

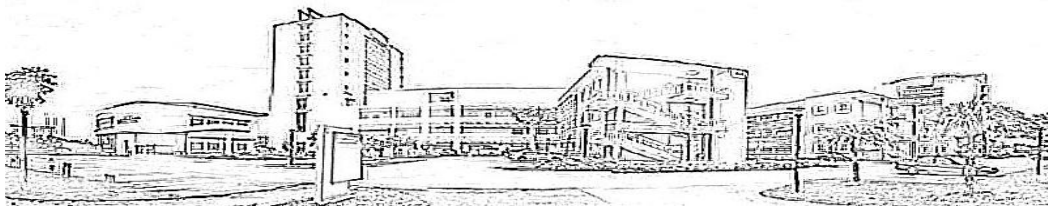


# UTHM

Universiti Tun Hussein Onn Malaysia

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## **OUTCOME-BASED EDUCATION IN FKAAS OBE REPORT 2019**



Universiti Tun Hussein Onn Malaysia  
Fakulti Kejuruteraan Awam dan Alam Sekitar  
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# 1 INTRODUCTION

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## 1.1 Outcome-Based Education (OBE) in FKAAS

This report presents the activities and the direct and indirect measurements on the practices of Outcome-based Education (OBE) in the Faculty of Civil and Environmental Engineering (FKAAS), both quantitative and qualitative to exhibit the attainments of Programme Educational Objectives (PEO), Programme Learning Outcomes (PLO) and Course Learning Outcomes (CLO) for the programme of Bachelor in Civil Engineering with Honours (BFF) programme for the year 2019.

Throughout the year, continuous activities related to OBE were done in FKAAS to ensure the success of OBE implementation within the whole faculty. These activities, not including teaching and learning activities for the years 2019 are summarised in Table 1-1.

The BFF programme is an undergraduate 4 year programme that carries a total of 136 credits, and of which 94 credits are for Core Engineering courses. This programme is developed with a framework to establish 4 Programmed Educational Objectives (PEO) as shown in Table 1-2. The mapping relationship of PEO to Programme Learning Outcomes (PLO) is also presented in the same table.

BFF programme in FKAAS adheres to 13 PLO, of which 12 PLO has direct reference to the Engineering Accreditation Council (EAC) Manual 2012, and 1 PLO on entrepreneurial skills referenced to the Malaysian Qualifications Framework 2011. Table 1-3 elaborates all the 13 PLO in detail relating each PLO to one Primary Domain and linking the FKAAS PLO numbering to the PLO numbering in the EAC Manual 2017. Table 1-4 shows the knowledge profile (WK) that encompass the PLO in the curriculum.

Table 1- 1. Summary of FKAAS OBE activities year 2019

No	Activity/ Programme	Date	Objective	Outcome
1.	Benchmarking for OBE and Accreditation to UTP and UKM	24-25/4/2019	Benchmark to established Universities in order to improve the practices of OBE	New insight on OBE implementation
2.	Fundamental Civil Engineering Exam (FCEE)	6/2019	PLO direct measurement on Final Year Students in IDP	Evaluation of PLO achievement for direct measurement on Final Year Students
3.	Seminar on Accreditation, Outcome Based Education (OBE), and Final Year Project (PS) for the Department of Civil Engineering (JKA)	31/7/2019	Introduction of OBE for new and current academic staffs in FKAAS.	All OBE committee took action on that particular matter
4.	Preparation for FCEE new questions	8/2019	Prepare and check new questions for FCEE	All clusters in FKAAS take part to prepare new sets of FCEE exam.
5.	Exit Survey by Graduates (Google form)	9/2019	To collect data for exit survey to measure the indirect measurement of PLO from the graduates.	Exit survey data collected
6.	CLO-PLO analysis	10/2019	Analysis of PLO	Evaluation of PLO achievement from continuous direct measurement of the student's results for Semester 1 and 2, Session 2018/2019.
7.	Fundamental Civil Engineering Exam (FCEE)	11/2019	PLO direct measurement on Final Year Students in IDP	Evaluation of PLO achievement for direct measurement on Final Year Students
8.	Preparation of OBE 2019 report.	11/2019	Report on the assessment of OBE for year 2019	PLO measurement is analysed and reported

Table 1- 2. Programme Educational Objectives (PEO) of Bachelor of Civil Engineering with Honours

PEO	Educational Objectives of BFF Programme are to produce civil engineers who are	Mapping of PEO to PLO
1	Knowledgeable and technically competent in civil engineering discipline in-line with the industry requirement	PLO 1, 2, 10
2	Effective in communication and demonstrate good leadership quality in an organization	PLO 3, 5, 9, 13
3	Capable to solve civil engineering problems innovatively, creatively and ethically through sustainable approach	PLO 4, 8, 11, 12
4	Able to demonstrate entrepreneurship skills and recognize the need of lifelong learning for successful career advancement	PLO 6, 7

Table 1- 3. Programme Learning Outcomes (PLO) of Bachelor of Civil Engineering with Honours

PLO	Key Outcome	Description of Learning Outcome
1	Engineering <u>Knowledge</u> (K)	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex civil engineering problems.  Primary Domain: COGNITIVE PLO 1 in EAC Manual
2	<u>Practical / Technical Skills/ Modern Tool Usage</u> (PS)	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations (WK6).  Primary Domain: PSYCHOMOTOR PLO 5 in EAC Manual
3	<u>Communication Skills</u> (CS)	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.  Primary Domain: PSYCHOMOTOR PLO 10 in EAC Manual

- |   |  |   |
|---|--|---|
| 4 | <u>C</u> ritical <u>T</u> hinking<br>and <u>P</u> roblem<br><u>S</u> olving /<br><u>I</u> nvestigation<br>(CTPS) | <p>Conduct investigation of complex engineering problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.</p> <p>Primary Domain: COGNITIVE</p> <p>PLO 4 in EAC Manual</p> |
| 5 | <u>I</u> ndividual and<br><u>T</u> eam <u>W</u> ork (TW)   | <p>Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.</p> <p>Primary Domain: AFFECTIVE</p> <p>PLO 9 in EAC Manual</p>  |
| 6 | <u>L</u> ife Long <u>L</u> earning<br>(LL)   | <p>Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</p> <p>Primary Domain: AFFECTIVE</p> <p>PLO 12 in EAC Manual</p>   |
| 7 | <u>E</u> ntrepreneurship<br><u>S</u> kills (ES)  | <p>Self-motivate and enhance entrepreneurship skills for career development.</p> <p>Primary Domain: PSYCHOMOTOR</p> <p>In MQF</p>   |
| 8 | <u>E</u> thics and<br><u>P</u> rofessionalism<br>Values (ET)   | <p>Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (WK7).</p> <p>Primary Domain: AFFECTIVE</p> <p>PLO 8 in EAC Manual</p>   |
| 9 | <u>L</u> eadership <u>S</u> kills /<br><u>P</u> roject<br><u>M</u> anagement and<br><u>F</u> inance (LS)         | <p>Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments.</p> <p>Primary Domain: PSYCHOMOTOR</p> <p>PLO 11 in EAC Manual</p>          |

- |    |  |  |
|----|--|--|
| 10 | <u>Design / Development of Solutions (DDS)</u> | <p>Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (WK5).</p> <p>Primary Domain: COGNITIVE</p> <p>PLO 3 in EAC Manual</p>      |
| 11 | <u>Problem Analysis (PA)</u>                   | <p>Identify, formulate, conduct research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 to WK4).</p> <p>Primary Domain: COGNITIVE</p> <p>PLO 2 in EAC Manual</p>                           |
| 12 | <u>Environment and Sustainability (ESus)</u>   | <p>Understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts.</p> <p>Primary Domain: AFFECTIVE</p> <p>PLO 7 in EAC Manual</p>   |
| 13 | <u>The Engineer and Society (ESoc)</u>         | <p>Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems (WK7).</p> <p>Primary Domain: AFFECTIVE</p> <p>PLO 6 in EAC Manual</p> |
-

Table 1- 4. Knowledge profile (WK) attributes in the Programme Learning Outcomes (PLO) of Bachelor of Civil Engineering with Honours

Knowledge Profile	Knowledge Profile Description
WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline.
WK2	Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge that supports engineering design in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability.
WK8	Engagement with selected knowledge in the research literature of the discipline.

The relationship and distribution of courses under BFF programme to PLO is presented in Fig. 1-1 to Fig. 1-4. The dominant level in each taxonomy domain is C4, P4 and A3, respectively, for Cognitive, Psychomotor and Affective domains. This is consistent with the undergraduate programme level of expectancy.

