C-2-5: Rubric for assessing PLO (S_4) /SO (i)

PI _No	Exemplary	Accomplished	Developing	Beginning	Decision
PI i.1: Apply current technique(s) to solve a real life problem.	Apply current technique(s) without errors	Apply current technique(s) with few errors	Apply current technique(s) with some errors	Apply current technique(s) with frequent errors	 Exempl ary Accom plished Develo ping Beginni ng

ſ	PI i.2: Use	Use broad	Use adequate	Use limited	Use very limited	1. Exemplary
	current skills	current skills	current skills	current skills	current skills	2 Accomplished
	to conduct	appropriately	mostly in an	partially in an	minimally in an	2.Accomplished
	computing	to conduct	appropriate way	appropriate way	appropriate way	3. Developing
	tasks	computing	to conduct	to conduct	to conduct	
		tasks	computing tasks	computing tasks	computing tasks	4. Beginning
	PI i.3:	Practice all	Practice most of	Practice some of	Practice very	1. Exemplary
	PI i.3: Practice	Practice all relevant	Practice most of the relevant	Practice some of the relevant	Practice very few or none of	1. Exemplary
	PI i.3: Practice current tools	Practice all relevant current tools to	Practice most of the relevant current tools to	Practice some of the relevant current tools to	Practice very few or none of the relevant	 Exemplary Accomplished
	PI i.3: Practice current tools to	Practice all relevant current tools to accomplish	Practice most of the relevant current tools to accomplish	Practice some of the relevant current tools to accomplish	Practice very few or none of the relevant current tools to	 Exemplary Accomplished Developing
	PI i.3: Practice current tools to accomplish	Practice all relevant current tools to accomplish computational	Practice most of the relevant current tools to accomplish computational	Practice some of the relevant current tools to accomplish computational	Practice very few or none of the relevant current tools to accomplish	 Exemplary Accomplished Developing
	PI i.3: Practice current tools to accomplish computationa	Practice all relevant current tools to accomplish computational tasks	Practice most of the relevant current tools to accomplish computational tasks	Practice some of the relevant current tools to accomplish computational tasks	Practice very few or none of the relevant current tools to accomplish computational	 Exemplary Accomplished Developing Beginning
	PI i.3: Practice current tools to accomplish computationa l tasks	Practice all relevant current tools to accomplish computational tasks	Practice most of the relevant current tools to accomplish computational tasks	Practice some of the relevant current tools to accomplish computational tasks	Practice very few or none of the relevant current tools to accomplish computational tasks	 Exemplary Accomplished Developing Beginning

The rubric consists of 3 sections to get the whole assessment of SO(i) like:

- Apply current technique(s) to solve a real-life problem.
- Use current skills to conduct computing tasks
- Practice current tools to accomplish computational tasks

Each section should be rated on a four point scale (Exemplary, Accomplished, Developing, and Beginning) in order to obtain rationalized response from the students.

The target achievement rate of the rubric is 2.6 (65%) out of 4 for each section in the rubric. The achievement rate in the following table C-2-6 is calculated by counting the number of responses in each scale then divided onto total number of response.

PI		Exemplary 4	Accomplished 3	Developing 2	Beginning 1	Average Rate
PI i.1	Male	1	4	1		3

Table C-2-6:Assessment of PLO (S₄) /SO (i)

	Female	3	1			3.75
PI i.2	Male		3	3		2.5
	Female		3		1	2.5
PI i.3	Male	2	1	2	1	2.67
	Female	4				4
Total	М	3	8	5	1	2.07
Total	F	7	4	0	1	5.07
1	1					

The overall SO(i) is achieved in both section where is the achievement ratio is 3.07

All the recommendations given by PLO assessment groups regarding PLO (K_1) and PLO (S_4) was implemented during the first semester 2020/2021 and strengths, area of improvement and priorities for improvement of PLO K_1 and S_4 is mention at the end.

Implementation of recommendations of program learning outcome (PLO) during second semester 2020/2021

Program Learning Outcome (K3) ≈ Student Outcome (j):

An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices According to the student outcome (SO) assessment plan 2017-2021, student outcome PLO $(K_3)/SO(j)$ was selected for assessment. A rubric was designed to assess the PLO $(K_3)/SO(j)$, rubric was mainly based on following three performance indicators (PI);

PI j.1: Apply math foundations in the modeling and design of computer-based systems

PI j.2: Apply algorithmic principles in the modeling and design of computer-based systems PI j.3: Apply computer science theory in the modeling and design of computer-based systems

These three PIs were measured against four performance level i.e. "exemplary", "accomplished", "developing" and "beginning". More explanation on measurement is given in section 2.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with strong relationship with SO (j). Data was collected for Computer Science (CS) program to evaluate the PLO (K_3)/SO (j) in second semester 2019/2020 and evaluation results are presented in this report.

