Assessment and Evaluation Process

Source : Ir. Academician Emeritus Professor Tan Sri Dato' Dr. HT Chuah
Chairman
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Federation of Engineering Institutions of Asia and the Pacific

Presented By

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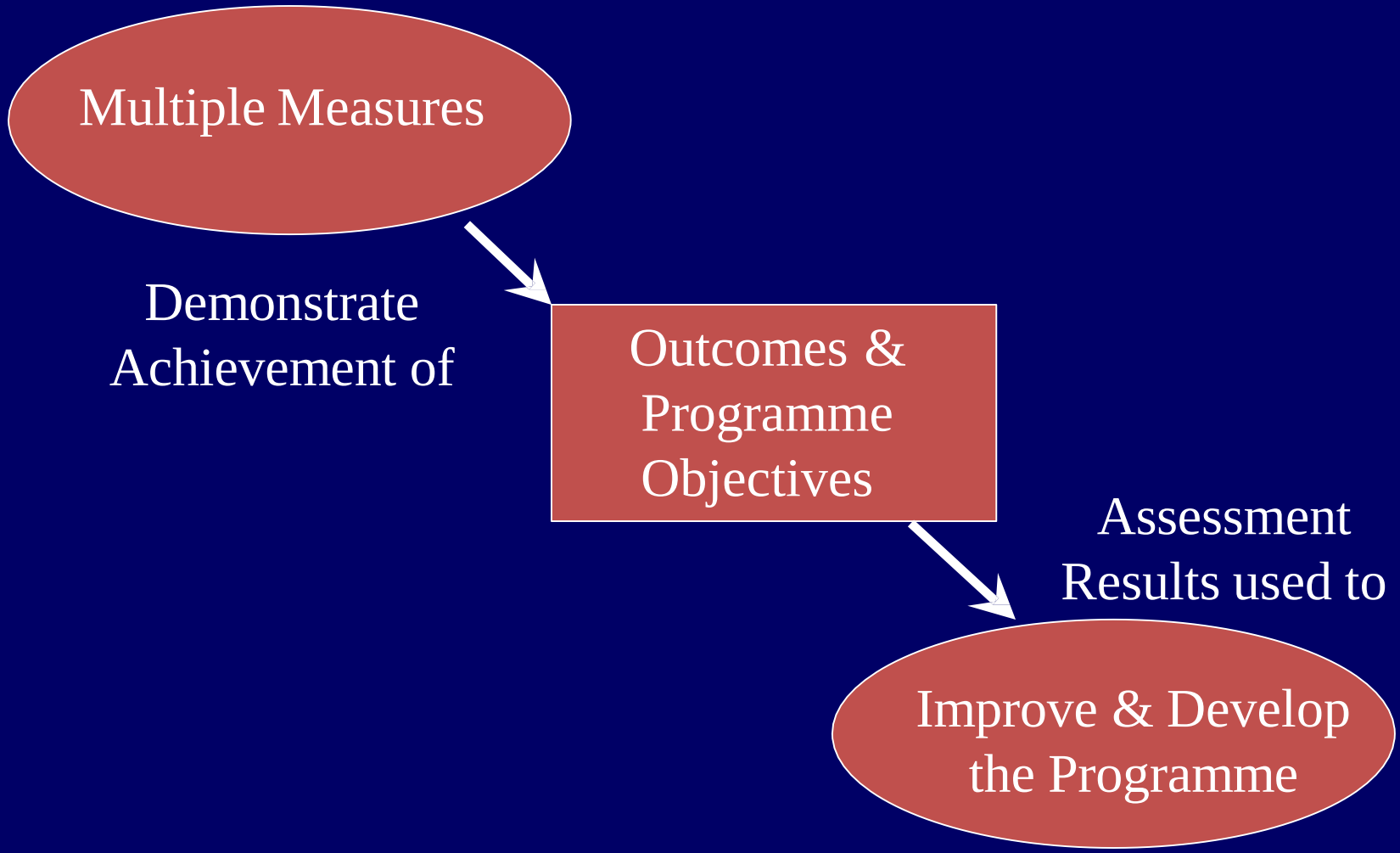
Assessment & Evaluation



What is Assessment?

In education, assessment is the process of gathering, interpreting, recording and using information about pupils' responses to an educational task

(Harlen, Gipps, Broadfoot, Nuttal, 1992).

In other words, Assessment is :

- the formative or/and summative determination for a specific purpose of the student's competence in demonstrating a specific outcome
- the processes that identify, collect, use and prepare data that can be used to evaluate achievement

Rightfully, Assessment is done because it :

- Helps to distinguish between ***Teaching*** and ***Learning***
- Informs what students know or not know
- Provides feedback to ***improve*** teaching/learning process

Formative Assessment

- Believe all students are *teachable*
- Assessment is carried out frequently and is planned at the same time as teaching
- Collecting information according to preset criteria to supply feedback on how learning can be improved
- Teaching/learning materials are structured in manageable components and assessed
- Feedback to students on their learning achievements for students to improve their learning; allows lecturer/student to recognise the “gap” in learning
- Adjust teaching/learning activities taking into account of feedback

Summative Assessment

- Judging the worth according to preset criteria of the student's demonstration of outcome attainment competence
- Used to assess a person's achievement under exam conditions, using tests and exams only and report only the marks
- The test and exam is a final measure of the students' ability/competency
- Tests are comprehensive and thorough
- Reliability is essential as they are used numerically to classify students and compare them to each other

Formative Assessment and Summative Assessment: Analogy

- When the cook tastes the soup, that's *formative assessment*

- When the customer tastes the soup, that's *summative assessment*

Paul Black

Formative Assessment and Summative Assessment

- Formative assessment takes place during the course of teaching and is used essentially to feed back into the teaching and learning process.

  In other words, "***The soup can still be improved!***"

- Summative assessment is the "sum" of teaching/learning assuming a finality status and happens at the end of a course.

  By analogy, **the student is *past help, just like the soup*!**

Functions of Formative and Summative Assessment Techniques

Formative assessment (***To improve for***)	**Summative assessment** (***To prove for***)
• Lecturers to ensure that learning has taken place • Lecturers to improve methods of instruction • Students to gain an idea of their success • Monitors progress in learning by students	• Employers for job selection • Curriculum developers for curriculum reviews • Validation /accreditation bodies for award of grades and diplomas • Students for selecting courses of higher study

The Fundamentals of Effective Assessment

- Assessment should help students to learn
- Assessment must be consistent with the objectives of the course and what is taught and learnt
- Variety in types of assessment allows a range of different outcomes to be assessed. It also keeps students interested
- Students need to understand clearly what is expected of them in assessed tasks

The Fundamentals of Effective Assessment (Cont'd)

- Criteria for assessment should be detailed, transparent and justifiable
- Students need specific and timely feedback on their work - not just be informed of a grade/mark
- Too much assessment is unnecessary and may be counter-productive
- Assessment should be undertaken with an awareness that an assessor may be called upon to justify a student's result

The Fundamentals of Effective Assessment (Cont'd)

- Group assessment needs to be carefully planned and structured
- When planning and wording assignments or questions, it is vital to mentally check their appropriateness to all students in the class, whatever their cultural differences
- Systematic analysis of students' performance on assessed tasks can help identify areas of the curriculum which need improvement

Assessment Tools for Programme Education Objectives (PEO)

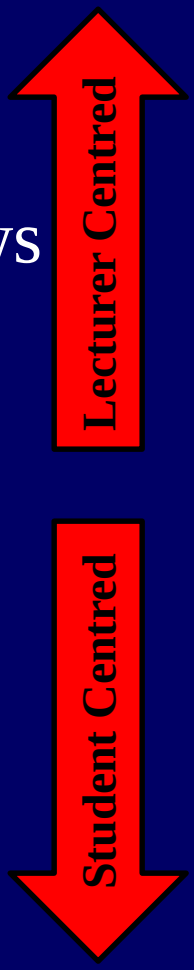
- Employers' Survey on Employment Satisfaction
- Input from Industrial Advisory Committee
- Program Educational Objectives Alumni's Survey
- Faculty Annual Self-Assessment

Assessment Tools for Programme Outcomes (PO)

- Course-based Embedded Assessment
- Student Course Satisfaction Survey
- Cumulative GPA (CGPA) Index for Each Course
- Senior Design Projects -- Index of Excellence
- Programme Accreditation
- Academic Review – External Examiner
- Graduate Employment Statistics

Assessment Tools for Course Outcomes (CO): Formative

- Written tests linked to course outcomes
- Oral presentation and assessment
- Student surveys, individual and focus group interviews
- Written project reports
- Assignments, and reports in capstone design subject
- Demonstration and simulation
- Student portfolios
- Peer-evaluations and self evaluations
- Behavioral observation