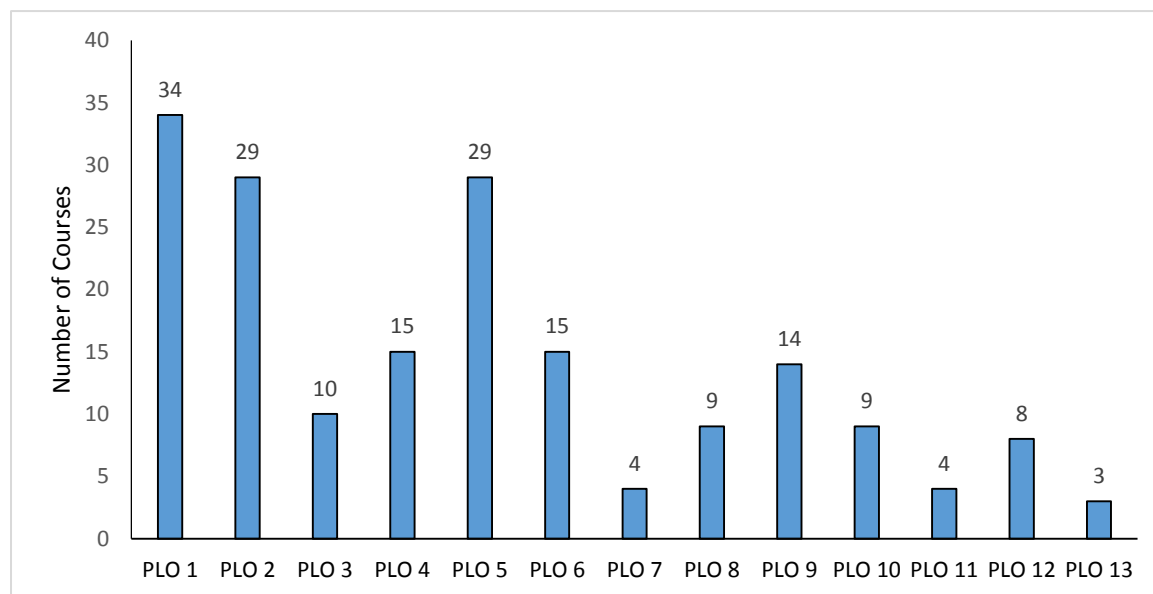


Fig. 1-1. Relationship of number of courses to PLO in BFF programme

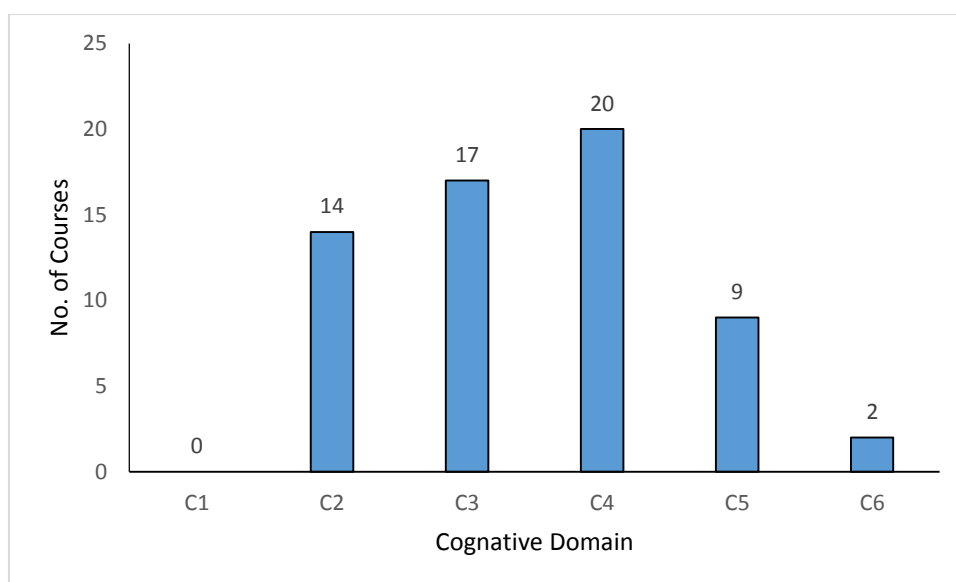


Fig. 1-2. Relationship of number of courses to levels in cognitive domain

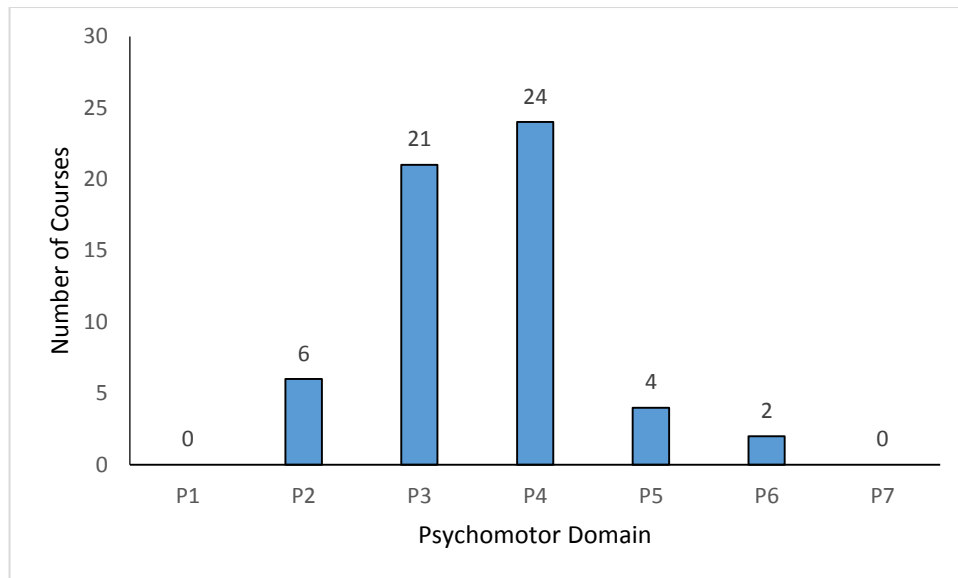


Fig. 1-3. Relationship of number of courses to levels in psychomotor domain

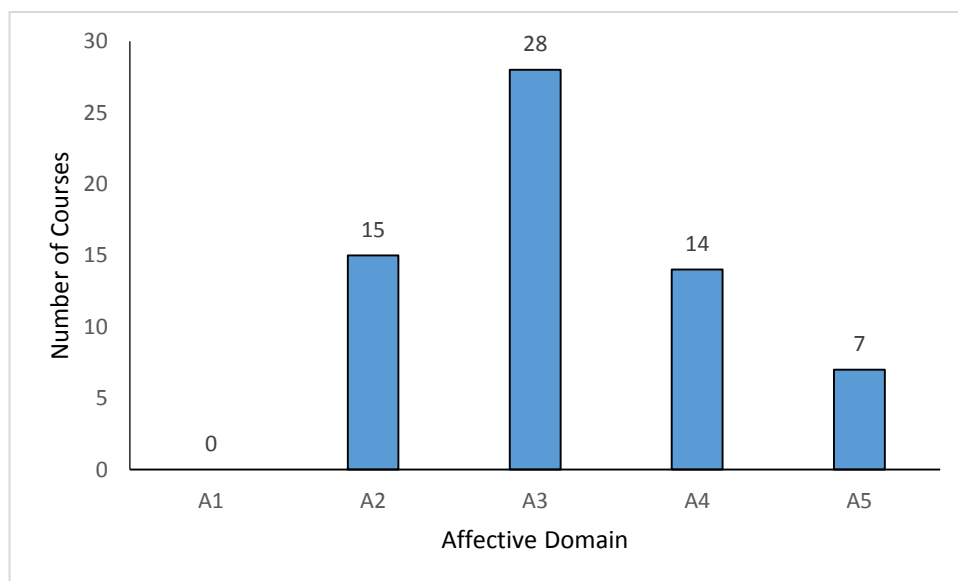


Fig. 1-4. Relationship of number of courses to levels in affective domain

## 2 ATTAINMENT OF PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

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### 2.1 PEO Assessment Methodology

The attainment of PEO in graduates focuses on measuring FKAAS Alumni that have already graduated between 3 to 5 years. Measurements were also done on FKAAS Alumni that have already graduated under 3 years and over 5 years. FKAAS adopts a triangular-shaped PEO assessment methodology which comprised of two types of measurement namely indirect and direct measurements, as illustrated in Fig. 2-1. These two types of measurement targets two groups of respondents – the Employer and the Alumni. The assessment methods are: (1) Employer Survey (an indirect measurement); (2) Alumni Survey (an indirect measurement); and (3) Alumni Survey (a direct measurement). An indirect measurement refers to measurement based on the perception of respondent towards the Alumni, while a direct measurement refers to real or actual achievement of the Alumni. These measurements are performed once in every 2 to 3 years.