PI. No	Performance Indicator	Exemplary	Accomplished	Developing	Beginning	Mark s in %age
PI	Apply math	Math	Math	Math	Math	
j.1	foundations in the	foundations	foundations in	foundations	foundation	
	modeling and design	in the	the modeling	in the	s in the	
	of computer-based	modeling	and design of	modeling	modeling	
	systems	and design	computer-	and design	and design	
		of	based systems	of	of	
		computer-	is applied	computer-	computer-	
		based	Proficiently	based	based	

GENERAL RUBRIC TO ASSESS THE PLO (K3)/SO (j)

		systems is applied distinguisha bly		systems is applied Marginally	systems is applied Unaccepta bly	
PI j.2	Apply algorithmic principles in the modeling and design of computer-based systems	Algorithmic principles in the modeling and design of computer- based systems is applied distinguisha bly	Algorithmic principles in the modeling and design of computer- based systems is applied Proficiently	Algorithmic principles in the modeling and design of computer- based systems is applied Marginally	Algorithmi c principles in the modeling and design of computer- based systems is applied Unaccepta bly	
PI j.3	Apply computer science theory in the modeling and design of computer-based systems	Computer science theory in the modeling and design of computer- based systems is applied distinguisha bly	Computer science theory in the modeling and design of computer- based systems is applied Proficiently	Computer science theory in the modeling and design of computer- based systems is applied Marginally	Computer science theory in the modeling and design of computer- based systems is applied Unaccepta bly	

*All = 90% and above [Exemplary]

*Most of the = 75% to 89% [Accomplished]

*Some of the = 50% to 74% [Developing]

*Very few = less than 50% [Beginning]

*** A Performance Indicator is said to be achieved if 65% of the students at the developing or above levels.

STUDENT OUTCOME ASSESSMENT PLAN

Assessment Coordinator (Collection Agent): Mr. Shah Masud, Ms. Raniah, Dr. Asadullah Shaikh, Dr. Mana Al Reshan, and Dr. Magzoub Abdullah

Program: Computer Science

Table C-2-7, shows the assessment plan of PLO $(K_3)/SO$ (j) for computer science program. Assessment plan includes the strategies used to assess the SO (j), assessment method, source of assessment and target to achieve the SO (j). Because we have to do summative assessment, so courses are selected only from level 8 and 9 with strong relationship of course learning outcome with SO (j). Moreover, curriculum mapping is also considered during selecting the CS courses as a source of assessment.

PI No	Performance Indicators	Strategies	Assessment Method(s)	Source of Assessment	Target for Performanc e	Evaluation of Results
РІ j.1	Apply math foundations in the modeling and design of computer- based systems	111CSS-4, 113CSS-4, 212CSS-3, 227CSS-3, 330CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 456CSS-3, 474CSS-3, 491CSS-4, 492CSS-3	Written project report and oral presentation with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessmen t Group
PI j.2	Apply algorithmic principles in the modeling and design of computer- based systems	113CSS-3, 212CSS-3, 222CSS-3, 227CSS-3, 235CSS-3, 329CSS-3, 330CSS-3, 340CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 429CSS-3, 456CSS-3, 457CSS-3, 474CSS-3, 491CSS-4, 492CSS-4	Written project report and oral presentation with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessmen t Group

Table C-2-7: PLO $(K_3)/SO(j)$ assessment plan for computer science program

PI j.3	Apply computer science theory in the modeling and design of computer- based systems	113CSS-3, 212CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 429CSS-3, 456CSS-3, 457CSS-3,	Written project report and oral presentation with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessmen t Group
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PLO (K3)/SO (j) ASSESSMENT RESULTS

The collected data is measured using rubric as follows:

- 1. The project examiner and project supervisor of 491CSS-4 and 492CSS-4 was asked to fill out the relevant criteria of the rubrics and return the evaluation results to the SO assessment group.
- 2. SO assessment group reviews the evaluation results and prepared the assessment report.
- 3. Since there is more than one source of data, the SO Assessment group must aggregate the evaluation results.

Overall, PLO (K₃)/SO (j) Assessment in Male and Female Campus

Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the PLO (K_3)/SO (j). Assessment is based on the three-graduation project-I and 2 graduation project-II. Table C-2-8 shows the overall assessment result of PLO (K_3)/SO (j) based on the data collected from both male and female campus. Assessment result shows that 90.04% students achieved the PLO (K_3)/SO (j) in male campus and 91.56% students achieved in female campus. Average achievement rate in male and female campus is 90.03% which achieved the target of 65%.

Table C-2-8: SO (j) achievement for computer science courses in male and female campus

Average	90.03%
Female Campus	91.56%
Male Campus	90.04%

Table C-2-9 below shows the achievement of each performance indicator of PLO (K₃)/SO (j) in male and female campus. PLO (K₃)/SO (j) was divided into three performance indicators and result shows that average achievement of PI b.1 is 89.36%, and average achievement of PI b.2 is 90.915.%. Individual assessment in male and female campus is also shown in table 3. As shown in figure C-2-1, each performance indicator in male and female campus achieves the target benchmark.