Assessment Tools for Course Outcomes (CO): Summative

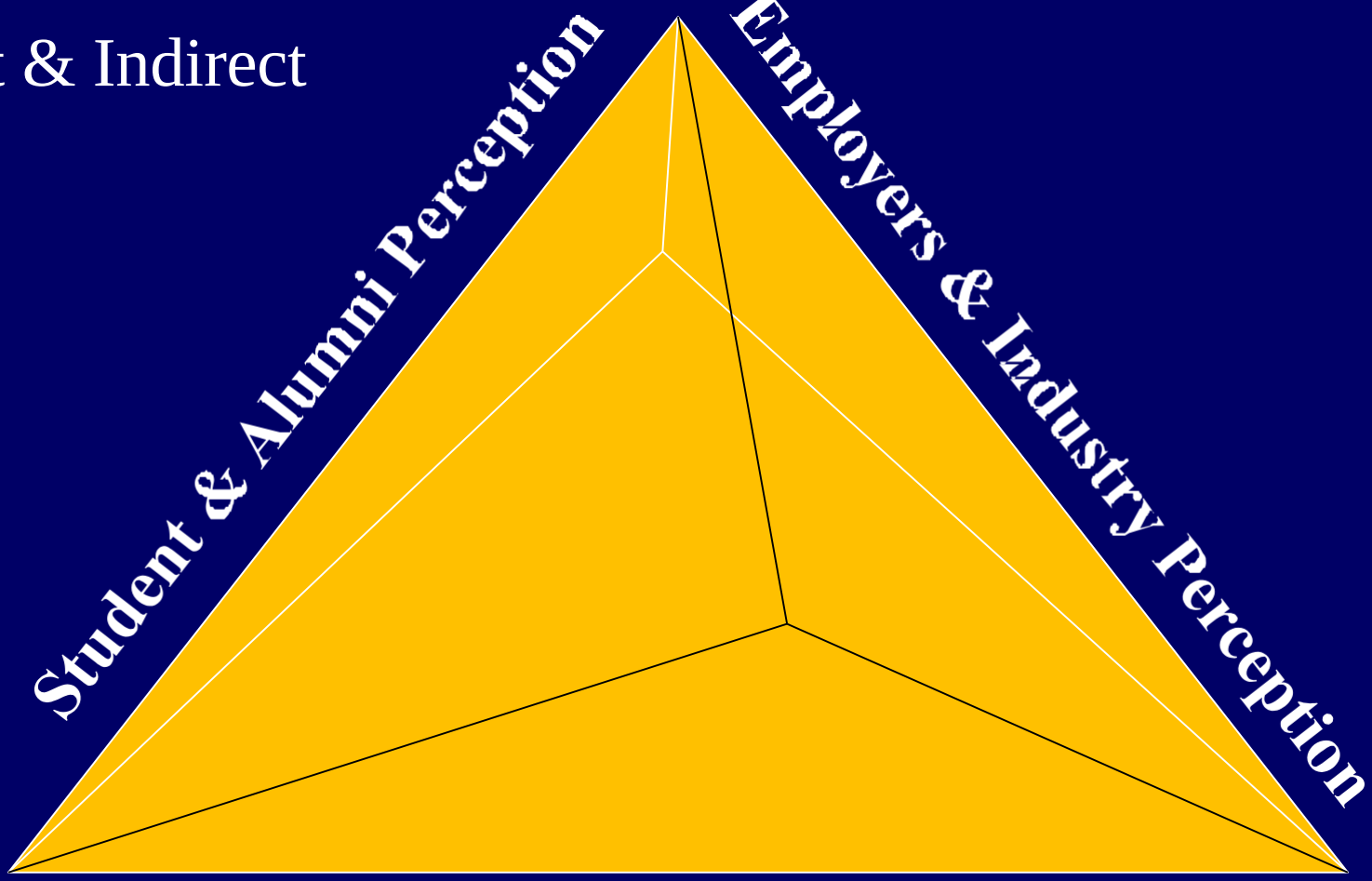
- Written examination and tests linked to course outcomes
- Oral presentation and assessment
- Student surveys, individual and focus group interviews
- Written project reports
- Demonstration
- Employer survey

Some Key Points

- Provide clear guidelines for all work
  - Report writing – nature and structure of the information required
  - Oral presentation – detailed evaluation criteria: clarity, effective use of visual aids, eye contact
- Use of higher order thinking skills
- Team involvement to be defined

Assessment & Evaluation Triangulation

Direct & Indirect



Assessment Process

- Anecdotal vs Measured Result
- Reliance on Course Grades only
- Over-reliance on Indirect Assessment (Survey)

Presenting Assessment Result

- A staff member can represent the data graphically
- How many students meet the expected standard of "meet criterion", the number who exceed standard and the number that are making progress can be determined
- Staff should think through how the data are going to be used before developing a rubric.

Expectations of Evaluators on Assessment

- ✓ Course assessment links to Course Outcomes /Programme Outcomes
- ✓ Formative Assessment
- ✓ Summative assessment
- ✓ Looking for content breadth & depth from direct assessment
- ✓ Looking for students ability to attain the highest level (depth)

Outcome–based Assessment

Implementation strategic	Assessment Strategy	Data Source/Assessment Instrument
Industrial project - improve student competence in communication, teamwork, and project management	Exams, Interview, Survey, observe, assess skill level, monitor development of skills	Reports, interview schedule, survey, observation records, grades of exams and projects, exit skill checklist
Design course - address industry needs	Assessment criteria from literature, by industry, and lecturers	List of assessment criteria, observation reports, interview, students evaluation, exams, exit skill checklist

Assessment Process - Steps

STEP 1 : Planning the Assessment

STEP 2 : Developing / Using Appropriate Assessment Tools

STEP 3 : Collecting Detail Data

STEP 4 : Calculating the Result of Achievement

STEP 5 : Analysing the Result

STEP 6 : Propose Improvements

STEP 7 : Documentation

Assessment Process-Planning

CO-GA Mapping

***** Criterion 2 – GAs***

***** Criterion 3 – Academic Curriculum***

Sample

EAC Eg. 4a

Subject - ChE 31012 Fluid Mechanics					Academic Year - (2014-2015)								
		Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Life-long Learning	Project Management and Finance
NO	CO DESCRIPTION	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
1	Solve problems related to manometers and decanters using the principles of fluid statics.		C3										
2	Determine boundary layer flows and turbulent flows.	C2											
3	Solve fluid flow problems with the application of the momentum and energy equations.		C3										
4	Analyze frictional flow in pipes and piping networks.				C4								
5	Analyze fluid flow in chemical engineering equipment including packed beds.				C4								
6	Apply different types of flow meters, valves, pumps and compressors in fluid transportation.		C3										

Learning Domains, Taxonomy Levels and Relevant Verbs

Reference: UTAR Guidelines on Outcome-Based Education (OBE)

1. **Bloom's Taxonomy for Cognitive Domain (6-level)**
2. **Bloom's Taxonomy for Affective Domain (5-level)**
3. **Bloom's Taxonomy for Psychomotor Domain (5-level)**

Cognitive		Affective		Psychomotor	
C1 -	**Remembering** *(recall data)*	A1 -	**Receiving phenomena** *(aware of phenomena)*	P1 -	**Perception**
C2 -	**Understanding** *(comprehend, explain)*	A2 -	**Responding** *(react to phenomena)*	P2 -	**Set**
C3 -	**Applying** *(use, practise, apply)*	A3 -	**Valuing** *(understand and act)*	P3 -	**Guided Response**
C4 -	**Analysing** *(make sense of structure)*	A4 -	**Organising personal value system** *(respond, reflect)*	P4 -	**Mechanism**
C5 -	**Evaluating** *(assess, judge, compare)*	A5 -	**Internalising value system** *(adopt behaviour as habitual)*	P5 -	**Complex Overt Response**
C6 -	**Creating** *(synthesise, design, build)*			P6 -	**Adapation**
				P7 -	**Origination**

Assessment Planning _ Course Work

Sample

EEAC Form (005)

Semester - II (2014-2015)		Course Code - ChE 31012	
Course Name - Fluid Mechanics		Teaching & Learning Method - L, A, T, P	
Lecturer/ Coordinator Name -			
% of Final Exam	60%	% of Course Work	40%

Course Works	CO	Full Marks	% Marks		Mark Distribution for each GA											
					Cognitive				Psycho-motor	Affective						
					GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
Assignment I (A1)	2	20	10	3.3	3.3											
Assignment II (A2)	3	20		3.3		3.3										
Assignment III (A3)	4	20		3.3				3.3								
Tutorial I (T1)	1	20	10	5.0		5.0										
Tutorial II (T2)	3, 4	20		5.0		2.5		2.5								
Lab Experiment I (P1)	2	20	20	5	5											
Lab Experiment II (P2)	4	20		5				5								
Lab Experiment III (P3)	5	20		5				5								
Lab Experiment IV (P4)	6	20		5		5										
Total Course Works				40	8.3	15.8		15.8	0	0	0	0	0	0	0	0
Final Exam				60	12	24		24								
Total Marks				100	20.3	39.8		39.8	0	0	0	0	0	0	0	0

Assessment Planning _ Exam

Sample EEAC Form (006)

Semester - II (2014-2015)	Course Code - ChE 31012
Course Name - Fluid Mechanics	
Lecturer/ Coordinator Name -	
% of Final Exam from Total Assessment - 60	Time - 3 hr
Examination Instruction - Attempt all questions.	