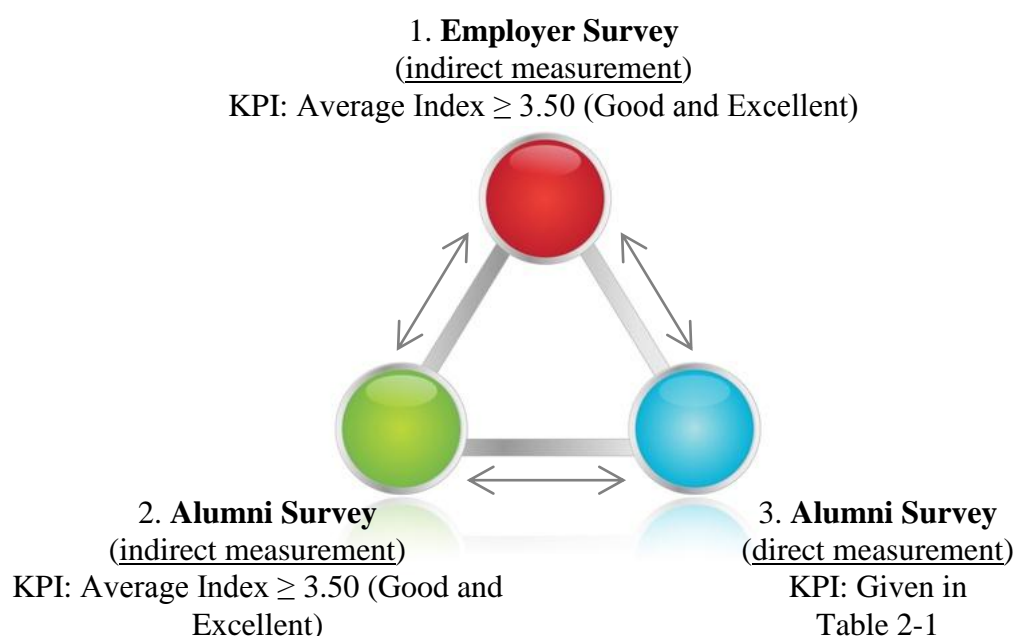


Fig. 2-1. PEO Assessment Methodology in FKAAS

## **2.2 PEO Achievement Key Performance Indicator**

The Key Performance Indicators (KPI) for direct measurement PEO achievement are consistently reviewed with the recent most continuous quality improvement resulting in a better and more realistic success criteria as presented in

Table 2-1. This direct measurement refers to the Alumni Survey explained in Fig. 2-1. For indirect measurement, the KPI of Employer Survey and the KPI of Alumni Survey is more than an Average Index of 3.50 indicating Good rating and above for every PEO. These KPI for indirect measurement are illustrated in Fig. 2-1.

## **2.3 PEO Assessment Questionnaire**

Three methods of assessment for PEO have been described in the previous section as shown in Fig. 2-1, one for Employer (indirect measurement), and two for Alumni (indirect and direct measurement). Two sets of Questionnaire Survey, each for Employer and Alumni are presented in Appendix 2-1 and Appendix 2-2, respectively. The questions inside these surveys have been reviewed and improved thoroughly as a result of the many years of OBE practice in FKAAS. The tool used to disseminate the Questionnaire Survey is Google Form. This tool allows flexible and easy respondent access as well as easy and fast analysis on the part of OBE team in FKAAS.

In Employer Survey and Alumni Survey (part for indirect measurement), the respondents were asked to provide feedback on graduate attainment of the PEO's and their strength of their attributes contributed in the organisation on a Likert-scale of 1 (very poor) to 5 (excellent). Each category of PEO is supported by at least two other questions to improve the validity of the outcome. The rating of all responses were analysed and converted into percentage of the total respondents, hence the unit used in the following graphs is percentage. Subsequently, an average index rating is calculated to represent the assessed attribute. This average index rating is interpreted as 5 being excellent and 1 being very poor as given in Table 2-2.

Table 2-1. Direct measurement PEO achievement KPI

PEO	KPI Success Criteria
1  KNOWLEDGE; TECHNICALLY COMPETENT	Each of the following criteria to be satisfied for the fulfilment of this PEO:  i. 50% of respondents have been promoted OR offered a better position. ii. 50% of respondent involved in research OR construction/design project proposal either as member or leader. iii. 2% of respondents are already Professional Engineer (PE). iv. 5% of respondents have published papers in conference/ journal OR written technical reports.
2  COMMUNICATION; LEADERSHIP	Each of the following criteria to be satisfied for the fulfilment of this PEO:  i. 50% of respondent involved in research OR construction/design project proposal either as member or leader. ii. 5% of respondents have published papers in conference/ journal OR written technical reports. iii. 50% of respondents have held leadership positions for a taskforce OR project within an organization.
3  PROBLEM SOLVING	Each of the following criteria to be satisfied for the fulfilment of this PEO:  i. 50% of respondents have been involved in construction/design projects. ii. 50% of respondents have been involved in research projects related to civil engineering.
4  ENTREPRENEURSHIP LIFE-LONG LEARNING	Each of the following criteria to be satisfied for the fulfillment of this PEO:  i. 20% of respondents have been attending Professional Development Courses. ii. 5% of respondents furthering or have furthered their studies. iii. 5% of respondents have ventured into business (self-owned or partnership).

Table 2-2. Interpretation to average index (AI) rating

Average Index (AI)	Interpretation
4.5 to 5.0	Excellent
3.5 to 4.49	Good
2.5 to 3.49	Average
1.5 to 2.49	Poor
1.0 to 1.49	Very Poor

The PEO assessment was last done in 2017 where the report has been made and published on the outcomes of the PEO. The analysis and results of the findings can be found in the OBE FKAAS assessment report for 2016 to 2018. The next PEO assessment will be done in the Year 2020 where employer and alumni surveys will be send out to assess on the direct and indirect achievement of PEO on FKAAS graduates.

### 3 ATTAINMENT OF PROGRAMME LEARNING OUTCOMES (PLO)

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#### 3.1 PLO Assessment Methodology

Similar to PEO assessment methodology, the assessment method for PLO also applies to a triangular-shaped concept as shown in Figure 3-1, which includes (1) Course Learning Outcome versus Programme Learning Outcome (CLO-PLO) Assessment; (2) Fundamental Civil Engineering Exam (FCEE); and (3) Exit Survey. The achievement of each PLO is considered as attained when all the three above mentioned assessment methods satisfy an average mark of not less than 55%.

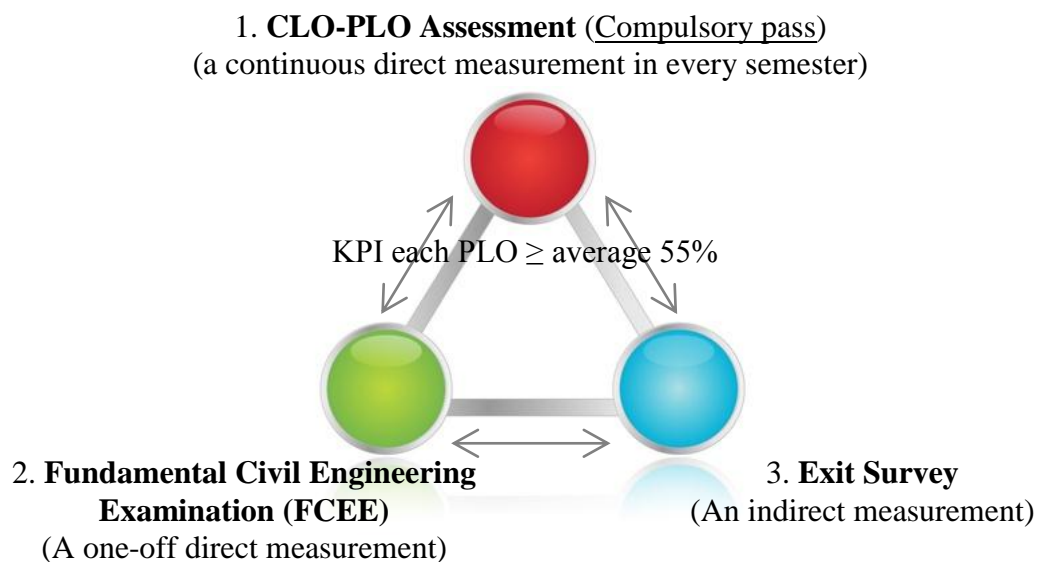


Fig. 3- 1. PLO assessment methodology in FKAAS

### 3.2 Course Learning Outcome versus Programme Learning Outcome (CLO-PLO) Assessment

CLO-PLO assessment is performed all through the semester within every course. For every course, there are 3 CLO mapped one PLO each for domain Cognitive (C), Psychomotor (P) and Affective (A), respectively. Table 3-1 provides the assessment tool and marks distribution for CLO based on the type of course with final exam and without final exam. Courses without final exam are then divided into two parts which are laboratory and computer as primary teaching courses where the marks are focused on both Psychomotor and Affective.

Table 3- 1. Typical assessment tool and marks distribution for CLO

CLO	PLO	Domain	Assessment Tool	Course with Final Exam	Courses without Final Exam (Laboratory Courses)	Courses without Final Exam (Computer as Primary Teaching)
				Marks (%)		
1	1 <sup>st</sup> PLO	Cognitive	Quizzes			
			Assignments	50	60	40
			Tests			
			Project			
			Exam			
2	2 <sup>nd</sup> PLO	Psychomotor	Project	7.5	20	30
3	3 <sup>rd</sup> PLO	Affective	Project	7.5	20	30
Total					100	

The CLO-PLO results for each course are automatically generated by a university centralised system known as Total Campus Integrated System (TCIS). Statistical distribution in tabulated and graph formats are given as shown in Figure 3-2 for course marks overall report and Figure 3-3 for course OBE overall report.