Table C-2-9: PLO (K3)/SO (j) achievement for computer science courses in male and femal	le campus
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	CS Student Outcomes	Percenta	ge of Perfo	ormance	
Student mathem principle the mod based sy compreh in design	t outcome (j): An ability to apply atical foundations, algorithmic es, and computer science theory in eling and design of computer- ystems in a way that demonstrates mension of the trade-offs involved n choices	Male Campus	Female Campus	Average	Source of Data
PI j.1	Apply math foundations in the modeling and design of computer-based systems	88.15%	90.57%	89.36%	491CSS-4, 492CSS-4
PI j.2	Apply algorithmic principles in the modeling and design of computer-based systems	90.31%	91.52%	90.915. %	491CSS-4, 492CSS-4
PI j.3	Apply computer science theory in the modeling and design of computer-based systems	91.67%	92.6%	92.135 &	491CSS-4, 492CSS-4

Average of Achievement of Performance Indicators of PLO (K₃)/SO (j) in male and female campus

Figure C-2-1: Average achievement of SO (j) in male and female campus

PLO (K₃)/SO (j) IMPROVEMENT PLAN

By and large PLO/SO assessment result shows that PLO (K_3)/SO (j) accomplished the benchmark of 65%. In any case, the outcomes introduced in the appraisal report are just founded on the two software engineering courses. Information from different courses from more elevated level can create more credible and dependable appraisal results. Along these lines, the evaluation council prescribes following activities to improve the outcomes. It is necessitated that software engineering information bunches audit the planning of the more elevated level courses and search for planning of different courses with PLO (K_3)/SO (j). More courses planned with PLO (K_3)/SO (j) will be useful to improve the hotspot for appraisal. Some venture chiefs or potentially venture analysts didn't presented the assessment results, so it is required to improve the reaction rate. Course teacher need to clarify the subjects in more detail and give more practice on addresses which are identified with PLO (K_3)/SO (j). Regular meeting with hypothesis educator, lab teacher and course facilitator is critical to improve the accomplishment results.

Program Learning Outcome (S1) ≈ **Student Outcome (b):**

An ability to analyze a problem, identify and define the computing requirements appropriate to its solution According to the student outcome (SO) assessment plan 2017-2021, student outcome $PLO(S_1)/SO$ (b) was selected for assessment. A rubric was designed to assess the $PLO(S_1)/SO$ (b), the rubric was mainly based on the following three performance indicators (PI);

PI b.1: Breakdown a given problem into smaller components.

PI b.2: Identify tools, techniques and models to achieve the solution.

PI b.3: Define the requirements for a given computing problem

These three PIs were measured against four performance level, i.e. "exemplary", "accomplished", "developing" and "beginning". More explanation on measurement is given in section 2.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with a strong relationship with $PLO(S_1)/SO$ (b). Data was collected for Computer Science (CS) program to evaluate the $PLO(S_1)/SO$ (b) in the first semester 2019/2020 and evaluation results are presented in this report.

Pl No	Performance Indicators	Exemplary	Accomplished	Developing	Beginning	Marks (in %age)
PI b.1	Breakdown a given problem into smaller components.	All components in a given problem have been identified correctly.	Most of the components in a given problem have been identified correctly.	Some of the components in a given problem have been identified correctly.	Very few or none of the components in a given problem have been identified correctly.	
	Identify tools,	All the tools, techniques and	Most of the tools,	Some of the tools,	Very few or none of the	

GENERAL RUBRIC TO ASSESS THE PLO(S₁)/S (b)

PI b.2	techniques and models to achieve the solution.	models are identified correctly.	techniques and models are identified correctly.	techniques and models are identified correctly.	tools, techniques and models are identified correctly.	
PI b.3	Define the requirement s for a given computing problem.	All of the requirements are defined correctly.	Most of the requirements are defined correctly.	Some of the requirements are defined correctly.	Very few or none of the requirements are defined correctly.	

*All = 90% and above [Exemplary]

*Most of the = 75% to 89% [Accomplished]

*Some of the = 50% to 74% [Developing]

*Very few = less than 50% [Beginning]

*** A Performance Indicator is said to be achieved if 65% of the students at the developing or above levels.

1. STUDENT OUTCOME ASSESSMENT PLAN

Assessment Coordinator (Collection Agent): Dr. Muhammad Al-Shargabi & Mr. Muhammad Akram

Program: Computer Science

Table C-2-10 shows the assessment plan of $PLO(S_1)/SO$ (b) for the computer science program. Assessment plan includes the strategies used to assess the $PLO(S_1)/SO$ (b), assessment method, source of assessment and target to achieve the $PLO(S_1)/SO$ (b). Because we have to do summative assessment, so courses are selected only from level 8 and 9 with strong relationship of course learning outcome with $PLO(S_1)/SO$ (b). Moreover, curriculum mapping is also considered while selecting the CS courses as a source of assessment.

