



**Branch Campus
Malaysian Institute of Chemical &
Bioengineering Technology**

**Programme Handbook
September 2020**

Disclaimer:

*The Programme Handbook Bachelor September 2020 Intake
is meant for the students for Bachelor September 2020 Intake.*

*Universiti Kuala Lumpur Branch Campus
Malaysian Institute of Chemical & Bioengineering Technology
(UniKL MICET)*

reserves the right to change the content without prior notice.

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Vision & Mission of University

CORPORATE STRATEGY





UniKL
UNIVERSITI
KUALA LUMPUR



VISION

TO BE THE LEADING ENTREPRENEURIAL TECHNICAL UNIVERSITY



MISSION

TO PRODUCE ENTERPRISING GLOBAL TECHNOPRENEURS

Academic Activities Calendar for September 2020 Intake – Bachelor Only

DESCRIPTION	SEPTEMBER SEMESTER
Semester Registration for New Students	13 September 2020
Classes	21 September 2020 – 1 January 2021 Week 1 – Week 14
Revision	2 Jan – 5 Jan 2021
FINAL EXAMINATION	6 Jan – 12 Jan 2021

Academic Top Management Team UniKL MICET

	<p>Associate Professor Ts. Dr Ruzainah binti Ali@Jaafar Dean of UniKL MICET Email: ruzainah@unikl.edu.my Phone: 06-551 2146</p>
	<p>Dr Rapidah binti Othman Deputy Dean Academic and Technology Email: rapidah@unikl.edu.my Phone: 06-551 2016</p>
	<p>Mr Syed Azhar bin Syed Ab Rahman Deputy Dean Student Development & Campus Lifestyle Email: syedazhar@unikl.edu.my Phone: 06-551 2136</p>
	<p>Dr Raja Nazrul Hakim bin Raja Nazri Deputy Dean IIIP Email: rajanazrul@unikl.edu.my Phone: 06-551 2077</p>

Academic Staff Member of UniKL MICET

TECHNICAL FOUNDATION SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE
			DESIGNATION
1.	ZAIDA RAHAYU BINTI YET (Head of Section)	MASTER OF SCIENCE	SENIOR LECTURER
2.	ABDUL HAKIM BIN HJ ABU BAKAR	MASTER ELECTRICAL ENGINEERING	SENIOR LECTURER
3.	ASIMI ANA BINTI AHMAD	MASTER OF ENGINEERING (CHEMICAL)	LECTURER
4.	AZLINA DIN	MASTER OF SCIENCE	LECTURER
5.	HANIZA BINTI KAHAR	MASTER OF SCIENCE	LECTURER
6.	IZUME AYUNA BINTI MOHAMED KHAMIL	MASTER OF INFORMATION TECHNOLOGY	LECTURER
7.	MOHD NASIR MAHMUD	MASTER OF MATHEMATICS	LECTURER
8.	MOHD ZULKHAIRI BIN ABDUL RAHIM (Dr)	PhD (CHEMISTRY)	SENIOR LECTURER
9.	MOHD NIZAM BIN ZAHARI	MASTER OF ENGINEERING TECHNOLOGY (GREEN & ENERGY EFFICIENT BUILDINGS)	LECTURER
10.	NAZATULSHIMA BINTI HASSAN (Dr)	PhD (BIOSTATISTIC)	LECTURER
11.	NURUL NABIHAH BINTI RAHMAN	MASTER OF ENGINEERING MATHEMATICS	LECTURER
12.	SITI HARTINI BINTI HAMDAN (Dr)	PhD (MECHANICAL ENGINEERING) TRIBOLOGY	SENIOR LECTURER
13.	SITI NUR ELMI BINTI ABDUL AZIZ	MASTER OF SCIENCE	LECTURER
14.	TEO SIEW HWAY	MASTER OF INFORMATION TECHNOLOGY	LECTURER
15.	YUSHAZAZIAH BINTI MOHD YUNOS	MASTER OF SCIENCE (MECHANICAL ENGINEERING)	LECTURER