## ANALISA GRED (DATA SMP)

GRED	BIL. PELAJAR
A+	0
A	5
A-	4
B+	5
B	13
B-	38
C+	50
C	84
C-	82
D+	0
D	96
D-	0
E	33
HL	0
HG	0
TS	0
*	0
<b>JUMLAH</b>	<b>414</b>

## GRAF ANALISA GRED (DATA SMP)

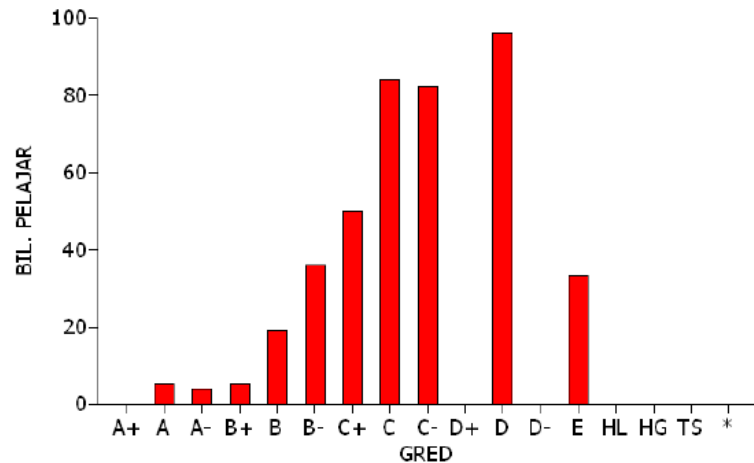


Fig. 3- 2. Typical Assessment of marks for a course



STATISTIK PURATA PENCAPAIAN CLO DAN PLO						
				CLO 1	CLO 2	CLO 3
Sesi/Semester	Kursus	Seksyen	Pilihan OBE	PLO 04 (CTPS)	PLO 02 (P)	PLO 03 (CS)
20142015/1	BFC43003	1	1	41.29	84.44	84.26
		2	1	48.02	83.47	75.75
		3	1	41.48	76.63	88.67
		4	1	38.59	76.78	84.63
		5	1	46.62	83.08	93.60
		6	1	44.65	75.45	85.33
		7	1	43.97	82.15	89.78
20142015/1 Total				43.23	80.29	85.72
Grand Total				43.23	80.29	85.72

## GRAF PURATA PENCAPAIAN CLO

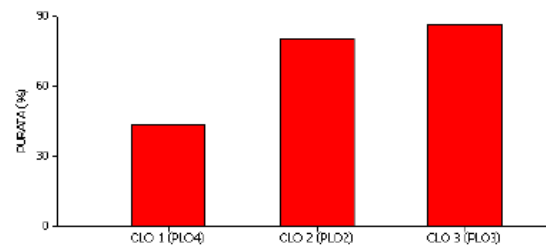


Fig. 3- 3. Typical OBE Overall Report for a course

The CLO-PLO achievement for 2 semesters of year 2019 is presented in Figure 3-4, respectively. The first success criterion / KPI for each PLO attainment is that the average mark of the courses addressing the PLO is at least 55%. Fig. 3-5 shows the PLO average marks for both semester 1 and 2 for session 2018/2019 for core engineering courses only.

It is seen that PLO with cognitive domain shows that it barely past KPI target. Fig. 3-6 and 3-7 shows the PLO average marks for the faculty general courses and the culminating courses respectively. All of the PLO achievements has achieved the KPI.

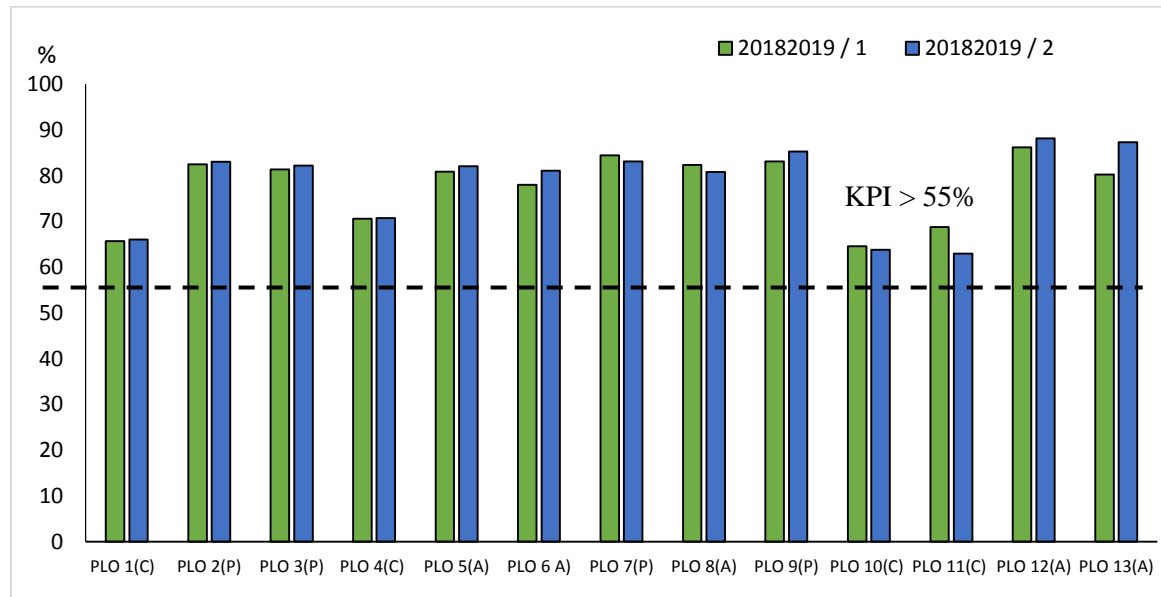


Fig. 3- 4. CLO-PLO achievement for BFF programme in Semester 1 and Semester 2 Session 2018/2019

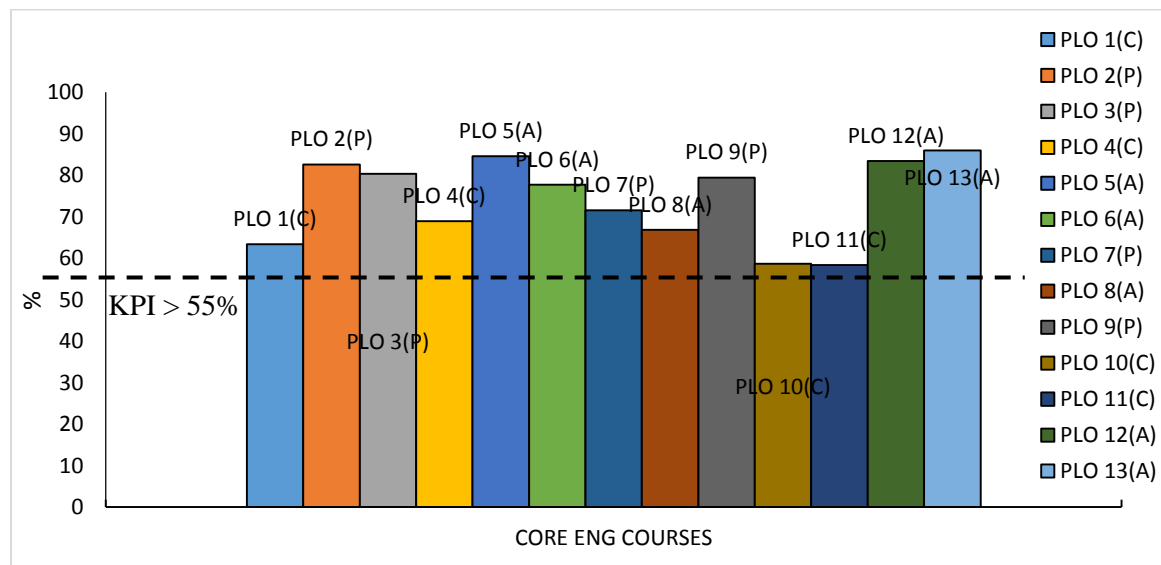


Fig. 3- 5. Average CLO-PLO achievement for Core Engineering Courses in BFF programme for Semester 1 and 2 Session 2018/2019