	Table C-2-1	0: PLO(S ₁)/SO (b) assess	nent plan for t	he computer s	cience program	1
PI No	Performance Indicators	Strategies	Assessme nt Method(s)	Source of Assessme nt	Target for Performan ce	Evaluation of Results
PI b.1	Breakdown a given problem into smaller components	111CSS-4, 113CSS-4, 212CSS-3, 227CSS-3, 330CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 456CSS-3, 474CSS-3, 491CSS-4, 492CSS-3	Written project report and oral presentatio n with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplish ed or above levels	SO Assessment Group
PI b.2	Identify tools, techniques and models to achieve the solution.	113CSS-3, 212CSS-3, 222CSS-3, 227CSS-3, 235CSS-3, 329CSS-3, 330CSS-3, 340CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 429CSS-3, 456CSS-3, 457CSS-3, 474CSS-3, 491CSS-4, 492CSS-4	Written project report and oral presentatio n with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplish ed or above levels	SO Assessment Group
PI b.3	Define the requirements for a given computing problem	328CSS-3, 330CSS-3, 340CSS-3, 342CSS-3, 380CSS-3, 429CSS-3, 474CSS-3, 491CSS-4, 492CSS-4	Written project report and oral exam.	491CSS-4, 492CSS-4	65% of the students at the accomplish ed or above levels	SO Assessment Group

2. PLO(S1)/SO (b) ASSESSMENT RESULTS

The collected data is measured using the rubric as follows:

- 1. The project examiner and project supervisor of 491CSS-4 and 492CSS-4 were asked to fill out the relevant criteria of the rubrics and return the evaluation results to the SO assessment group.
- 2. SO assessment group reviewed the evaluation results and prepared the assessment report.
- 3. Since there is more than one source of data, the PLO/SO Assessment group must aggregate the evaluation results.

Overall PLO(S₁)/SO (b) Assessment in Male and Female Campus

Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the PLO(S1)/SO (b). Assessment is based on the four graduation project-I and four graduation project-II. Table C-2-11 shows the overall assessment result of PLO(S₁)/SO (b) based on the data collected from both male and female campus. Assessment result shows that 83.67% of students achieved the PLO(S₁)/SO (b) in male campus and 89.94% students achieved in the female campus. Average achievement rate in male and female campus is 86.81% which achieved the target of 65%.

Campus	SO (b) achievement
Male Campus	83.67%
Female Campus	89.94%

Average

Table C-2-11: PLO(S1)/SO (b) achievement for computer science courses in male and female campus

Table C-2-12 below shows the achievement of each performance indicator of $PLO(S_1)/SO$ (b) in male and female campus. $PLO(S_1)/SO$ (b) was divided into three performance indicators and the result shows that average achievement of PI b.1 is 86.32%, average achievement of PI b.2 is 88.05% and average achievement of PI b.3 is 86.04%. Individual assessment in male and female campus is also shown in table 3. As shown in figure C-2-2, each performance indicator in male and female campus achieves the target benchmark.

86.81%

Table C-2-12: PLO(S1)/SO (b) achievement for computer science courses in male and female campus

CS Student Outcomes	Perce	entage of Pe	rformance	Source of
Student outcome (b): An ability to analyze a problem, and identify	Male Campus	Female Campus	Average	Data
and define the computing	-			

requirem solution	ents appropriate to its				
PI b.1	Breakdown a given problem into smaller components.	84%	88.64%	86.32%	491CSS-4, 492CSS-4
PI b.2	Identify tools, techniques and models to achieve the solution.	84.50%	91.60%	88.05%	491CSS-4, 492CSS-4
PI b.3	Define the requirements for a given computing problem.	82.50%	89.59%	86.04%	491CSS-4, 492CSS-4

*** Target for Performance is 65% of the students are at the developing or above levels

Average Achievement of Performance Indicators of $PLO(S_1)/SO$ (b) in male and female campus

Target	is
65%	

Figure C-2-2: Average achievement of PLO(S₁)/SO (b) in male and female campus

3.

4. PLO(S₁)/SO(b) IMPROVEMENT PLAN

Overall SO evaluation result shows that $PLO(S_1)/SO$ (b) achieved the benchmark of 65%. However the results presented in the assessment report are only based on the two computer science courses. Data from other courses from higher level can produce more authentic and reliable assessment results. So the assessment committee recommends following actions to improve the results;

It is required that computer science knowledge groups review the mapping of the higher level courses and look for mapping of other courses with PLO(S₁)/SO (b). More courses mapped with PLO(S₁)/SO (b) will be helpful to improve the source for assessment.

- Some project supervisors and/or project examiners did not submitted the evaluation results, so it is required to improve the response rate.
- Course instructor need to explain the topics in more detail and give more practice on lectures which are related to PLO(S₁)/SO (b).
- Regular meeting with theory instructor, lab instructor and course coordinator is very important to improve the achievement results.

Program Learning Outcome (V1) \approx **Student Outcome (d):**

An ability to function effectively on teams to accomplish a common goal.

According to the student outcome (SO) assessment plan 2017-2021, student outcome $PLO(V_1)/SO$ (d) was selected for assessment. A rubric was designed to assess the $PLO(V_1)/SO$ (d), rubric was mainly based on following three performance indicators (PI);

PI b.1: Share knowledge and ideas to achieve a common goal.