Question No	CO	Graduate Attributes			% Total	Time, min	Moderator's/ Panel Comments
		GA1	GA2	GA4			
Question 1	2	20			20	35	
Question 2	3		20		20	35	
Question 3	4			20	20	35	
Question 4	5			20	20	35	
Question 5	6		20		20	40	
Total Marks Upon 100%		20	40	40	100	180	Moderator's Name -
Total Marks Upon 60%		12	24	24	60		

Assessment Contribution

Sample

EEAC Form (007)

					CO Distribution							GA Distribution			
					Solve problems related to manometers and decanters using the principles of fluid statics.	Determine boundary layer flows and turbulent flows.	Solve fluid flow problems with the application of the momentum and energy equations.	Analyze frictional flow in pipes and piping networks.	Analyze fluid flow in chemical engineering equipment including packed beds.	Apply different types of flow meters, valves, pumps and compressors in fluid transportation.	Total	Engineering Knowledge	Problem Analysis	Investigation	Total
NO	ASSESSMENT ITEMS	Full Marks	%	Fraction	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6		GA 1	GA 2	GA 4	
1	Assignment I (A1)	20	3.33	0.03		100					100	100			100
2	Assignment II (A2)	20	3.33	0.03			100				100		100		100
3	Assignment III (A3)	20	3.33	0.03				100			100			100	100
4	Tutorial I (T1)	20	5.0	0.05	100						100		100		100
5	Tutorial II (T2)	20	5.0	0.05			50	50			100		50	50	100
9	Lab Experiment I (P1)	20	5.0	0.05		100					100	100			100
10	Lab Experiment II (P2)	20	5.0	0.05				100			100			100	100
11	Lab Experiment III (P3)	20	5.0	0.05					100		100			100	100
12	Lab Experiment IV (P4)	20	5.0	0.05						100	100		100		100
17	Q1	20	12	0.12		100					100	100			100
19	Q2	20	12	0.12			100				100		100		100
21	Q3	20	12	0.12				100			100			100	100
23	Q4	20	12	0.12					100		100			100	100
26	Q5	20	12	0.12						100	100		100		100
	TOTAL		100		5.0	20.3	17.8	22.8	17.0	17.0	100	20.3	39.8	39.8	100
					CO CONTRIBUTION							GA CONTRIBUTION			

Assessment Process - Developing

SMK 4542 : SHIP DESIGN III : REPORT ASSESSMENT FORM

PROJECT NO :			**SEM :**			
PROJECT TITLE :			**SESSION :**			
GROUP NO :			**EXAMINER :**			
NO	**ASSESSMENT CRITERIA**	**PO**	**%**	**SCORE** *(1 - 10)*	**MARK**	**COMMENT**
A : REPORT ORGANIZATION			***10***			
1	All deliverable contents included	PO 6	3			
2	Professional report layout and organizaton	PO 6	4			
3	Contents are sequenced appropriately	PO 6	3			
B : TECHNICAL CONTENT			***75***			
1	Executive summary is clearly written	PO 6	5			
2	Introduction is relevant to report content	PO 6	7			
3	Aims / Objectives of report written clearly and precisely	PO 6	5			
4	Theoritical Background / Basic Concept Incuded	PO 2	5			
5	Calculation Procedure written clearly step by step	PO 2	10			
6	Example of calculation is given and relavent	PO 2	5			
7	Calculation done completely and accurately	PO 2	8			
8	Result presented in professional format	PO 2	5			
9	Discussion of result is relevant and valid	PO 2	5			
10	Suggetion for improvemnt is discussed	PO 4	5			
11	Conclusion of report written clearly	PO 6	5			
12	Reference included and cited in the report	PO 10	5			
13	All relevant details are shown in Appendixes	PO 2	5			
C : LANGUAGE			***15***			
1	Smooth flow of thought and easy to understand	PO 6	5			
2	Proper use of terms and symbols	PO 6	5			
2	Proper used of words and grammer	PO 6	5			
TOTAL			**100**			

OVERALL COMMENT :	**FINAL MARK**	**SIGNATURE**

Assessment Process - Developing

EXAMPLE OF ASSESSMENT RUBRIC

NO	SCALE	0 - 3	4 - 5	6 - 7	8 - 10
	CRITERIA	FAIL	PASS	GOOD	EXCELLENT
1	***CONTENTS***	Not relevant, Outdated, not appropriate to the audience	Only part of the content relevant, some information were outdated, not fully addressing audience need	Most content were relevant, up to date but may not fully addressing audience specific need	All contents were relevant, up to date, specific to audience need
2	***SLIDES***	No or poorly prepared slides, text and pictures can not be understood, wrongly sequenced, no animation at all	Slides prepared half hazardly, some font, text and background colour were not appropriate, minimun diagram/pictures, some slides not properly sequence, no animation or additional features	Most font, text size, and background colour are appropriate, relevant diagrams /pictures included, approriately sequence, partly animated but no additional features	Appropriate Font, size and text and background colour, Relevant and clear diagram/picture, properly sequence, Animated appropriately, has some additional features
3	***SPELLING & GRAMMAR***	Frequently used poor or wrong sentence, term and caption, too many spelling and grammar mistakes	Some of the sentence, term and caption [illegible] several [illegible] are ou[illegible] not consistent, not properly formatted	Sentence, term and caption mostly appropriate, minimum spelling and grammar mistakes	Use appropriate sentence, term and caption, correct spelling and perfect grammar
4	***REFFERENCES / SOURCES***	No or very little references and outdated and not properly cited and formatted	Not enough dated, ci[illegible] not properly formatted	Adequate references, some may not up to date, correctly cited and formatted	More than adequate references, up to date, properly cited, correct format
5	***DELIVERY***	Cant hear properly, no eye contact at all, restless audience, late and poor time management	Loud but may not be very clear, some eye contact, low audience attention, time not properly managed	Loud and clear, some eye contact, retain part of audience attention, good time management.	Loud and clear presentation, good eye contact, able to fully retain audience attention, good time management.
6	***APPEARENCES***	Dressed poorly, ill mannered, little or no greeting, late	Dressed casually, fairly mannered, greeting and last minute appearance	Dressed appropriate to occasion with same level to audience, good mannered, greeting and punctual	Dressed appropriate to occasion and one level above audience, well mannered, adequate greeting, punctual.
7	***QUESTION & ANSWER***	Not answering the question or wrongly answer, don't understand the question at all, raised unnecessary argument, rude	Listen but not fully understood the question, answer partly correct, no rude argument	Listen to and understood the question, answer correctly but longer than necessary, polite	Listen tentatively, understood the question correctly, answer correctly and precisely, express argument politely

Assessment Process-Collecting Detail Data

Assessment Process – Collecting Data

NAMA (Dengan Huruf Besar)	
NO. KP.	870711710587
KOD & NAMA MATA PELAJARAN	SHIP PRODUCTION TECHNOLOGY (SMK 2722)
KUMPULAN KULIAH/SEKSYEN	01
NAMA PENSYARAH	HJ YAHYA B SAMIAN
TARIKH PEPERIKSAAN	27/04/08
TEMPAT PEPERIKSAAN	MPI

ARAHAN KEPADA CALON

1. **Isikan** butir-butir di atas dengan terang dan mudah dibaca.
2. Tuliskan jawapan di **kedua-dua mukasurat buku** kertas jawapan.
3. Mulakan sesuatu jawapan bagi setiap soalan di muka yang baru.
4. Tuliskan **nombor kad pengenalan dan nombor soalan** di sebelah atas setiap **muka kertas jawapan.**
5. Semua jawapan termasuk kerja-kerja percubaan mesti dibuat di kertas jawapan.
6. **Bulatkan** nombor-nombor soalan yang dijawab di dalam ruangan yang disediakan di petak sebelah kanan.
7. **Mustahak:** Ikatkan semua buku kertas jawapan dan kertas tambahan mengikut susunan nombor soalan yang anda jawap.
8. Dilarang **membawa keluar** buku kertas jawapan dan kertas tambahan yang telah digunakan atau yang belum digunakan, dari Bilik Peperiksaan.

Soalan	UNTUK KEGUNAAN PEMERIKSA SAHAJA Markah
1	A - 21
2	
3	B - 20
4	
5	C - 14
6	
7	D - 2
8	
9	
10	
11	
12	
JUMLAH	57

SECTION A

Question 7.