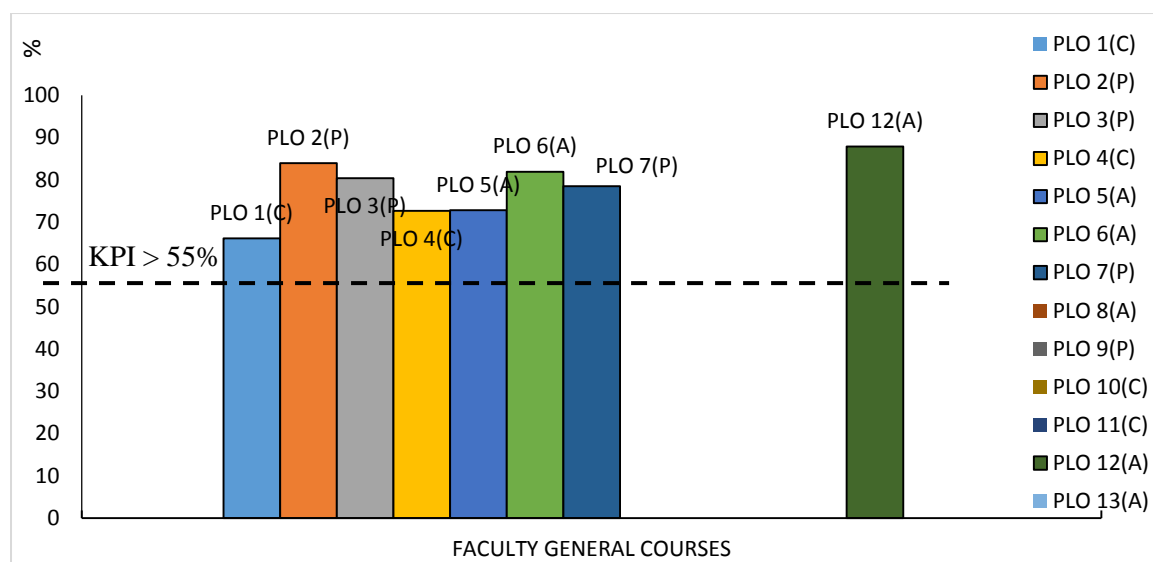


Fig. 3- 6. Average CLO-PLO achievement for Faculty General Courses in BFF programme for Semester 1 and 2 Session 2018/2019

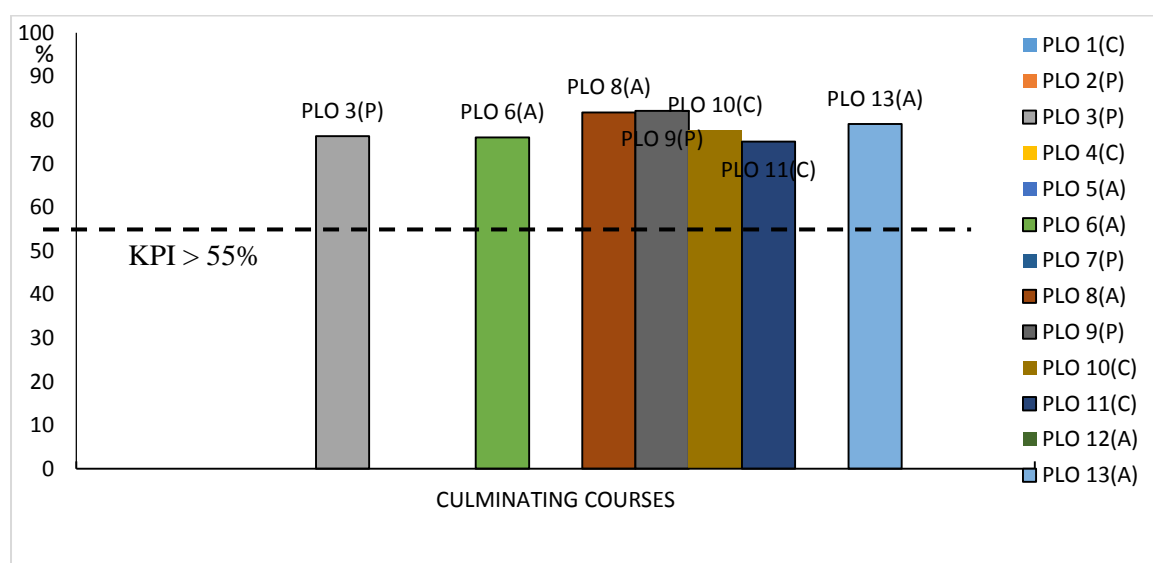


Fig. 3- 7. Average CLO-PLO achievement for Culminating Courses in BFF programme for Semester 1 and 2 Session 2018/2019

The second success criterion / KPI used to measure the achievement of PLO is at least 50% of students within each cohort / section achieve 55% marks as illustrated in Fig. 3-8 for a single course. This latter success criterion focuses on the student numbers while the former success criterion focuses on the PLO marks.

**Overall CLOs Achievement Report ( Previous )**

Session Course Code	20142015 / 1 BFC43003						
OBE Option	CLOS	PLOS	KPI		Achieved KPI		Remarks
			% Students	% Marks	No. Students	% Students	
1	CLO 1	PLO 04 ( CTPS )	50	55	46 / 335	13.73	Not Achieved
2	CLO 1	PLO 10 ( DS )	50	55	14 / 79	17.72	Not Achieved
1	CLO 2	PLO 02 ( P )	50	55	307 / 335	91.64	Achieved
2	CLO 2	PLO 09 ( LS )	50	55	65 / 79	82.28	Achieved
1	CLO 3	PLO 03 ( CS )	50	55	332 / 335	99.10	Achieved
2	CLO 3	PLO 05 ( TS )	50	55	79 / 79	100.00	Achieved

**Overall CLOs Achievement Report ( Current )**

Session	20152016 / 1						
Course Code	BFC43003						
OBE Option	CLOs	PLOS	KPI		Achieved KPI		Remarks
			% Students	% Marks	No. Students	% Students	
1	CLO 1	PLO 04 ( CTPS )	50	55	2 / 12	16.67	Not Achieved
2	CLO 1	PLO 10 ( DS )	50	55	117 / 310	37.74	Not Achieved
1	CLO 2	PLO 02 ( P )	50	55	11 / 12	91.67	Achieved
2	CLO 2	PLO 09 ( LS )	50	55	287 / 310	92.58	Achieved
1	CLO 3	PLO 03 ( CS )	50	55	11 / 12	91.67	Achieved
2	CLO 3	PLO 05 ( TS )	50	55	309 / 310	99.68	Achieved

STATISTIK BILANGAN PELAJAR MENDAFTAR KURSUS							
Sesi	Sem	Kod Kursus	Seksyen	Program	DT	UK	Jumlah
2014/2015	1	BFC43003	1	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	53	1	64
			2	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	58	2	60
			3	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	62	1	63
			4	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	51		51
			5	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	48		48
			6	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	62		62
			7	BFF - SARJANA MUDA KEJURUTERAAN AWAM DENGAN KEPULJAN	65	1	66
Jumlah Besar					409	5	414

Fig. 3- 8. Typical example of CLO-PLO assessment with KPI focus on student numbers

### 3.3 Fundamental Civil Engineering Exam (FCEE)

The Fundamental Civil Engineering Exam (FCEE) is a one-off direct measure of final year students' understanding on the fundamental of civil engineering disciplines. FCEE is one of the three tools used to measure students' achievement on the Learning Outcomes (PLO) of Bachelor of Civil Engineering with Honours (see Figure 3-1). Beginning year 2016, resulting from feedbacks and lessons from Benchmark Visits to other universities, External Examiner, and Stakeholders' Symposium, two significant improvements have been made: (1) FCEE focus on assessing only the Cognitive Domain PLO because it is a written exam oriented assessment; and (2) New questions for two sets of FCEE papers which covers the four PLO that are categorised as Cognitive Domain PLO, namely PLO 1 for Engineering Knowledge; PLO 4 for Critical Thinking and Problem Solving; PLO 10 for Design / Development of Solutions; and PLO 11 for Problem Analysis.

The date of the FCEE and the number of candidates for year 2019 is shown in Table 3-2.

Table 3- 2. FCEE date and number of candidates in 2019

Year	Semester, Session	Date of FCEE	Number of Student	Total
2019	Semester I, Session 2018/2019	23 Nov. 2019	239	533
	Semester II, Session 2018/2019	2 – 10 May 2020	294	

The FCEE was conducted online via Google forms. The FCEE format is the same for paper-based which was used in the previous years. It consists of 40 multiple-choice questions, to be completed in 2 hours. The FCEE constitutes 20% of the grade in the Integrated Design Project course. Different set of FCEE is administered each academic year. The exam covers most of the Civil Engineering courses, including Construction Management, Structure and Materials, Highway and Traffic, Geotechnical, Environmental, Hydraulics and Hydrology, and Surveying. Table 3-3 lists the breakdown of the questions according to the varying courses covered in the FCEE.

Table 3- 3. Number of questions according to subjects in the new format of FCEE paper

Subjects	Number of Questions
Water Resources & Environmental Engineering	10
Structure & Materials Engineering	10
Survey, Geotechnical Engineering, Traffic & Highway Engineering	10
Construction Engineering & Sustainable Management	10
Total	40

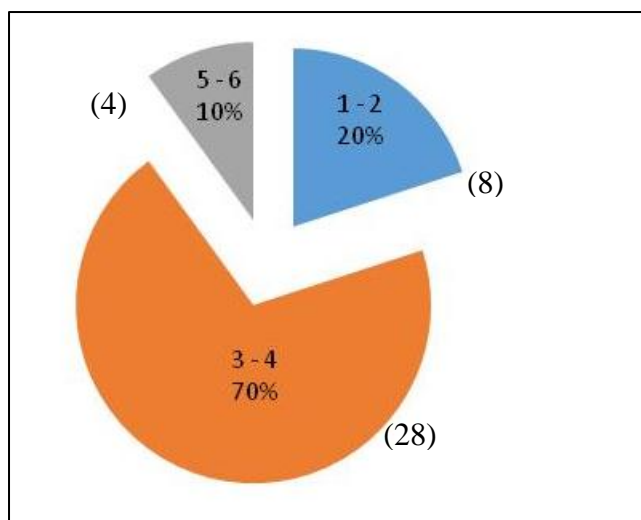


Fig. 3- 9. Typical of FCEE questions ( ) follows the taxonomy level

Figure 3-9 shows the distribution of the FCEE questions follows the taxonomy level. Each PLO has 10 questions and out of the 40 questions, 20% (8 questions) have the taxonomy levels 1 & 2, 70% (28 questions) in taxonomy levels 3 & 4, and 10% (4 questions) in taxonomy levels of 5 and higher. A dominant of 70% of the FCEE questions were designed in taxonomy level 3 & 4 because these levels correspond to graduates of Bachelor of Civil Engineering with Honours that should be able to apply the knowledge of mathematics, natural science, engineering fundamentals and civil engineering specialization to solve complex civil engineering problems.