PI b.2: Adhere to team responsibilities to achieve a common goal.

PI b.3: Listen to other team members.

These three PIs were measured against four performance level i.e. "exemplary", "accomplished", "developing" and "beginning". More explanation on measurement is given in section 2.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with strong relationship with $PLO(V_1)/SO(d)$. Data was collected for Computer Science (CS) program to evaluate the $PLO(V_1)/SO(d)$ in second semester 2019/2020 and evaluation results are presented in this report.

GENERAL RUBRIC TO ASSESS THE PLO(V1)/SO (d)

Pl No	Performa nce Indicator s	Exemplary	Accomplished	Developing	Beginning
PI d.1	Share knowledg e and ideas to achieve a common goal.	Collects and presents to the team a great deal of relevant information; offer well developed and clearly express ideas to achieve a common goal.	Collect basic, useful information related to the project; occasionally offer useful ideas to achieve common goal.	Collects information when prodded; tried to offer some ideas, and not clearly expressed to achieve the common goal.	Collect very few relevant information; no useful suggestions to achieve a common goal.
PI d.2	Adhere to team responsibi lities to achieve a common goal.	Performs all tasks very effectively; attends all meetings and participates enthusiasticall y; very reliable.	Performs all assigned tasks; attends meetings regularly and usually participates effectively; generally reliable;	Performs assigned tasks but needs many reminders; attends meetings regularly but generally does not say anything constructive; sometimes expects others to do his/her work;	Perform very few assigned tasks; often misses meetings and, when present, does not have anything constructive to say; relies on others to do the work;
PI d.3	Listen to other team members.	Always listens to others and their ideas; helps them develop their ideas while giving them full credit; always helps	Usually listens to others' points of view; always uses appropriate and respectful language; tries to make a definite effort to	Sometime listen to other's point of view; does not pay much attention when others talk, and often assumes their ideas will not work; no	Rarely listen to other's point of view and often argues with team mates; doesn't let anyone else talk; occasional

	the team reach a fair decision.	understand others' ideas;	personal attacks and put-downs.	personal attacks and put-downs.	
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*All = 90% and above [Exemplary]

*Most of the = 75% to 89% [Accomplished]

*Some of the = 50% to 74% [Developing]

*Very few = less than 50% [Beginning]

*** A Performance Indicator is said to be achieved if 65% of the students at the developing or above levels.

STUDENT OUTCOME ASSESSMENT PLAN

Assessment Coordinator (Collection Agent): Mr. Shah Masud, Ms. Raniah, Dr. Asadullah Shaikh, Dr. Mana Al Reshan, and Dr. Magzoub Abdullah

Program: Computer Science

Table C-2-13, shows the assessment plan of $PLO(V_1)/SO$ (d) for computer science program. Assessment plan includes the strategies used to assess the $PLO(V_1)/SO$ (d), assessment method, source of assessment and target to achieve the $PLO(V_1)/SO$ (d). Because we have to do summative assessment, so courses are selected only from level 8 and 9 with strong relationship of course learning outcome with $PLO(V_1)/SO$ (d). Moreover, curriculum mapping is also considered during selecting the CS courses as a source of assessment.

Table C-2-13: PLO(V ₁)/SO	(d)) assessment plan for computer science program
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PI No	Performance Indicators	Strategies	Assessment Method(s)	Source of Assessment	Target for Performanc e	Evaluati on of Results
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PI b.1	Share knowledge and ideas to achieve a common goal.	111CSS-4, 113CSS-4, 212CSS-3, 227CSS-3, 330CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 456CSS-3, 474CSS-3, 491CSS-4, 492CSS-3	Written project report and oral presentation with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessm ent Group
PI b.2	Adhere to team responsibilitie s to achieve a common goal.	113CSS-3, 212CSS-3, 222CSS-3, 227CSS-3, 235CSS-3, 329CSS-3, 330CSS-3, 340CSS-3, 342CSS-3, 345CSS-3, 380CSS-3, 429CSS-3, 456CSS-3, 457CSS-3, 474CSS-3, 491CSS-4, 492CSS-4	Written project report and oral presentation with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessm ent Group
PI b.3	Listen to other team members.	328CSS-3, 330CSS-3, 340CSS-3, 342CSS-3, 380CSS-3, 429CSS-3, 474CSS-3, 491CSS-4, 492CSS-4	Written project report and oral exam.	491CSS-4, 492CSS-4	65% of the students at the accomplishe d or above levels	SO Assessm ent Group

PLO(V₁)/SO (d) ASSESSMENT RESULTS

The collected data is measured using rubric as follows:

- 1. The project examiner and project supervisor of 491CSS-4 and 492CSS-4 was asked to fill out the relevant criteria of the rubrics and return the evaluation results to the SO assessment group.
- 2. SO assessment group reviews the evaluation results and prepared the assessment report.
- 3. Since there is more than one source of data, the SO Assessment group must aggregate the evaluation results.