- Malaysia need own shipbuilding industry because:

1) to ~~reduce~~ reduce the dependency to the ~~fore~~ foreign ship
2) to ~~supp~~ provide local transportation.
3) To provide job opportunity
4) As military reason : strategy
5) source of foreign exchange

Question 8

- Welding is one of type in joinning ~~method~~

- The type of welding normally used:

i) Shield Metal Arc (SMA)
ii) Gas tungsten Arc (GTA)
iii) Gas Metal Arc (GMA)
iv) Plasma Welding (PAW)
v) Submerged Arc Welding (SAW)

Assessment Process – Collecting Data

QUESTION 1 [25 MARKS]

a) State the general definition of Technology and gives example how this definition applied in shipbuilding Industry

Techno is mean software like managing, planning and scheduling. logy means hardware like tools and machines. In shipbuilding industry, we need proper managing, planning and other soft skills. Besides, tools like cutting tools, and machines also important in shipbuilding industry.

2½

[3 Marks]

b) List down four (4) of the Nature of Shipbuilding Industry.

i. One off or tailor made

ii. Heavy industry

iii. Large investment but low profit

iv. Need a lot of supporting industries.

1½

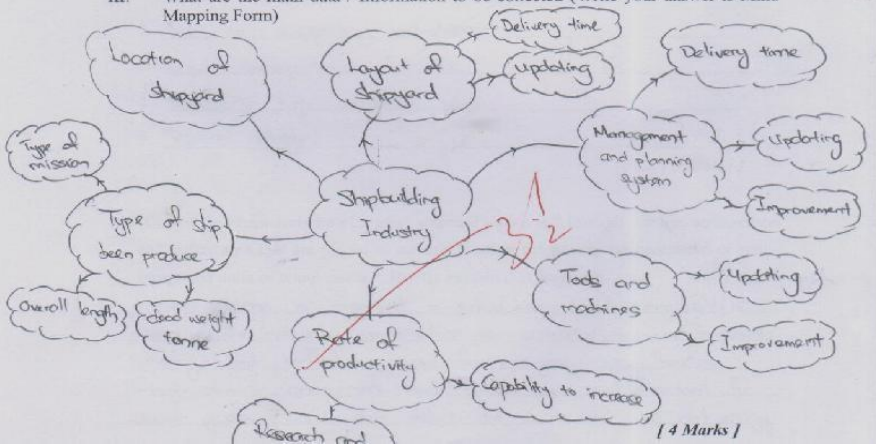
[2 Marks]

c) One of the importance of shipbuilding industry is " *to reduce nation's dependency on foreign ships that is owned and operated by foreign nations. This is inline with the independence status of each country* ". Briefly explain this statement.

As an independent country, we should have our own shipbuilding industry to provide marine transportation and also sea defence. Besides, we can reduce the operation cost if we have our own ship or the ship is operated by our country. Other than that, marine transportation can operated continuously during war if we own or operate owned ship. Lastly, it can be one way to increase income of our country.

1½

iii. What are the main data / Information to be collected (Write your answer is Mind Mapping Form)



3½

[4 Marks]

Assessment Process – Collecting Data

UNIVERSITI TEKNOLOGI MALAYSIA
FACULTY OF MECHANICAL ENGINEERING
FINAL EXAMINATION
SEMESTER II, SESSION 2008/2009

COURSE CODE	: SMK 2722/SZL 3702
COURSE NAME	: SHIP PRODUCTION TECHNOLOGY
PROGRAMME	: SMK/SZL
DURATION	: 3 HOURS
DATE	: APRIL/MAY, 2009

INSTRUCTION TO CANDIDATES:

1. CHOOSE 3 QUESTIONS FROM QUESTION 1 TO 4 AND ANSWER QUESTION 5.
2. ALL ANSWER MUST BE WRITTEN IN THE BLANK SPACE GIVEN IN THE EXAMINATION PAPER.

Circle the attempted questions	To be filled by the examiner
(1)	
(2)	
3	
(4)	
(5)	
6	
7	
8	
9	
10	

Assessment Process-Calculating

Calculating_ Course Work

***** Criterion 2 - GAs***

Sample

EEAC Form (008)

ChE 31012 Fluid Mechanics

	Assessment	A1	A2	A3	T1	T2		P1	P2	P3	P4	
	Date				2.1.15							
	GA	1	2	4	2	4	2	1	4	4	2	
	CO	2	3	4	1	4	3	2	4	5	6	
	FULL MARK	20	20	20	20	10	10	20	20	20	20	
	PERCENTAGE	3.3	3.3	3	5.0	2.5	2.5	5	5	5	5	40
	Calculation	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	

NO	STUDENT ID	SCORE										TOTAL	TOTAL (40%)
1	III.ChE-1	20	19	18	14	10	3	19	18	17	15	153	33
2	III.ChE-2	20	20	20	20	10	3	19	18	17	15.5	162.5	36
3	III.ChE-3	18	20	19	20	10	3	18	18	17	15	158	35
4	III.ChE-4	18	19	20	20	6	3	17	17	16.5	14.5	151	33
5	III.ChE-5	18	20	20	20	10	1	19	18	17	14	157	34
6	III.ChE-6	20	20	19	16	10	3	19	18	16.5	15	156.5	34
7	III.ChE-7	18	19	10	20	8	2	17	18	17	15	144	32
8	III.ChE-8	16	20	15	19	10	2	18	18	16.5	15	149.5	33
9	III.ChE-9	15	0	12	0	4	0	16	17	15.5	15	94.5	21
10	III.ChE-10	17	20	0	9	9	1	17	17	15.5	13.5	119	27
11	III.ChE-11	10	10	12	0	9	0	18	15	14.5	13.5	102	23
12													
13													
14													
15													
16													
17													
18													
19													
20													

Calculating_ Exam

*** Criterion 2 - GAs*

Sample

EEAC Form (009)

ChE 31012 Fluid Mechanics

	Assessment	Q1	Q2	Q3	Q4	Q5	
	Date	25-9-2015					
	GA	1	2	4	4	2	
	CO	2	3	4	5	6	
	FULL MARK	20	20	20	20	20	100
	PERCENTAGE	12	12	12	12	12	60
	Calculation	0.6	0.6	0.6	0.6	0.6	

NO	STUDENT ID	SCORE					TOTAL (100%)	TOTAL (60%)
1	III.ChE-1	20	20	10	17	19	86	52
2	III.ChE-2	20	19	6	13	20	78	47
3	III.ChE-3	20	19	6	14	19	78	47
4	III.ChE-4	19	17	5	17	16	74	44
5	III.ChE-5	20	19	7	9	17	72	43
6	III.ChE-6	2	14	3	12	17	48	29
7	III.ChE-7	20	19	4	12	19	74	44
8	III.ChE-8	17	15	2	10	2	46	28
9	III.ChE-9	13	12	4	1	2	32	19
10	III.ChE-10	15	7	3	9	3	37	22
11	III.ChE-11	14	7	3	6	1	31	19

Sample

** Criterion 2 - GAs

EEAC Form (010)

ChE 31012 Fluid Mechanics

	Assessment	A1	A2	A3	T1	T2		P1	P2	P3	P4	Q1	Q2	Q3	Q4	Q5	
	Date											25.9.15					
	GA	1	2	4	2	4	2	1	4	4	2	1	2	4	4	2	
	CO	2	3	4	1	4	3	2	4	5	6	2	3	4	5	6	
	FULL MARK	20	20	20	20	10	10	20	20	20	20	20	20	20	20	20	
	PERCENTAGE	3.3	3.3	3.3	5	2.5	2.5	5	5	5	5	12	12	12	12	12	100
	Calculation	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6	

NO	STUDENT ID	SCORE															TOTAL	GRADE
1	III.ChE-1	20	19	18	14	10	3	19	18	17	15	20	20	10	17	19	85	A+
2	III.ChE-2	20	20	20	20	10	3	19	18	17	15.5	20	19	6	13	20	82	A+
3	III.ChE-3	18	20	19	20	10	3	18	18	17	15	20	19	6	14	19	81	A+
4	III.ChE-4	18	19	20	20	6	3	17	17	16.5	14.5	19	17	5	17	16	77	A+
5	III.ChE-5	18	20	20	20	10	1	19	18	17	14	20	19	7	9	17	78	A+
6	III.ChE-6	20	20	19	16	10	3	19	18	16.5	15	2	14	3	12	17	63	B+
7	III.ChE-7	18	19	10	20	8	2	17	18	17	15	20	19	4	12	19	76	A+
8	III.ChE-8	16	20	15	19	10	2	18	18	16.5	15	17	15	2	10	2	61	B+
9	III.ChE-9	15	0	12	0	4	0	16	17	15.5	15	13	12	4	1	2	41	C-
10	III.ChE-10	17	20	0	9	9	1	17	17	15.5	13.5	15	7	3	9	3	49	C+
11	III.ChE-11	10	10	12	0	9	0	18	15	14.5	13.5	14	7	3	6	1	41	C-
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
																Class Average	67	