PROCESS ENGINEERING TECHNOLOGY SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE DESIGNATION
1.	MOHD. RAZEALY BIN ANUAR (Head of Section)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
2.	AHMAD AZAHARI BIN HAMZAH (Dr)	PhD (ELECTRICAL ENGINEERING)	SENIOR LECTURER
3.	AIZA SYUHANIZ BINTI SALLEH	MASTER OF ENGINEERING	LECTURER
4.	ALIFF RADZUAN BIN MOHAMAD RADZI (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
5.	AMIN SAFWAN BIN ALIKASTURI (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
6.	AZRIN BIN ABDUL RAHMAN	MASTER OF SCIENCE (PROCESS PLANT MANAGEMENT)	SENIOR LECTURER
7.	AZYYATI BINTI JOHARI	MASTER OF CHEMICAL ENGINEERING WITH ENTERPRENEUR	LECTURER
8.	FARIDAH BINTI GHAFAR (SL)	MASTER OF SCIENCE	SENIOR LECTURER
9.	ASSOC. PROF. Dr INOK NURUL HASYIMAH BINTI MOHD AMIN	PhD (CHEMICAL ENGINEERING & PROCESS)	ASSOCIATE PROFESSOR
10.	ASSOC. PROF. Dr KELLY YONG TAU LEN	PhD (MECHANICAL SCIENCE & ENGINEERING)	ASSOCIATE PROFESSOR
11.	LAW JENG YIH (Dr)	PhD (CHEMICAL ENGINEERING)	LECTURER
12.	MARMY ROSHAIDAH BINTI MOHD SALLEH	MASTER OF ENGINEERING	LECTURER
13.	NADIA BINTI ISA (SL)	MASTER OF SCIENCE	LECTURER
14.	NAJUA DELAILA BINTI TUMIN	MASTER OF ENGINEERING(POLYMER)	SENIOR LECTURER
15.	NAZERAH BINTI AHMAD	MASTER OF ENGINEERING	LECTURER
16.	NOR AFIFAH BINTI KHALIL (Ts.)	MASTER IN ENG. TECH. (CHEMICAL ENGINEERING)	LECTURER
17.	NOR AINI BINTI BUROK (Ts.)	MASTER OF INDUSTRIAL SAFETY MANAGEMENT	SENIOR LECTURER
18.	NOR SHAHIRAH BINTI MOHD NASIR (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
19.	NORULAKMAL BINTI NOR HADI	MASTER OF SCIENCE	SENIOR LECTURER
20.	RABIATUL ADAWIAH BINTI MAT NOOR (SL)	MASTER OF SCIENCE	LECTURER
21.	SYAHIDI FADZLI BIN ALFAN	MASTER OF SCIENCE (INDUSTRIAL & TECHNOLOGY MANAGEMENT)	LECTURER

22.	SYED AZHAR BIN SYED AB RAHMAN	MASTER OF SCIENCE (CHEMICAL ENGINEERING)	SENIOR LECTURER
23.	WAN NOOR AIDAWATI BINTI WAN NADHARI (Dr.)	PhD (BIORESOURCE, PAPER AND COATINGS TECHNOLOGY)	SENIOR LECTURER
24.	ZAINAL ABIDIN BIN MOHD YUSOF (Ts.)	MASTER OF SCIENCE	SENIOR LECTURER
25.	ZULHAFIZ BIN TAJUDIN (Ts. Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
26.	ZURAIDAH BINTI RASEP (SL)	MASTER OF ENGINEERING	LECTURER