The overall PLO achievement for semester 1 and 2 session 2018/2019 is shown in Fig. 3-9. It is seen that the PLO achievement for semester 2 is higher than semester 1 for session 2019/2020. However, each PLO achievement is still below 50% except for PLO 11 for both semesters.

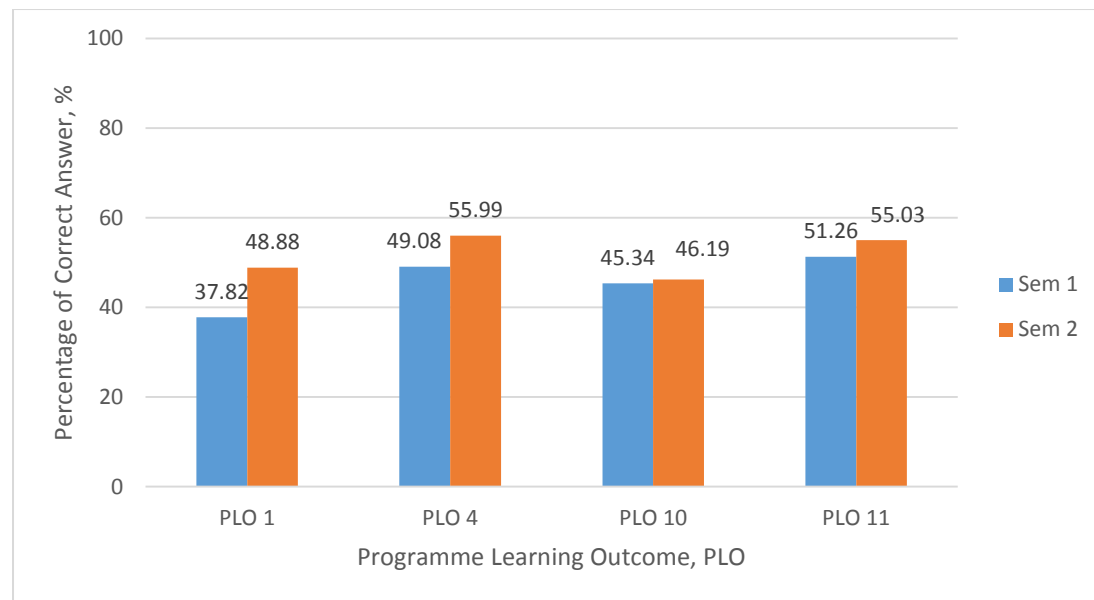


Fig. 3- 10. FCEE PLO achievement for year 2019

The following are activities recommended to improve students' performance in the upcoming FCEE:

1. Student briefing on FCEE should be carried out by the coordinator during the first meeting of Integrated Design Project course to ensure that the students are well prepared for the exam;
2. The FCEE questions should be reviewed by professional engineer or adjunct professor to increase its quality and suitability; and
3. More sets of questions should be prepared to increase the reserve of questions, as a different set of FCEE questions is used each semester.

### 3.4 Exit Survey

Exit Survey is an indirect measurement of self-assessment of the PLO based on individual perception as presented in Appendix 3-1. The main objectives of the survey are (1) To determine students' perception on the achievement of PLO in oneself; (2) To determine students' perception on their achievement of soft-skills attributes listed within the PLO;

and (3) To evaluate students' satisfaction level towards learning and teaching aspects, academic management, and university facilities. The tool used to perform this survey is Google Form. This survey is normally completed by all graduating students during their convocation.

The Exit Survey was conducted for the year 2019 in the month of October. The respondents are the graduating students of that year. The general statistics of the graduates are shown in Table 3-4.

Table 3- 4. General statistic of the graduates for year 2019

Year	2019
Number of graduates	526
Male percentage	47.87%
Female percentage	52.73%

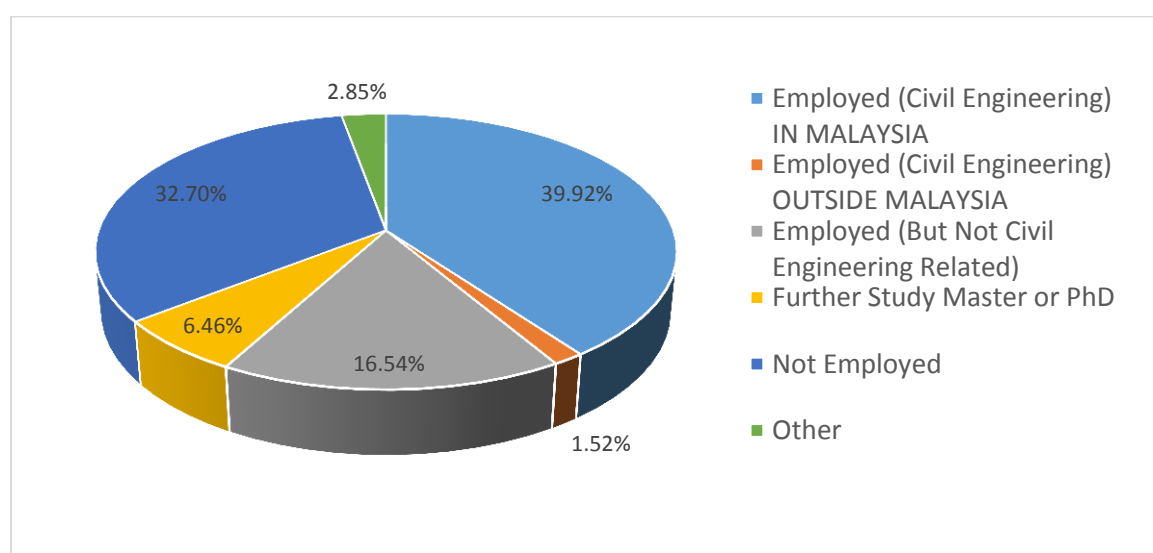


Fig. 3- 11. Employment statistics of graduates 4 months after final semester exam for year 2019

Detailed statistics of the Exit Survey result are given in Fig. 3-10. The Exit Survey for 2019 showed that 39.92% of FKAAS graduates, within 4 months after their final semester examination have been offered employment in the Civil Engineering industry within Malaysia while up to 1.52% has been employed outside Malaysia in the Civil Engineering

industry. There are 16.54% of the graduates are employed but are not working in the field of civil engineering. There are also only 6.46% of the graduates who are pursuing their education in postgraduate studies. Finally, the statistics also showed that 32.70% of the graduates are not employed yet.

In gauging the PLO attainment, respondents were asked to evaluate themselves on a scale of 1 (very poor) to 5 (excellent) according to level of attainment. Table 3-5 shows the summary of PLO achievement where graduating students perceived their own PLO attainment at a level of good (scale 4) or excellent (scale 5) score.

Table 3- 5. Exit Survey PLO achievement – % of students responded good (scale 4) or excellent (scale 5) score for year 2019


PLO	Taxonomy	Year 2018
1 K	C	86
2 PS	P	83
3 CS	P	84
4 CTPS	C	82
5 TW	A	90
6 LL	A	86
7 ES	P	87
8 ET	A	89
9 LS	P	86
10 DDS	C	81
11 PA	C	81
12 ESus	A	85
13 ESoc	A	85

Note: C is Cognitive, P is Psychomotor, and A is Affective

A clear lesson from the data in Table 3-5 shows that in general, many graduating students perceived themselves to have lower command of the Cognitive PLO but stronger command of the Psychomotor and Affective PLO.

### 3.5 Continuous Quality Improvement (CQI) Efforts

In order to improve CLO within the teaching learning of a particular course, various strategies can be proposed by the lecturer for the different area of concern. This is generated in a format known as CQI Report for CLO as shown in Fig. 3-11. The proposed strategy for improvement is suggested and passed onto the next lecturer automatically via a course management system.