Grade	Mark	No. of student	% (Nos)
A+	75	6	55%
A	70	0	0%
A-	65	0	0%
B+	60	2	18%
B	55	0	0%
B-	50	0	0%
C+	45	1	9%
C	42	0	0%
C-	40	2	18%
D	<40	0	0%
		11	

CO Student Achievement

No.	Student ID	CO1			CO2			CO3			CO4			CO5			CO6		
		Mark Distribution	Student Achievement	CO1 Grade	Mark Distribution	Student Achievement	CO2 Grade	Mark Distribution	Student Achievement	CO3 Grade	Mark Distribution	Student Achievement	CO4 Grade	Mark Distribution	Student Achievement	CO5 Grade	Mark Distribution	Student Achievement	CO6 Grade
		5	100		20.3	100		17.8	100		22.8	100		17.0	100		17.0	100	
1	III.ChE-1	3.5	70	A	20.1	99	A+	15.9	89	A+	16.0	70	A	14.5	85	A+	15.2	89	A+
2	III.ChE-2	5	100	A+	20.1	99	A+	15.5	87	A+	13.9	61	B+	12.1	71	A	15.9	93	A+
3	III.ChE-3	5	100	A+	19.5	96	A+	15.5	87	A+	13.7	60	B+	12.7	74	A	15.2	89	A+
4	III.ChE-4	5	100	A+	18.6	92	A+	14.1	79	A+	12.1	53	B-	14.3	84	A+	13.2	78	A+
5	III.ChE-5	5	100	A+	19.7	97	A+	15.0	84	A+	14.5	64	B+	9.7	57	B	13.7	81	A+
6	III.ChE-6	4	80	A+	9.3	45	C+	12.5	70	A	11.9	52	B-	11.3	67	A-	14.0	82	A+
7	III.ChE-7	5	100	A+	19.2	95	A+	15.1	84	A+	10.6	46	C+	11.5	67	A-	15.2	89	A+
8	III.ChE-8	4.75	95	A+	17.3	85	A+	12.8	72	A	10.7	47	C+	10.1	60	B+	5.0	29	D
9	III.ChE-9	0	0	D	14.3	70	A	7.2	40	C-	9.6	42	C	4.5	26	D	5.0	29	D
10	III.ChE-10	2.25	45	C+	16.1	79	A+	7.8	44	C	8.3	36	D	9.3	55	B	5.2	30	D
11	III.ChE-11	0	0	D	14.6	72	A	5.9	33	D	9.8	43	C	7.2	43	C	4.0	23	D

Grade	Mark	CO1		CO2		CO3		CO4		CO5		CO6	
		No. of student	% (Nos)	No. of student	% (Nos)	No. of student	% (Nos)	No. of student	% (Nos)	No. of student	% (Nos)	No. of student	% (Nos)
A+	75	7	64%	8	73%	6	55%	0	0%	2	18%	7	64%
A	70	1	9%	2	18%	2	18%	1	9%	2	18%	0	0%
A-	65	0	0%	0	0%	0	0%	0	0%	2	18%	0	0%
B+	60	0	0%	0	0%	0	0%	3	27%	1	9%	0	0%
B	55	0	0%	0	0%	0	0%	0	0%	2	18%	0	0%
B-	50	0	0%	0	0%	0	0%	2	18%	0	0%	0	0%
C+	45	1	9%	1	9%	0	0%	2	18%	0	0%	0	0%
C	42	0	0%	0	0%	1	9%	2	18%	1	9%	0	0%
C-	40	0	0%	0	0%	1	9%	0	0%	0	0%	0	0%
D	<40	2	18%	0	0%	1	9%	1	9%	1	9%	4	36%
		11		11		11		11		11		11	

		CO1	CO2	CO3	CO4	CO5	CO6
A	A+,A,A-	73%	91%	73%	9%	55%	64%
PASS	>B-	73%	91%	73%	55%	82%	64%
FAIL	<B-	27%	9%	27%	45%	18%	36%

GA Student Achievement

No.	Student ID	GA1		GA2		GA3		GA4	
		Mark Distribution	Student Achievement	Mark Distribution	Student Achievement	Mark Distribution	Student Achievement	Mark Distribution	Student Achievement
		20.3	100	39.8	100			39.8	100
1	III.ChE-1	20.1	99	34.6	87			30.4	76
2	III.ChE-2	20.1	99	36.4	91			26.0	65
3	III.ChE-3	19.5	96	35.6	89			26.4	66
4	III.ChE-4	18.6	92	32.3	81			26.4	66
5	III.ChE-5	19.7	97	33.7	85			24.2	61
6	III.ChE-6	9.3	45	30.4	76			23.3	58
7	III.ChE-7	19.2	95	35.2	88			22.0	55
8	III.ChE-8	17.3	85	22.5	57			20.8	52
9	III.ChE-9	14.3	70	12.2	31			14.1	35
10	III.ChE-10	16.1	79	15.2	38			17.6	44
11	III.ChE-11	14.6	72	9.8	25			17.0	43
Average GA Achievement		**84**			**68**				**57**

Assessment Process- Analyzing and Improvement

Sample EEAC Form (011)

ChE 31012 Fluid Mechanics

Grade Distribution	A+	A	A-	B+	B	B-	C+	C	C-	D
% (Nos)	55%	0%	0%	18%	0%	0%	9%	0%	18%	0%
Overall Mean: **Class Average : 67**										

Course Outcomes achieved by the Students

CO	KPI	A	PASS	FAIL	COMMENT
CO 1	Excellent: 100% Pass with minimum 20%A, Good: More than 80% Pass, Fair: More than 60% Pass, Bad: More than 40% Fail	73%	73%	27%	Fair
CO 2		91%	91%	9%	Good
CO 3		73%	73%	27%	Fair
CO 4		9%	55%	45%	Bad
CO 5		55%	82%	18%	Good
CO 6		64%	64%	36%	Fair

Achievement

** Criterion 2 – GAs

Sample EEAC Form (014)

ChE 31012 Fluid Mechanics

OVERALL GA ANALYSIS

	Engineering Knowledge	Problem Analysis	Design/ Development of Solutions	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Life-long Learning	Project Management and Finance
	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
GA - MAPPING	C2	C3		C4								
GA - MARK DISTRIBUTION	20.3	39.8		39.8								
GA - STUDENT ACIEVEMENT	84	68		57								

KPI : Above 60% GA Achievement

STUDENT ACHIEVEMENT

Comment 1 :

GA 1: Achieved KPI. Good performance on Engineering Knowledge.

GA 2: Achieved KPI. Student need to be practised more on problem analysis.

GA 4: Below KPI. Student still lack of effort in investigation ability for frictional fluid flow and fluid flow through packed bed.

Comment 2 :

On overall anlysis - Relatively good achievement.

GA IMPLEMENTATION

Comment 1 :

GA4 had been assessed accordingly with the appropriate degree of emphasis.

SUGGESTION FOR IMPROVEMENT

1. Give more emphasis (more exercise) on problem analysis (GA2).
2. More (exercises and examples) on investigation ability (GA 4).

Assessment Process – Improvement

(Reflection)

Describe to what extend the course has contributed towards the achievement of the programme outcomes (Please state the performance criteria or achievement level and	In general students are able to perform and deliver the design work according to the standard requirements. They are able to plan and manage the project well and delivered within time stipulated. Good in report writing and excellent in Team working. However they are still very poor in critically thinking and still lacking in their ability to seek additional knowledge / information from other sources other than the lecture's note - something that are quite worrying for final year students
Reflections Please include the analysis of data, areas of improvement and action plan to be taken at course or programme level.	The students, in general are quite good in performing and delivering the design job if they are coached properly. They can work in team effectively if you give the opportunity. The only worrying me is their lack of ability in Critical thinking and life long learning. These two skills are essential to make them a better employee / person in future. I need to create ways of enhancing these abilities in future.