Overall, PLO(V1)/SO (d) Assessment in Male and Female Campus

Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the $PLO(V_1)/SO$ (d). Assessment is based on the three-graduation project-I

and 2 graduation project-II. Table C-2-14 shows the overall assessment result of $PLO(V_1)/SO$ (d) based on the data collected from both male and female campus. Assessment result shows that 82.91% students achieved the $PLO(V_1)/SO$ (d) in male campus and 93.01% students achieved in female campus. Average achievement rate in male and female campus is 87.96% which achieved the target of 65%.

Campus	PLO(V1)/SO (d) Achievement
Male Campus	82.91%
Female Campus	93.01%

Average

Table C-2-14: $PLO(V_1)/SO(d)$ achievement for computer science courses in male and female campus

87.96%

Table C-2-15 below shows the achievement of each performance indicator of $PLO(V_1)/SO$ (d) in male and female campus. $PLO(V_1)/SO$ (d) was divided into three performance indicators and result shows that average achievement of PI b.1 is 86.32%, average achievement of PI b.2 is 88.05% and average achievement of PI b.3 is 86.04%. Individual assessment in male and female campus is also shown in table C-2-15. As shown in figure C-2-3, each performance indicator in male and female campus achieves the target benchmark.

Table C-2-15: $PLO(V_1)/SO(d)$ achievement for computer science courses in male and female campus

(CS Student Outcomes	Percenta			
PLO(V₁)/SO (d): An ability to function effectively on teams to accomplish a common goal.		Male Campus	Female Campus	Averag e	Source of Data
PI b.1 Share knowledge and ideas to achieve a common goal.		82.03%	92.74%	87.38 %	491CSS-4, 492CSS-4

PI b.2	Adhere to team responsibilities to achieve a common goal.	81.09%	93.62%	87.35 %	491CSS-4, 492CSS-4
PI b.3	Listen to other team members.	85.61%	92.69%	89.15 %	491CSS-4, 492CSS-4

*** Target for Performance is 65% of the students are at the developing or above levels

Average of Achievement of Performance Indicators of PLO(V1)/SO (d) in male and female campus

Figure C-2-3: Average achievement of $PLO(V_1)/SO(d)$ in male and female campus

PLO(V1)/SO(d) IMPROVEMENT PLAN

By and large PLO/SO assessment result shows that $PLO(V_1)/SO$ (d) accomplished the benchmark of 65%. In any case, the outcomes introduced in the appraisal report are just founded on the two software engineering courses. Information from different courses from more elevated level can create more credible and dependable appraisal results. Along these lines, the evaluation council prescribes following activities to improve the outcomes. It is necessitated that software engineering information bunches audit the planning of the more elevated level courses and search for planning of different courses with $PLO(V_1)/SO$ (d). More courses planned with $PLO(V_1)/SO$ (d) will be useful to improve the hotspot for appraisal. Some venture chiefs or potentially venture analysts didn't presented the assessment results, so it is required to improve the reaction rate. Course teacher need to clarify the subjects in more detail and give more practice on addresses which are identified with $PLO(V_1)/SO$ (d). Regular meeting with hypothesis educator, lab teacher and course facilitator is critical to improve the accomplishment results.

Program Learning Outcome $(V_2) \approx$ Student Outcome (f):

Ability to communicate effectively with a range of audiences

According to the student outcome (SO) assessment plan 2017-2021, student outcome $PLO(V_2)/SO(f)$ was selected for assessment. A rubric was designed to assess the $PLO(V_2)/SO(f)$, rubric was mainly based on following three performance indicators (PI);

PI f.1: Prepare a scientific report.

PI f.2: Present scientific accomplishment verbally.

PI f.3: Utilize presentation skills and technology.

These three PIs were measured against four performance level i.e. "exemplary", "accomplished", "developing" and "beginning". More explanation on measurement is given in section 2.

Since it was required to do the summative assessment, so courses are selected only from level 8 and 9 with strong relationship with $PLO(V_2)/SO(f)$. Data was collected for Computer Science (CS) program to evaluate the $PLO(V_2)/SO(f)$ in first semester 2019/2020 and evaluation results are presented in this report.

Pl No	Performance Indicators	Exemplary	Accomplished	Developing	Beginning	Marks (in %age)
		The	One of the	Two or more	The	
		introduction,	following:	of the	introduction,	
	Prepare a	conclusion,	introduction,	following:	conclusion,	
DI C 1	scientific report	spelling,	conclusion,	introduction,	spelling,	
PI f.1		references and	spelling,	conclusion,	references	
		analysis	references and	spelling,	and analysis	
		design	analysis design	references	design	

5. GENERAL RUBRIC TO ASSESS THE PLO(V₂)/SO(b)

		/implementati on are all well defined	/implementatio n is not well defined	and analysis design /implementati on are not well defined	/implementati on are poorly defined	
PI f.2	Present scientific accomplishme nt verbally	Present appropriate information (Problem statement, objective, background materials and design/imple mentation), in very clear way within the expected time, and answer all questions in very clear way.	Present appropriate information (Problem statement, objective, background materials and design/implem entation), and answer all questions in clear way	Present appropriate information (Problem statement, objective, background materials and design/imple mentation), in clear way and not answer all questions, in clear way.	Present appropriate information (Problem statement, objective, background materials and design/imple mentation), and answer all questions, in a way not clear.	
PI f.3	Utilize presentation skills and technology	The Slides are very well designed	The Slides are well designed	The Slides' design is moderate	The Slides' design is poor	

*All = 90% and above [Exemplary]

*Most of the = 75% to 89% [Accomplished]

*Some of the = 50% to 74% [Developing]

*Very few = less than 50% [Beginning]

*** A Performance Indicator is said to be achieved if 65% of the students at the developing or above levels.

6.