 <b>UNIVERSITI TUN HUSSEIN ONN MALAYSIA</b> <b>CQI REPORT FOR CLOs</b> Session / Sem : 20152016 / 1 Course Code : BFC43303 Course Name : PROJEK REKABENTUK BERSEPADU / INTEGRATED DESIGN PROJECT			
<b>CLO 1</b> Design the building structures and infrastructures for complex engineering based on relevant guidelines.		<b>KPI : At least 50% of students have achieved 55 marks and above</b> Setting : 2	
<b>PLO 10 (DS)</b>	<b>Achievement of Previous Semester ( 20142015 / 2 )</b> Passed / No of Students : 252 / 252    Remarks/Status : <b>Achieved</b> <b>100 %</b>		<b>Achievement of Current Semester ( 20152016 / 1 )</b> Passed / No of Students : 151 / 152    Remarks/Status : <b>Achieved</b> <b>99.34 %</b>
	<b>Area of Concern</b> <b>Proposed Strategy</b>		<b>Upcoming Strategy</b>
1. Student Performance	Let students critical thinking		Closing monitoring by Ir lecturer
2. Course Contents	Provide more notes		Add green building component
3. Delivery Methods	Student group selected by lecture		Give more example as per industry practice

<b>CLO 1</b> Design the building structures and infrastructures for complex engineering based on relevant guidelines.		<b>KPI : At least 50% of students have achieved 55 marks and above</b> Setting : 2	
<b>PLO 10 (DS)</b>	<b>Achievement of Previous Semester ( 20142015 / 2 )</b> Passed / No of Students : 252 / 252    Remarks/Status : <b>Achieved</b> <b>100 %</b>		<b>Achievement of Current Semester ( 20152016 / 1 )</b> Passed / No of Students : 151 / 152    Remarks/Status : <b>Achieved</b> <b>99.34 %</b>
	<b>Area of Concern</b> <b>Proposed Strategy</b>		<b>Upcoming Strategy</b>
4. Assessment Methods	Provide guideline student presentation		Provide guideline student presentation

<b>CLO 2</b> Organize a project in team effectively as well as an individual		<b>KPI : At least 50% of students have achieved 55 marks and above</b> Setting : 2	
<b>PLO 09 (LS)</b>	<b>Achievement of Previous Semester ( 20142015 / 2 )</b> Passed / No of Students : 245 / 252    Remarks/Status : <b>Achieved</b> <b>97.22 %</b>		<b>Achievement of Current Semester ( 20152016 / 1 )</b> Passed / No of Students : 151 / 152    Remarks/Status : <b>Achieved</b> <b>99.34 %</b>
	<b>Area of Concern</b> <b>Proposed Strategy</b>		<b>Upcoming Strategy</b>
1. Student Performance	Monitoring minutes meeting closely		Provide studio for design office
2. Course Contents	Add more notes		Add green building item
3. Delivery Methods	Let Ir involve in the lecture team		add more example as per industry practice
4. Assessment Methods	Request external panel industry		add log book for time frame

<b>CLO 3</b> Propose a technical knowledge through project report for problem solving in civil engineering works based on relevant guidelines.		<b>KPI : At least 50% of students have achieved 55 marks and above</b> Setting : 2	
<b>PLO 13 (ES)</b>	<b>Achievement of Previous Semester ( 20142015 / 2 )</b> Passed / No of Students : 250 / 252    Remarks/Status : <b>Achieved</b> <b>99.21 %</b>		<b>Achievement of Current Semester ( 20152016 / 1 )</b> Passed / No of Students : 146 / 152    Remarks/Status : <b>Achieved</b> <b>96.05 %</b>
	<b>Area of Concern</b> <b>Proposed Strategy</b>		<b>Upcoming Strategy</b>
1. Student Performance	Let students critical thinking		Provide studio for design office
2. Course Contents	Provide more notes		Add green building item
3. Delivery Methods	More discussion with students		add more example as per industry practice
4. Assessment Methods	Upgrade student report with rubric		add log book for time frame

Fig. 3- 12. CQI report for CLO

More comprehensive CQI is also carried out in the class with students for every course. This is normally recorded in a faculty level form called CQI Report as presented in Fig.

3-12 which includes description of CQI activities, CQI topics and recommendations for improvement. CQI efforts in Integrated Design Project were done where external practicing engineers were invited to examine the students presenting their projects.

### **3.6 PLO Achievement for Individual Student via MyPLO**

The achievement of PLO at student level for every individual has been developed and displayed through MyPLO. The detail achievement of an individual student is presented in Fig. 3-14.

### **3.7 Complex Engineering Problem in PLO**

Complex Engineering Problem are defined as engineering problems that have some or all of the following characteristics: (1) involve wide ranging or conflicting technical or engineering issues; (2) have no obvious solution and require originality in analysis; (3) involve infrequently encountered issues; (4) are outside problems encompassed by standards and code of practice for professional engineering; (5) involve diverse group of stakeholders with wide varying needs; (6) have significant consequences in a range of contexts; (7) cannot be resolved without an in-depth engineering knowledge .

Complex Engineering Problem (CEP) is mentioned in PLO 1, PLO 4, PLO 10 and PLO 11, all four PLOs being designated with Cognitive Domain as the primary domain type in FKAAS. Under CEP, accompanying attributes related to Complex problem solving (WP) and Complex engineering activities (EA) can be found within other different PLO. Such attributes are found across all courses offered and having different degree of complexity. However, for a start, 11 courses and all elective courses have been specially selected to showcase CEP components. This is given in Table 3-6. Each of these courses has been assigned to various CPS attributes. The CEP activities for every attribute are described in a form as shown in Fig. 3.15.



**Continual Quality Improvement (CQI) Report**  
**Faculty of Civil and Environmental Engineering**

CQI Report (OBE Form)			
Programme :	<b>Bachelor of Civil Engineering with Honours</b>	Semester :	<b>II</b>
Course Name :	<b>Hydraulics</b>	Session :	<b>2014/2015</b>
Course Code :	<b>BFC 21103</b>	Section :	<b>1, 2, 3, 5 &amp; 6</b>
Coordinator :	<b>Tan Lai Wai</b>	Cohort :	<b>BFF0405-8</b>

KPI	50% of students achieve 55% marks			Achieved	Not-achieved	
CLO 1 (Cognitive)	Explain the concept of uniform and non-uniform flows in open channel, hydraulic structure and machinery (C4, PLO1)					
Number of students that require CQI for Test 1 (score less than 55%)	88 (31.2%)	Attach "Laporan Keseluruhan Kursus" for <u>Test 1</u> (from TCIS) (Appendix 1)				
Number of students that require CQI for Test 2 (score less than 55%)	178 (63.1%)	Attach "Laporan Keseluruhan Kursus" for <u>Test 2</u> (from TCIS) (Appendix 1)				
CQI activities	Additional Class	Additional Exercise	Additional Notes	Different Delivery Approaches	Self-assessment	Other
Please tick (x)	–	x	x	x	x	x
Description on CQI activities	Students were given more exercises, additional notes (also in graphic & video formats to create interest), and also trial exams to help students improve their grasps of the learning outcomes.					
Description on topics where CQI has been conducted (Attach examples and pictures as proof)						
1) Careless mistakes in calculating open channel flow characteristics (Appendix 2). Students were always informed that if mistakes were done earlier in the calculations, the end results of analysis will be affected.						
2) Students have problems in derivation and mathematical equations. Appendix 3 shows how WhatsApp and online learning management system AUTHOR are used in delivering lessons.						
3) Video and photos were used in learning and teaching of Hydraulics to relate students to the engineering practices (Appendix 4).						
4) Additional notes and exercises were conducted throughout the semester for Hydraulics. For every chapter, new exercise questions were discussed during the tutorial sessions (Appendix 5).						
Suggestion of improvement in the next semester:						
Current CQI activities can be maintained as comparison between Test 1, Test 2 and Final Examination results shows that CQI activities conducted have help student in improving their achievement in Final Examination. Variety of delivery approaches can be proposed ahead of next semester as to ensure students realize the importance of the learning outcomes and how they relate to the civil engineering practices. Apart from CQI activities on students, staff also attended variety of learning and teaching courses to enhance the skills (Appendix 6).						

Prepared by :

Tan Lai Wai

Tan Lai Wai

Date :

08 July 2015

Fig. 3- 13. CQI report at faculty level



Fig. 3- 14. MyPLO summary achievement of individual student

Table 3- 6. Selected courses for CEP components

No	Course Code	Courses
1	BFC 23702	Creativity and Innovation
2	BFC 32703	Sustainable Construction Management
3	BFC 32102	Reinforced Concrete Design I
4	BFC 32803	Reinforced Concrete Design II
5	BFC 43003	Structural Steel and Timber Design
6	BFC 21502	Geomatic Practice
7	BFC 43103	Foundation Engineering
8	BFC 32403	Environmental Engineering
9	BFC 32904	Industrial Training
10	BFC 43303	Integrated Design Project
11	BFC 43402	Final Year Project I and II
12	BFX 4xxx3	Elective

**COMPLEX ENGINEERING PROBLEM (CEP) DESCRIPTIVE FORM FOR FKAAS**COURSE CODE: **BFC43003**COURSE NAME: **STRUCTURAL STEEL AND TIMBER DESIGN**

		PLO	LEVEL
CLO 1	Design the steel and timber structure elements according to BS EN 1993 and BS EN 1995.	10	C
CLO 2	Manipulate structural design processes to complete the assigned project.	9	P
CLO 3	Organize the design works report in group affectively which comprise of ideas and problem solving.	5	A

**COMPLEX PROBLEM SOLVING (CPS) MATRIX**

ATTRIBUTE	1	2	3	4	5	6	7	8	9
(tick)	/		/					/	/

CPS ATTRIBUTE	ASSESSMENT METHOD	TOPIC	CEP ACTIVITY DESCRIPTION
(1) Depth of knowledge required	Project	Beam, Column, Truss, Connection	Students are to perform the following activities: Layout planning, load distribution and analysis, design calculations, structural drawing and detailing. The project activities involve proposing a design for either a residential medium-rise, bus station or stadium grandstand. Wide ranging, indepth fundamental engineering knowledge are required.
(3) Depth of analysis required	Project	Beam, Column, Truss, Connection	In order to solve the given project, the students need to demonstrate and perform lengthy and in-depth analysis and calculations. Some analysis do not have obvious solutions for example in the design of long span truss frames. The students need to understand the fundamental concept of statics and mechanics before pursuing the analysis either by hand or using software.
(8) Consequences	Project	Beam, Column, Truss, Connection	A good design will be economical and easy to build. A poor design will be costly and hard to build. Detailing skills are also important.
(9) Judgment	Project	Beam, Column, Truss, Connection	The student will be assessed on their judgment especially in the layout planning activity. Good judgment brings about good decision making also in the load distribution and load combinations for the design works.