Assessment Process – Improvements

Table 3: PO attainment for all courses taken in **Semester 2, Session 08/09** for the SMK programme

No	Course	Course Name	Technical				Generic Skill						
			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1			87.0	86.0									
2			83.9	73.2									
3			66.7	68.7				74.1					
4			74.7	78.7									
5			54.7	60.0	100.0								
6			71.0	65.0	68.0			71.0		77.0			
7			60.0	66.5	46.8	46.7	79.7	69.2	53.7	51.2		39.6	81.3
8			74.9	75.9	68.0		87.3	66.6	75.3	76.0			87.3
9			66.6	78.2	27.8								
10			66.0	73.0	10.0		95.0		95.0				
11			76.0	59.8	83.8								84.0
12			52.8	50.2	43.2								
13			71.2	59.4	49.4								90.0
14			66.7	65.3	72.9								
15				72.7	70.8	71.9	74.2	72.9	69.3	71.8		73.7	
16			65.9	64.3	64.6	68.5	69.4	67.6	58.1			60.7	67.6
17											71.5		
18			79.0	40.1									
19			63.5	63.5	65.2	67.8	68.8	64.9	60.4			64.3	69.3
20				72.0	72.0	72.0		72.0					72.0
		Average (%)	68.9	67.0	60.2	55.3	79.1	69.8	68.6	69.0	71.5	59.6	78.8

Mapping of PEO and GAs

***** Criterion 2 – GAs***

Sample EEAC Form (012)

Mapping of Programme Objectives (PEO) and Graduate Attributes (GAs)

Programme - _____

Graduate Attributes (GAs)

		Tex Level	
1	Engineering Knowledge	Cognitive	Acquire and apply fundamental knowledge of science, engineering and mathematics, with an engineering focus in solving complex engineering problems.
2	Problem Analysis	Cognitive	Apply first principles of mathematics, natural and engineering sciences to identify, study, formulate and evaluate complex engineering problems based on systematic approach and leading to authenticated conclusions.
3	Design / Development of Solutions	Cognitive	Devise solutions for complex engineering problems and design systems, components or processes by taking into consideration cost-effectiveness and specific concerns for public health, safety and environment.
4	Investigation	Cognitive	Make use of research based knowledge and methodology through critical thinking to interpret, analyse, and study complex engineering problems, designs and operational performances to reach convincing conclusions.
5	Modern Tool Usage	Psychomotor	Apply original engineering techniques and state of the art engineering and IT resources to model, simulate and analyse complex engineering problems within the relevant constraints and range of validity.
6	The Engineer and Society	Affective	Apply appropriate knowledge in the evaluation and assessment of subject matters pertinent to the professional engineering practice with considerations of public health and safety, community welfare and cultural perspectives as well as legal, moral and ethical responsibilities.
7	Environment and Sustainability	Affective	Recognise the significance of sustainable development when devising professional solutions to engineering problems with a clear understanding and pro-active considerations of environmental concerns as well as needs for eco-friendly continual growth for local and global community.
8	Ethics	Affective	Apply professional virtues and principles with strong commitment to moral and ethical responsibilities during the course of engineering practice.
9	Individual and Team Work	Affective	Demonstrate the ability to convey ideas and information effectively within the engineering profession and the general community when addressing complex engineering issues and activities, including unambiguous interpretation of data and instructions, enlightening oral presentations and writing skills evident in accurate documentation of designs and solutions.
10	Communication	Affective	Display capability to work competently in the context of a diverse team within multidisciplinary environment, as an individual member with teamwork fortitude or as an inspiring leader with effective management skills.
11	Life-long Learning	Affective	Recognize the need to take on independent life-long learning and continuous self improvement in the context of scientific and engineering advancement and professional development.
12	Project Management and Finance	Affective	Show capability to comprehend and apply engineering and management philosophy to manage projects of in cross disciplinary content, as a member or a leader in a team realising the importance of cost-effective design and solution for sustainable development.

	Graduate Attributes (GAs)												Total Contributions	(%)Achievement	Achievement (Pass/Fail)*
	1	2	3	4	5	6	7	8	9	10	11	12			
PEO1	1	1	1	1	1								5	82.2%	Pass
PEO2									1	1		1	3	28.0%	Fail
PEO3						1	1	1			1		4	21.8%	Fail
	77.4%	84.0%	81.9%	84.0%	84.0%	87.1%	0.0%	0.0%	84.0%	0.0%	0.0%	0.0%			

Mapping of Mission and Programme Objectives (PEO)

**** Criterion 1– PEOs**

MISSION

To educate and train students systematically to become engineers, specialists and researchers who

1 Universal values in our beliefs
2 Tenacity in overcoming challenges
3 Agility in facing new frontiers
4 Responsibility in pursuit of excellence

Programme Objectives (PEO)

1 Graduates competent in practising fundamental scientific and engineering principles in civil engineering profession in a creative and innovative manner.
2 Graduates capable of communicating and managing effectively in diverse areas of civil engineering.
3 Graduates practising professional ethics, life-long learning, and sustainable development for the betterment of the profession and society.

	Programme Educational Objectives (PEOs)			Total Contributions	(%) Achievement	Achievement (Pass/Fail)*
	PEO 1	PEO 2	PEO 3			
Mission 1	1			1	82.2%	Pass
Mission 2		1		1	28.2%	Fail
Mission 3		1		1	28.2%	Fail
Mission 4			1	1	21.8%	Fail
	82.2%	28.0%	21.8%			

Assessment Process-Documentation

***** Criterion 3– Academic Curriculum***

Assessment Process – Documentation

Example of Course File Contents

COURSE PORTFOLIO - PROPOSED

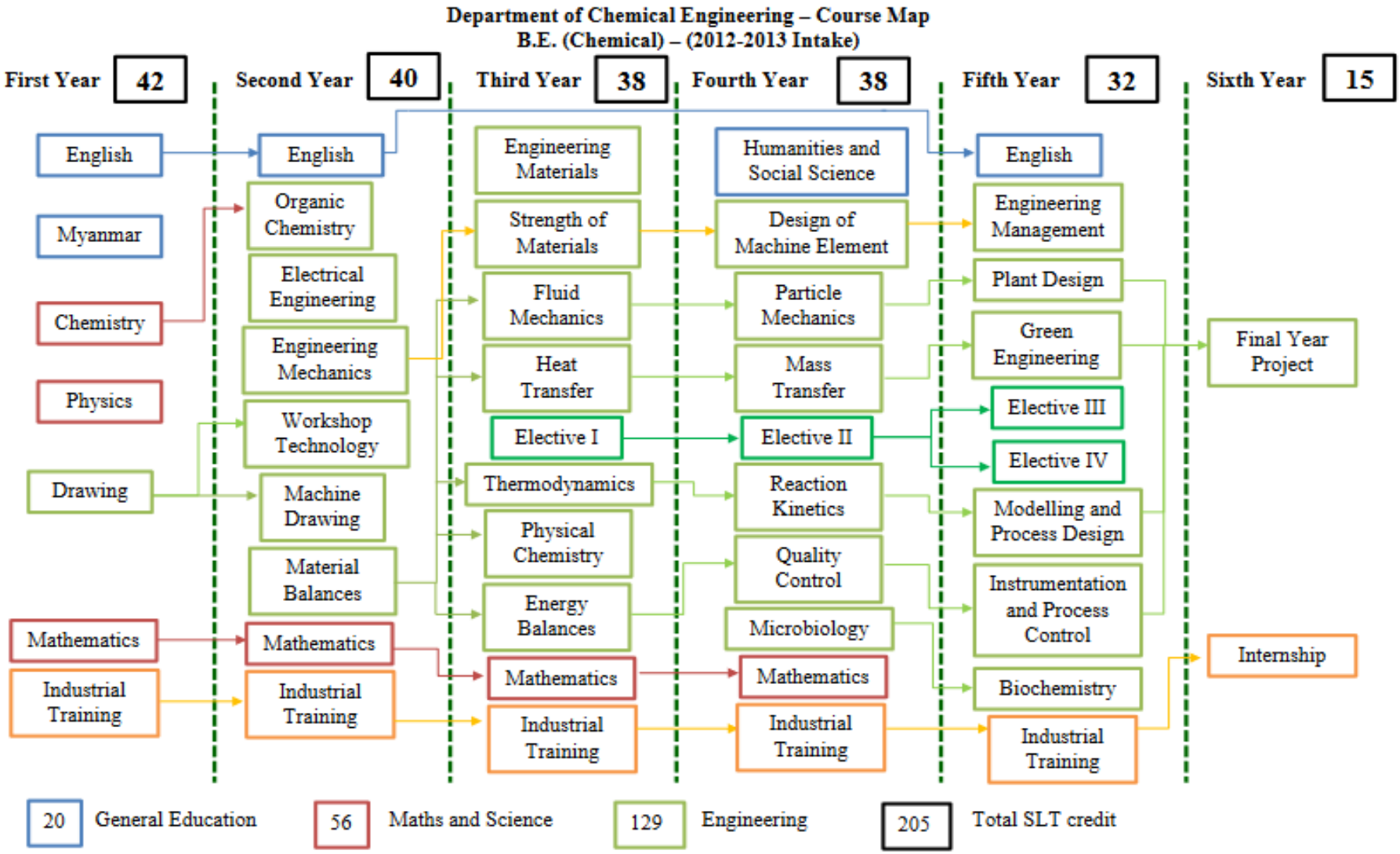
Purpose : To provide a complete, systematic, consistent and integrated document related to the contents, teaching and learning methods and assessment methods of a course offered in a particular programme.
Justification : To be used as part of accreditation documents. Continuous improvement process. Reference / guidelines for new lecturer.
Preparation : Lecturer who teach the course (If more than one lecturers involved, a coordinator need to be appointed)
Storage : All information should be kept in one file and the fail should be kept in the Head of Department office.
Monitoring : Head of Department / Head of Panel
Confidentiality : Materials compiled in the portfolio must be treated as confidential documents to the outside parties.