BIOENGINEERING TECHNOLOGY SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE
			DESIGNATION
1.	FARA WAHIDA BINTI AHMAD HAMIDI (Head of Section)	MASTER OF SCIENCE (BIOPROCESS ENGINEERING)	LECTURER
2.	LEONG CHEAN RING (Dr)	PhD IN MEDICINE	SENIOR LECTURER
3.	MOHAMAD ZULKEFLEE BIN SABRI	MASTER OF ENGINEERING	LECTURER
4.	PROF. DR MOHD AZIZAN BIN MOHD NOOR	PhD (BIOCHEMISTRY)	PROFESSOR
5.	MUHAMAD YUSUF BIN HASAN (Ts.)	MASTER OF SCIENCE (PROCESS PLANT MANAGEMENT)	SENIOR LECTURER
6.	MUHAMMAD SHARIR BIN ABDUL RAHMAN	MASTER OF CHEMICAL ENGINEERING	LECTURER
7.	NIK IDA MARDIANA BINTI NIK PA	MASTER OF SCIENCE	LECTURER
8.	NORHANI BINTI JUSOH (SL)	MASTER OF ENGINEERING	SENIOR LECTURER
9.	NURDIYANA BINTI HUSIN	MASTER OF SCIENCE	LECTURER
10.	NURUL FAEZAWATY BINTI JAMALUDIN (Ts.)	MASTER OF SCIENCE	SENIOR LECTURER
11.	ROZYANTI BINTI MOHAMAD (Ts. Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
12.	ASSOC. PROF. DR RUZAINAH BINTI ALI @JAAFAR	PhD (BIOTECHNOLOGY)	ASSOCIATE PROFESSOR
13.	SHARIFAH SOPLAH BINTI SYED ABDULLAH (Ts DR)	PhD (ENVIRONMENTAL ENGINEERING)	SENIOR LECTURER
14.	SHARIFAH MARIAM BINTI SAYED HITAM (Ts. Dr.)	PhD (BIOPROCESS ENGINEERING)	SENIOR LECTURER
15.	TONG WOEI YENN (Dr.)	PhD IN MICROBIOLOGY	SENIOR LECTURER
16.	ZAINATUL 'ASYIQIN BINTI SAMSU (Ts. Dr)	MASTER OF SCIENCE	LECTURER

ENVIRONMENT AND POLYMER ENGINEERING TECHNOLOGY SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE DESIGNATION
1.	Ts. Dr NORILHAMIAH BINTI YAHYA (Head of Section)	PhD (FUEL CELL ENGINEERING)	SENIOR LECTURER
2.	AMELIA BINTI MD SOM (Dr)	PhD (GEOENVIRONMENT ENGINEERING)	SENIOR LECTURER
3.	AHMAD NAIM BIN AHMAD YAHAYA (Assoc. Prof. Ts. Dr.)	PhD (ENVIRONMENT ENGINEERING TECHNOLOGY)	ASSOCIATE PROFESSOR
4.	ELMY NAHIDA BINTI OTHMAN (Ts.)	INTERNATIONAL MASTER OF SCIENCE (RURAL DEVELOPMENT) (Erasmus Mundus Programme)	SENIOR LECTURER
5.	KHAIRUL NADIAH BINTI IBRAHIM	MASTER OF TECHNOLOGY	SENIOR LECTURER
6.	MOHD SYAZWAN BIN MOHD GHAZALI	MASTER OF SCIENCE	LECTURER
7.	NADIA BINTI RAZALI (Dr.)	PhD (CONSTRUCTION)	SENIOR LECTURER
8.	NOR ZALINA BINTI KASIM (Dr.)	PhD (CIVIL ENGINEERING)	SENIOR LECTURER
9.	NORHAYATI BINTI MOHD IDRUS	MASTER OF SCIENCE	LECTURER
10.	ROBERT THOMAS BACHMANN (Prof. Dr.)	PhD (ENVIRONMENTAL ENGINEERING TECHNOLOGY)	PROFESSOR
11.	SABRINA BINTI KARIM (Ts. Dr.)	PhD (CIVIL & ENVIRONMENTAL ENGINEERING)	SENIOR LECTURER
12.	SITI NOORAIN BINTI ROSLAN (Dr)	DOCTOR OF ENGINEERING (CIVIL & ENVIRONMENTAL ENGINEERING)	SENIOR LECTURER
13.	TENGGU FAZLI BIN TG JAYA @ TG YAHYA	MASTER OF ENGINEERING	SENIOR LECTURER
14.	AZANAM SHAH BIN HASHIM (Prof. Dato' Dr.)	DOCTOR OF ENGINEERING (MATERIAL SCIENCE)	PROFESSOR
15.	FAHMI ASYADI BIN MD YUSOF (SL)	MASTER OF ENGINEERING	SENIOR LECTURER
16.	MAZLINA BINTI GHAZALI (Ts.)	BACHELOR OF ENGINEERING (HONS) IN POLYMER ENGINEERING	ASST. LECTURER
17.	MOHD EDYAZUAN BIN AZNI (SL)	MASTER OF ENG. TECH. (GREEN & ENERGY EFFICIENT BUILDINGS)	LECTURER
18.	MUAZZIN BIN MUPIT (SL)	MASTER OF SCIENCE	SENIOR LECTURER
19.	MUZAFAR BIN ZULKIFLI (Ts. Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
20.	NOOR FAIZAH BINTI CHE HARUN (Dr)	DOCTOR OF ENGINEERING (ENVIRONMENTAL CHEMISTRY & ENGINEERING)	SENIOR LECTURER