Fig. 3- 15. Complex Engineering Problem Form

### 3.8 Summary of PLO Attainment

With the three Assessment Methods for PLO described in Figure 3-1, in order to show that every PLO for BFF programme has been achieved, the overall average of all three assessments must be no less than 55%. This is the overall key performance indicator (KPI) set for PLO attainment. Table 3-7 present the summary PLO attainment for year 2019. The results conclude that PLO attainment ranges from lowest 64% (PLO 1 – K) to highest 82.14% (PLO 12 – ESus). All the PLO satisfies the PLO KPI of no less than 55%.

Table 3- 7. PLO attainment for 2019

PLO		CLO-PLO		CLO-PLO Achievement for 2019	Exit Survey	FCEE		FCEE Achievement for 2019	Ave. All	KPI ≥ 55%
		SEM 1	SEM 2			SEM 1	SEM 2			
1	K	65.65	66.01	65.83	85.55	37.82	48.88	43.35	64.91	PASS
2	PS	82.44	83.02	82.73	83.26				83.00	PASS
3	CS	81.32	82.15	81.73	84.03				82.88	PASS
4	CTPS	70.59	70.70	70.64	82.12	49.08	59.99	54.53	69.10	PASS
5	TW	80.86	82.01	81.43	89.73				85.58	PASS
6	LL	77.94	81.02	79.48	85.74				82.61	PASS
7	ES	84.42	83.09	83.75	87.45				85.60	PASS
8	ET	82.29	80.77	81.53	89.35				85.44	PASS
9	LS	83.10	85.23	84.16	85.55				84.85	PASS
10	DDS	64.56	63.75	64.16	80.60	45.34	46.19	45.76	63.51	PASS
11	PA	68.73	62.96	65.84	81.17	51.26	55.03	53.14	66.72	PASS
12	ESus	86.13	88.11	87.12	85.17				86.14	PASS
13	ESoc	80.23	87.26	83.75	84.98				84.36	PASS

## **4 REPORT CONCLUSION**

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This report provides the evidences of OBE implementation and the measurement both direct and indirect to demonstrate the attainment of FKAAS PLO for year 2019.

## Appendix 2-1 PEO Employer Survey

Version 2016



### PROGRAMME EDUCATIONAL OBJECTIVES (PEO) EMPLOYER SURVEY

#### EMPLOYER DETAILS

1. Name :
2. Email :
3. Contact Number :
4. Company Address :
5. I am a : ☐ Consultant  
☐ Contractor  
☐ Developer  
☐ Manufacturer  
☐ Government Agency  
☐ Others : \_\_\_\_\_
6. Date Of This Survey :

#### ALUMNI STATISTICS

Total number of UTHM Alumni you are employing

	1 Person	2 Person	3 Person	4 Person	5 Person	6 Person	7 Person	8 Person	9 Person
Graduated 3 to 5 years ago									

If more than 9 persons please state : \_\_\_\_\_

**GRADUATE RATING (graduated 3 to 5 years ago)**  
*Kindly rate UTHM graduates*

Please rate the strength of UTHM alumni.

		<b>Fail</b>	<b>Poor</b>	<b>Average</b>	<b>Good</b>	<b>Excellent</b>
1.	Knowledgeable in Engineering, Mathematics & Science	1	2	3	4	5
2.	Technically competent	1	2	3	4	5
3.	Have a sense of number and dimensions	1	2	3	4	5
4.	Proficient in spoken English	1	2	3	4	5
5.	Proficient in written English	1	2	3	4	5
6.	Able to prepare and deliver presentation	1	2	3	4	5
7.	Able to prepare report containing words and drawings	1	2	3	4	5
8.	Able to lead a given task or project	1	2	3	4	5
9.	Able to work with others in a team	1	2	3	4	5
10.	Able to solve problems related to work	1	2	3	4	5
11.	Willing to share ideas	1	2	3	4	5
12.	Willing to do things in the right way	1	2	3	4	5
13.	Willing and able to follow instruction	1	2	3	4	5
14.	Show concerns for safety, quality and environmental protection	1	2	3	4	5
15.	Have basic interpersonal skills	1	2	3	4	5
16.	Bold and courageous to explore new ideas	1	2	3	4	5
17.	Often ready to initiate ideas	1	2	3	4	5
18.	Enthusiastic and productive at work	1	2	3	4	5
19.	Willing to learn and improve technical abilities	1	2	3	4	5
20.	Able to understand and meet expectations of customers	1	2	3	4	5

**THANK YOU**

## Appendix 2-2 PEO Alumni Survey

Version 2016



### PROGRAMME EDUCATIONAL OBJECTIVES (PEO) ALUMNI SURVEY

#### PART 1 : PERSONAL DETAILS

1. Name :
2. Email :
3. Contact Number :
4. Year Graduate Degree Programme :
5. Position :
6. Company Address :

#### PART 2: PROGRAMME EDUCATIONAL OBJECTIVES

Please rate on a scale of 1 (Very Poor) to 5 (Excellent) how well has each of these PEO been achieved in you from the day you graduated until now

		Very Poor	Poor	Average	Good	Excellent
PEO	Knowledgeable and technically competent in					
1	civil engineering discipline in-line with the industry requirement.	1	2	3	4	5
PEO	Effective in communication and demonstrate					
2	good leadership quality in an organization	1	2	3	4	5
PEO	Capable to solve civil engineering problems					
3	innovatively, creatively and ethically through sustainable approach	1	2	3	4	5
PEO	Able to demonstrate entrepreneurship skills					
4	and recognize the need of life-long learning for successful career advancement	1	2	3	4	5

### **PART 3: TRACER STUDY FOR ALUMNI**

#### ***Programme Educational Objectives (PEO) FKAAS***

Please tick in the box below.

- |     |   |                              |                             |
|-----|---|------------------------------|-----------------------------|
| 1.  | Have been promoted or offered to a better position                                      | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 2.  | Have been involved in research/construction project proposal either as member or leader | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 3.  | I am a Professional Engineer (PE)   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 4.  | Have published papers in conference/journal   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 5.  | Have held leadership positions for a taskforce or project within an organization        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 6.  | Have been involved in civil engineering design/construction projects                    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 7.  | Have been involved in research and/or development projects related to civil engineering | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 8.  | Have been attending Continuous Professional Development courses.                        | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 9.  | Have furthered studies to a higher degree   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 10. | Have ventured into business (self-owned or partnership)                                 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

**THANK YOU**

## Appendix 3-1 PLO Exit Survey



### EXIT SURVEY PROGRAM LEARNING OUTCOME (PLO) FKAAS

Please rate (tick in the box below) on a scale of 1 (POOR) to 5 (EXCELLENT) how well has each of the 13 PLO been achieved in you.

#### PART 1: PERSONAL DETAILS

1. Name :
2. Matric Number :
3. Gender :
4. Working Status : ☐ Further Study Master or PhD  
☐ Not Employed  
☐ Employed (Civil Engineering)  
☐ Employed (Not Civil Engineering)

#### PART 2: PROGRAM LEARNING OUTCOME (PLO)

Please rate (tick in the box below) on a scale of 1 (Fail) to 5 (Excellent) how well has UTHM graduates fulfil these PLO

		Fail	Poor	Average	Good	Excellent
1.	Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex civil engineering problems.	1	2	3	4	5
2.	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex civil engineering activities, with an understanding of the limitations.	1	2	3	4	5
3.	Communicate effectively on complex civil engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	1	2	3	4	5
4.	Conduct investigation into complex problems using research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.	1	2	3	4	5
5.	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	1	2	3	4	5

6.	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	1	2	3	4	5
7.	Self-motivate and enhance entrepreneurship skills for career development.	1	2	3	4	5
8.	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.	1	2	3	4	5
9.	Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	1	2	3	4	5
10.	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	1	2	3	4	5
11.	Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.	1	2	3	4	5
12.	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.	1	2	3	4	5
13.	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	1	2	3	4	5

### PART 3: VERIFICATION

E-mail : \_\_\_\_\_

**THANK YOU**