NO	CONTENTS	DETAILS	PURPOSE / JUSTIFICATION
1	COVER PAGE	Showing course name and code, Programme title, Department / Field, Faculty / University and Year	Indicating a complete and integrated information of a course
2	TABLE OF CONTENTS	Table of contents	Provide easy way for checking. Every content should be separated by a separator page.
3	CURRICULUM	Table of Curriculum that is used for the programme. The course should be highlighted.	Showing the overall courses offered in the curriculum
4	SYLLABUS (L1)	Syllabus (L1) used in the program curriculum.	Detail and clear information related to course learning outcomes, course contents, and assessment methods.
5	CLO – PLO MAPPING	Mapping of CLO to PLO	Showing how course learning outcomes are connected / contributing to Programme Learning Outcomes.

Assessment Process – Documentation

6	LECTURER / INSTRUCTOR	Name(s) and Brief CV of the lecturer (s) teaching the course (May be more than one). CV focus on Academic Qualification, Teaching Experience and T&L research / Contribution. Latest Photo may be included.	Provide evidence on Lecturer's qualification, experience and contribution in Teaching.
7	TEACHING STRATEGY (L2)	Weekly / by Topic / One Session Teaching Strategy	Provide detail information regarding T & L activities and Implementation of Generic Skills.
8	TEACHING MODULE / NOTES / TEXT BOOKS / ADDITIONAL REFERENCES	Lecture Notes, Module, Text Book / Reference Books (For Books, only the Title Page are required)	Provide evidence on the appropriateness of the note and books to the syllabus of the course.
9	COURSE WORKS	Questions and answers / marking Scheme for Tests, Assignments, Projects, Quizzes, Tutorials etc.	Showing the content of course works and method of assessment is in line with the CLO. Also indicating that the assessment is done systematically and fairly.
10	FINAL EXAM	Final Examination Questions, Answer & Marking Scheme, and selected students answer scripts.	Provide evidence on the quality of examination questions that is in line with CLO and the assessment was done fairly and consistently.
11	ASSESSMENT FORM FOR FINAL EXAM AND COURSE WORKS	Assessment / Checking Form on the examination questions and course works– bloom's level and its percentages. Used by Head of Panel and moderator.	Evidence showing that all examination questions and course had undergone checking and assessment process as to ensure that all assessment for each course is inline with the course CLO.
12	ANALYSIS AND FEED BACK SURVEY	Exit survey, feedback, self assessment and reflection on the T & L process of the course.	Showing that a system of feedback is being implemented.
13	CONTINUOUS IMPROVEMENT	Effort and Suggestion for continuous improvement for the course.	Showing that a continuous improvement system is in place.
14	ADDITIONAL INFORMATION	Any information (documentation, paper etc) related to T & L of the course.	Indicating addition effort, references that help the improvement of T & L process.

Curriculum Sequencing



**** Criterion 3 – Academic Curriculum**

No.	Course Information
1.	Course Code: UEMX4913 Name of Course: Integrated Design Project
2.	Synopsis: This course provides an understanding on design of general civil infrastructure systems. It enables students to apply the knowledge gained from related design subjects to execute design of civil and structural elements in a housing/ buildings project.
3.	Name(s) of academic staff: Lee Min Lee (PhD, BEng(Hons) Civil Engineering), Ling Lloyd (PhD, BEng(Hons) Civil Engineering), Huang Yuk Feng (PhD, BEng(Hons) Water Resources Engineering), Koo Chai Hoon (PhD, BEng(Hons) Civil Engineering), Lau See Hung (PhD, BEng(Hons) Civil Engineering), Woon Yoke Bee (MSc, BEng(Hons) Civil Engineering), Lee Khia Min (PhD, BSc. Environmental Chemistry)
4.	Trimester / Year offered: T1Y4, T2Y4, T3Y4
5.	Credit Value: 3
6.	Pre-requisite / co-requisite (if any): Earned 90 credit hours
7.	Course Classification:
8.	Course Learning Outcomes (CO): Domain & Taxonomy Level[1] CO1 - Design a civil engineering project by taking into consideration of cost-effectiveness, practicality, and environment. C6 CO2 - Apply appropriate knowledge learnt from previous courses into an integrated design project that satisfies the requirements of public health and safety, environment, and authority regulations. A3 CO3 - Use appropriate techniques with the aid of computing tools for solving complex civil engineering problems. P4 CO4 - Demonstrate the ability to present the project outcomes through oral presentation. A2 CO5 - Recognise the needs of life-long learning through attending technical talks and site visits. A1

[1]Domain and Taxonomy Level – Cognitive (C), Level 1 - 6; Affective (A), Level 1 - 5; Psychomotor (P), Level 1 - 5

9. Mapping of the Course Learning Outcomes to the Programme Outcomes, Teaching Methods and Assessment:

CO	Programme Outcomes (PO)												Teaching Methods[2]	Assessment[3]
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		
CO1			1										L/P	A/Te
CO2						1							L/P	A
CO3					1								L/P	A
CO4									1				P	Pre
CO5											1		O	O
#REF!														

*Other Teaching Methods: Talk & Site Visit

*Other Assessment Methods: Attending records of talk & site visit

[2] L = Lecture, T = Tutorial, P = Practical, O = Others

[3] Te = Test, Q = Quiz, A = Assignment, P = Practical, Pre = Presentation, CaS = Case Study, FE = Final Exam, O = Others

10. Transferable Skills (if applicable):
(Skills learned in the course of study which can be useful and utilized in other settings)

Programme Structure

Programme - _____

** Criterion 3– Academic Curriculum

		Y1		Y2		Y3		Y4		Y5		Y6		
UNIT CODE	UNIT DESCRIPTION	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	Pre-requisite
UECM1653	Mathematics for Engineering I	3												
UEEA1243	Circuit Theory	3												
UEEA1313	Basic Electronics	3												
UECS1643	Fundamentals of Programming	3												
UEEN1043	Object-Oriented Concepts and Programming Techniques			3										UECS1643
UEEA1453	Power Systems Analysis				3									UEEA2433
UECM1723	Mathematical Techniques for Engineering		3											UECM1653
UEEA1323	Digital Electronics			3										
UECM1713	Mathematics for Engineering II				3									UECM1653
UEEA1253	Signals, Circuits and Systems			3										UEEA1243
UEEA1333	Analogue Electronics			3										UEEA1313
UEEA2263	Introductory Electromagnetics				3									
UEEA2283	Computer Organization and Architecture							3						UEEA1323
UEEA2634	Microprocessor and Microcontroller Systems				4									UEEA1323
UEEA2433	Electrical Machines			3										UEEA1243
UEEA2273	Electromagnetic Fields and Waves						3							UEEA2263
UEEA2543	Principles of Communication Systems					3								
UEEA2413	Process Control and Instrumentation						3							UEEA1313
UEEA2473	Power Electronics and Drives						3							UEEA1333
UEEA2663	Electrical Drives							3						UEEA2433, UEEA2473
UECM2623	Numerical Methods and Statistics									3				UECM1653
UEEA2183	Digital Signal Processing									3				UEEA1253
UEEA3423	Control Systems							3						UECM1713
UEEA3773	Power Transmission & Distribution							3						UEEA1453
UEGE3116	Industrial Training								6					Earned 60 credit hours
UEGE4118	Project										4		4	Earned 90 credit hours
UEEA4483	High Voltage Engineering										3			UEEA1453
UEEA4833	Electrical Design and Utilisation										3			UEEA1453
UEME4253	Project Management							3						
UEEA2148	Integrated Design Project									4	4			UEEA1333, UEEA2634
	Elective I: (Choose 3 subjects)*									6			3	
UEEA2223	Integrated Circuit Design													UEEA1323, UEEA1333
UEEA2343	Solid State Electronics													UEEA1313
UEEA3373	Optics and Optoelectronics													UEEA1313
UEMH4113	Automation and Robotics													UEEA3423
UEEA3363	Renewable Energy													
UEEA3993	Power Protection and Switchgear													UEEA1453, UEEA3773
UEEA3753	Transient Stability and Controls													UEEA1453
UEEA3383	Wind and Solar Power Engineering													UEEA1453, UEEA2473
UEEA4233	Power System Operation and Economics													UEEA3773
UEEA3343	Solar Cell Technology													UEEA1243
UEEA4663	Embedded System Design													UEEA2634
UEEA2353	Digital System Design													UEEA1323
UEMH4523	Micro-Electromechanical systems (MEMS)													UEEA1243
	Elective II: (Choose 1 subject)*											3		
UEMH4723	Applications of Artificial Intelligence													
UEMH4283	Automation in 4th industrial revolution													
UECM2243	Data Analysis for Business Intelligence													
UECS2233	Electronic Commerce													
	Arts & Humanities:													
~~MPU32013 / MALxxx3~~	Bahasa Kebangsaan (A) / Foreign Language				3									
~~MPU31Z3 / MPU3142~~	~~Hubungan Etnik (for local students) / Malaysian Studies/Pengajian Malaysia (for texts) students) /~~					3								
MPU32043	English for Engineering - MPU2	3					3							
UEEG2113	Law for Engineers												3	
MPU33183	Engineer in Society - MPU3												3	
UKMM1043	Basic Economics, Accounting and Management						3							
UKMM1011	Sun Zi's Art of War and Business Strategies										1			
MPU34xx2	Co-curricular - MPU4											2		
	Total (130 credit hours)	15	3	15	16	6	15	15	6	16	15	5	13	140