7. PLO(V₂)/SO (b) ASSESSMENT PLAN

Assessment Coordinator (Collection Agent): Dr. *Muhammad* Al-Shargabi & Mr. Muhammad Akram

Table C-2-16, shows the assessment plan of $PLO(V_2)/SO$ (f) for computer science program. Assessment plan includes the strategies used to assess the SO (f), assessment method, source of assessment and target to achieve the $PLO(V_2)/SO$ (f). Because we have to do summative assessment, so courses are selected only from level 8 and 9 with strong relationship of course learning outcome with $PLO(V_2)/SO$ (f). Moreover, curriculum mapping is also considered during selecting the CS courses as a source of assessment.

PI No	Performanc e Indicators	Strategies	Assessment Method(s)	Source of Assessment	Target for Performan ce	Evaluation of Results
PI f.1	Prepare a scientific report	111CSS-4, 113CSS- 4, 212CSS-3, 227CSS-3, 330CSS- 3, 342CSS-3, 345CSS-3, 380CSS- 3, 456CSS-3, 474CSS-3, 491CSS- 4, 492CSS-3	Written project report and oral presentatio n with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplis hed or above levels	SO Assessment Group
PI f.2	Present scientific accomplish ment verbally	113CSS-3, 212CSS- 3, 222CSS-3, 227CSS-3, 235CSS- 3, 329CSS-3, 330CSS-3, 340CSS- 3, 342CSS-3, 345CSS-3, 380CSS- 3, 429CSS-3, 456CSS-3, 457CSS- 3, 474CSS-3, 491CSS-4, 492CSS- 4	Written project report and oral presentatio n with scoring rubrics	491CSS-4, 492CSS-4	65% of the students at the accomplis hed or above levels	SO Assessment Group
PI f.3	Utilize presentatio n skills and technology	328CSS-3, 330CSS- 3, 340CSS-3, 342CSS-3, 380CSS- 3, 429CSS-3,	Written project report and oral exam.	491CSS-4, 492CSS-4	65% of the students at the accomplis	SO Assessment Group

Table C-2-16: $PLO(V_2)/SO(f)$ assessment plan for computer science program

474CSS-3, 491CSS-		hed or	
4, 492CSS-4		above	
		levels	

PLO(V₂)/SO (f) ASSESSMENT RESULTS

The collected data is measured using rubric as follows:

- 1. The project examiner and project supervisor of 491CSS-4 and 492CSS-4 was asked to fill out the relevant criteria of the rubrics and return the evaluation results to the SO assessment group.
- 2. SO assessment group reviews the evaluation results and prepared the assessment report.
- 3. Since there is more than one source of data, the SO Assessment group must aggregate the evaluation results.

Overall PLO(V2)/SO (f) Assessment in Male and Female Campus

Two courses 491CSS-4 (Graduation Project-I) and 492CSS-4 (Graduation Project-II) were selected to assess the PLO(V₂)/SO (f). Assessment is based on the four graduation project-I and four graduation project-II. Table C-2-17 shows the overall assessment result of PLO(V₂)/SO (f) based on the data collected from both male and female campus. Assessment result shows that 82.04% students achieved the PLO(V₂)/SO (f) in male campus and 91.09% students achieved in female campus. Average achievement rate in male and female campus is 86.56% which achieved the target of 65%.

Campus	SO (f) achievement
Male Campus	82.04%
Female Campus	91.09%
Average	86.56%

Table C-2-17: PLO(V₂)/SO (f) achievement for computer science courses in male and female campus

Table C-2-18 below shows the achievement of each performance indicator of $PLO(V_2)/SO$ (b) in male and female campus. $PLO(V_2)/SO$ (f) was divided into three performance indicators and result shows that average achievement of PI f.1 is 88.18%, average achievement of PI f.2 is 86.55% and average achievement of PI f.3 is 84.98%. Individual assessment in male and female campus is also shown in table 3. As shown in figure C-2-4, each performance indicator in male and female campus achieves the target benchmark.

C	S Student Outcomes	Percenta	ge of Perf		
PLO(V ₂)/SO (f): Ability to Communicate effectively with a range of audiences		Male Campus	Female Campus	Average	Source of Data
PI f.1	Prepare a scientific report	85.63%	90.72%	88.18%	491CSS-4, 492CSS-4
PI f.2	Present scientific accomplishment verbally	82.25%	90.85%	86.55%	491CSS-4, 492CSS-4
PI f.3	Utilize presentation skills and technology	78.25%	91.70%	84.98%	491CSS-4, 492CSS-4

Table C-2-18: PLO(V₂)/SO (f) achievement for computer science courses in male and female campus

*** Target for Performance is 65% of the students are at the developing or above levels

Average Achievement of Performance Indicators of PLO(V₂)/SO (f) in male and female campus

		Target is			
		65%			
	 		 	-	

Figure C-2-4: Average achievement of $PLO(V_2)/SO(f)$ in male and female campus

PLO(V2)/SO(f) IMPROVEMENT PLAN

Figure C-2-5, below shows the general view of SO improvement plan.

Overall SO evaluation result shows that $PLO(V_2)/SO$ (f) achieved the benchmark of 65%. However the results presented in the assessment report are only based on the two computer science courses. Data from other courses from higher level can produce more authentic and reliable assessment results. So the assessment committee recommends following actions to improve the results;

- It is required that computer science knowledge groups review the mapping of the higher level courses (mainly level 8 and level 9) and look for mapping of other courses with PLO(V₂)/SO (f). More courses mapped with PLO(V₂)/SO (f) will be helpful to improve the source for assessment for summative assessment.
- Some project supervisors and/or project examiners did not submitted the evaluation results, so it is required to improve the response rate.
- Course instructor need to explain the topics in more detail and give more practice on lectures which are related to PLO(V₂)/SO (f).
- Regular meeting with theory instructor, lab instructor and course coordinator is very important to improve the achievement results.

Implementation of recommendations.

Following figure below shows the general view of SO implementation plan.

Figure C-2-5: PLOs/SO improvement plan

Recommendation	Implementation Status	Remarks/Comments
	Status	

It is required that computer	Completed	Updated CS curriculum (10 levels)
science knowledge groups		is approved by the University.
review the mapping of the		Mapping of PLO with course is
higher level courses (mainly		revised in updated CS curriculum.
level 8 and level 9) and look for		
mapping of other courses with		
$PLO(V_2)/SO$ (f). More courses		
mapped with $PLO(V_2)/SO(f)$		
will be helpful to improve the		
source for assessment for		
summative assessment.		
It is necessitated that software	Currently working	
engineering information		
bunches audit the planning of		
the more elevated level courses		
and search for planning of		
different courses with PLO		
(K ₃)/SO (j).		
More courses planned with	Completed	Updated CS curriculum (10 levels)
PLO (K_3)/SO (j) will be useful		is approved by the University.
to improve the hotspot for		Mapping of PLO with course is
appraisal		revised in updated CS curriculum.
Course teacher need to clarify	Completed	Course instructors are instructed to
the subjects in more detail and		focus on giving more practical
give more practice on addresses		work to students.
which are identified with PLO		
(K ₃)/SO (j).		
Regular meeting with theory	Completed	Course instructor, lab instructor and
instructor, lab instructor and		course coordinators are instructed
course coordinator is very		by HoD to meet regularly to discuss
important to improve the		potential plans to improve the CLO
achievement results.		achievement.
It is required that computer	Completed	Updated CS curriculum (10 levels)
science knowledge groups		is approved by the University.
review the mapping of the		Mapping of PLO with course is
higher level courses and look		revised in updated CS curriculum.
for mapping of other courses		
with $PLO(S_1)/SO$ (b). More		
courses mapped with		
$PLO(S_1)/SO$ (b) will be helpful		

to improve the source for		
assessment.		
Some project supervisors and/or	Completed	Project supervisor and examiners
project examiners did not		are motivated to submit the
submitted the evaluation results,		evaluation results to the PLO
so it is required to improve the		assessment group immediately after
response rate.		the assessment of project is
		finalized.
Course instructor need to	Completed	Course instructors are instructed to
explain the topics in more detail		focus on giving more practical
and give more practice on		work to students and give the
lectures which are related to		explanation of course topic in
$PLO(S_1)/SO$ (b).		detail.

Strengths :

- All PLOs/SOs recommendations given by PLO/SO assessment groups are implemented in first semester and second semester 2020/2021 as specified in PLO/SO assessment plan.
- 4. PLO mapping/alignment with CS course learning outcome is revised by computer science knowledge groups and updated CS curriculum.
- 5. Updated CS program specification is approved by University administration which contain the revised mapping of PLOs with course CLOs.

Areas for Improvement:

 Course instructor, lab instructor and course coordinators are instructed by HoD to meet regularly to discuss potential plans to improve the CLO achievement but it is required by department accreditation unit to follow up the implementation of improvement plan. All faculty members in male and female section are required to submit the results of courses align with CS program PLO/SO as soon as the course evaluation is completed.

Priorities for Improvement:

- Computer Science department accreditation unit should follow up the course implementation and evaluation plan with course instructor for each CS course.
- Course theory instructor and lab instructor should meet regularly to align the theory contents with lab contents on weekly bases.