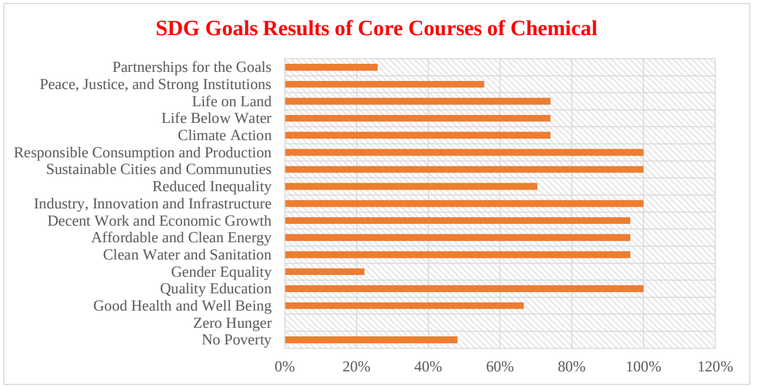
Programme - _____

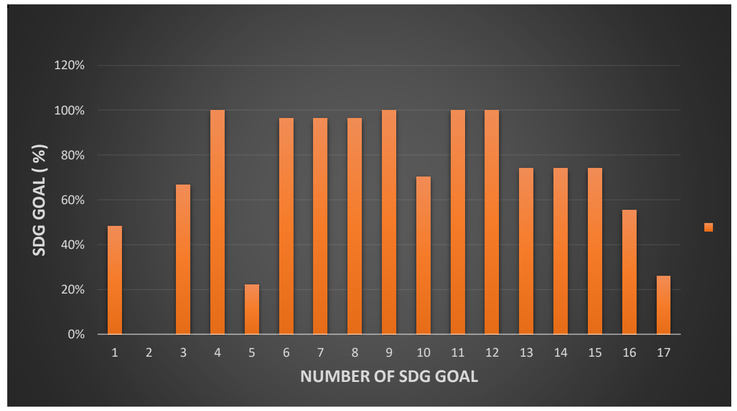
**** Criterion 3– Academic Curriculum**

No.	Code	Course / Course Outcomes	Tax Lev	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
		Graduate Attributes (GAs)		Cognitive				Psy	Affective						
1	UEMX1133	Introduction to Building Services		1	1	1				1					
		Explain the basic building service components, which include HVAC, air handling and piping, fire protection, and lift and escalat	C2	1											
		Estimate the electricity consumption, and describe the design and planning of electrical and power systems	C4		1										
		Calculate and discuss the water plumbing, stormwater drainage systems and sewerage treatment systems	C4			1									
		Evaluate the sustainability of a building through GBI	A3							1					
2	UEMX1223	Survey II			4	1		1							
		Analyse ground data spatially referenced to boundary and survey reference marks to support engineering designs of civil works	P2					1							
		Set up civil structures according to their designed horizontal and vertical parameters.	C5			1									
		Operate elementary photogrammetry and sensing systems using mathematical concepts in photogrammetry, resection, intersec	C3		1										
		Apply fundamental theory of remote sensing and sensors record and theory of electromagnetic radiation in survey works.	C3		1										
		Apply large-scale monitoring program and land use mapping in civilengineering projects.	C3		1										
		Apply and analyse Geographic Information Systems (GIS) concepts and its data sources & structure in the planning	C4		1										
3	UEMX1843	Survey I		4				1							
		Apply the principles and objectives of the setting out of new buildings and the measurement of existing buildings and land	C3	1											
		Use the equipment available; and apply the measurement techniques currently in use	P2					1							
		Operate levelling instruments commonly used in surveying, and the presentation of related recorded information	C3	1											
		Set out simple building site accurate to within agreed tolerances	C3	1											
		Design and set up the horizontal or vertical curve using different methods	C5	1											
4	UEMX2313	Structural Analysis I		2	2										
		Compute the support reactions, internal forces and stresses in statically determinate structures, arches and in-extensional cable	C3	1											
		Calculate the displacements in statically determinate structures.	C3		1										
		Construct bending moment and shear force equations, and diagrams for structural members.	C3		1										
		Determine the buckling load of a column accounting for the effects of yielding of the material and geometric imperfection.	C3	1											
5	UEMX2323	Structural Analysis II		1	4										
		Determine stresses and strains for typical structures in 2-D and 3-D states based on equilibrium equations	C3	1											
		Apply stiffness method to analyse beams, trusses and plane frames.	C4		1										
		Analyse complex and indeterminate truss and frame structures using approximation methods.	C4		1										
		Apply influence Lines technique to analyse statically indeterminate structures' behaviour.	C4		1										
		Analyse behaviour of beams and frames using Displacement Methods: Slope-Deflection Equations, and Moment Distribution, ar	C4		1										

			Number of Sustainable Development Goals																
No.	Core Course Code	Core Course Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	ChE 21011	Material Balances				1		1	1	1	1		1	1					
2	ChE 22011	Energy Balances				1		1	1	1	1		1	1					
3	ChE 31012	Momentum Transfer				1		1	1	1	1		1	1					
4	ChE 31013	Chemical Engineering Thermodynamics				1		1	1	1	1		1	1	1	1	1		
5	ChE 32013	Physical Chemistry				1		1	1	1	1		1	1	1	1	1		
6	ChE 32022	Heat Transfer				1		1	1	1	1		1	1	1	1	1		
7	ChE 32024	Environmental Study for Chemical Engineering			1	1		1	1	1	1	1	1	1	1	1	1	1	
8	MICR 42017	Industrial and Environmental Microbiology			1	1		1	1	1	1	1	1	1	1	1	1	1	
9	ChE 41032	Mass Transfer				1		1	1	1	1		1	1					
10	ChE 41042	Particle Mechanics				1		1	1	1	1		1	1					
11	ChE 42014	Elective I	1		1	1		1	1	1	1	1	1	1	1	1	1	1	
12	ChE 42015	Quality Control and Experimental Design			1	1		1	1	1	1	1	1	1	1	1	1	1	
13	ChE 42036	Chemical Engineering Design Project I	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	ChE 51014	Elective II	1		1	1		1	1	1	1	1	1	1	1	1	1	1	
15	ChE 51024	Green Engineering for Chemical Engineers	1		1	1		1	1	1	1	1	1	1	1	1	1	1	
16	ChE 51026	Chemical Reaction Kinetics and Reactor Design			1	1		1	1	1	1	1	1	1	1	1	1		
17	ChE 51036	Chemical Engineering Integrated Design Project II	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	ChE 51046	Economics and Business Management for Chemical Engineers	1		1	1		1	1	1	1	1	1	1	1	1	1	1	1
19	ChE 52014	Elective III	1		1	1		1	1	1	1	1	1	1	1	1	1	1	
20	ChE 52025	Instrumentation, and Chemical and Biomolecular Process Control	1		1	1		1	1		1	1	1	1					
21	ChE 52046	Plant Design for Chemical Engineers	1		1	1		1	1	1	1	1	1	1	1	1	1	1	1
22	ChE 52052	Biochemical Engineering			1	1		1	1	1	1	1	1	1	1	1	1		
23	ChE 52056	Modeling, Simulation, Optimization and Chemical Process Design	1		1	1		1	1	1	1	1	1	1	1	1	1	1	
24	ChE 61015	Research Methodology and Statistical Analysis				1	1			1	1	1	1	1					
25	ChE 61066	Internship Programme	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	ChE 61076	Final Year Project	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	ChE 61096	Industrial Training Assessment	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Total Results	13		18	27	6	26	26	26	27	19	27	27	20	20	20	15	7
		%	48.1%	0.0%	66.7%	100.0%	22.2%	96.3%	96.3%	96.3%	100.0%	70.4%	100.0%	100.0%	74.1%	74.1%	74.1%	55.6%	25.9%

	SDG Goals
1	No Poverty
2	Zero Hunger
3	Good Health and Well Being
4	Quality Education
5	Gender Equality
6	Clean Water and Sanitation
7	Affordable and Clean Energy
8	Decent Work and Economic Growth
9	Industry, Innovation and Infrastructure
10	Reduced Inequality
11	Sustainable Cities and Communuties
12	Responsible Consumption and Production
13	Climate Action
14	Life Below Water
15	Life on Land
16	Peace, Justice, and Strong Institutions
17	Partnerships for the Goals





THANK YOU

FOR LISTENING