21.	NOR NADIAH BINTI MOHAMAD YUSOF (Dr)	PhD (ENERGY & ENVIRONMENT SCIENCE)	SENIOR LECTURER
22.	ONG SIEW KOOI (Assoc. Prof. Ts. Dr.)	PhD (POLYMER TECHNOLOGY)	ASSOCIATE PROFESSOR
23.	RAJA NAZRUL HAKIM BIN RAJA NAZRI (Dr)	PhD (MATERIAL & METALLURGICAL ENGINEERING)	SENIOR LECTURER
24.	SUHAINI BINTI MAMAT	MASTER OF ENGINEERING	LECTURER
25.	YUSRIAH BINTI LAZIM (Dr.)	PhD IN MATERIAL SCIENCE AND ENG.	SENIOR LECTURER
26.	ZAIHAR BIN YAACOB	MASTER OF ENGINEERING	SENIOR LECTURER

FOOD ENGINEERING TECHNOLOGY SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE DESIGNATION
1.	SITI FATIMAH BINTI IBRAHIM (Dr.) (Head of Section)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
2.	ABDUL MANAN BIN DOS MOHAMED (Assoc. Prof. Dr.)	PhD (BIOSCIENCE & BIOTECHNOLOGY)	ASSOCIATE PROFESSOR
3.	FARAH SALINA BINTI HUSSIN	MASTER OF SCIENCE (FOOD TECHNOLOGY)	SENIOR LECTURER
4.	HARUN BIN SARIP (Assoc. Prof. Ts. Dr.)	PhD (FOOD TECHNOLOGY)	ASSOCIATE PROFESSOR
5.	KHAIRUL FAIZAL BIN PA'EE (Dr.)	PhD (FOOD & NUTRITIONAL SCIENCE)	SENIOR LECTURER
6.	LILY SUHAILA BINTI YACOB	MASTER OF ENVIRONMENT (ENVIRONMENTAL SCIENCE)	LECTURER
7.	MASNIZA BINTI MOHAMED @ MAHMOOD	MASTER OF SCIENCE	SENIOR LECTURER
8.	MAZIDAH ABDUL RAHMAN (Ts. Dr.)	PhD (SCIENCE FOOD TECHNOLOGY)	SENIOR LECTURER
9.	NOR RAIHANA BINTI MOHAMED ZAM (Dr.)	PhD (NUTRITION)	SENIOR LECTURER
10.	NOR ZANARIAH BINTI SAFIEI (Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
11.	NORIZA BINTI AHMAD (Ts. Dr)	PhD (FOOD SCIENCE & TECHNOLOGY)	SENIOR LECTURER
12.	NORZAHIR SAPAWE (Assoc. Prof. Dr)	PhD (CHEMICAL ENGINEERING)	ASSOCIATE PROFESSOR
13.	NUR AQILAH BINTI HAMIM (Ts.) (SL)	BACHELOR OF PLANT BIOTECHNOLOGY	SPECIALIST
14.	RINANI SHIMA BINTI ABD. RASHID (SL)	MASTER OF SCIENCE (FOOD TECHNOLOGY)	SENIOR LECTURER
15.	SHAHRULZAMAN BIN SHAHARUDDIN (Dr.)	PHISOLOPHY DOCTORATE OF BIOPROCESS ENG.	SENIOR LECTURER

CHEMICAL ENGINEERING SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE
			DESIGNATION
1.	WONG CHEE SIEN (Dr.) (Head of Section)	PhD (BIOPROCESS ENGINEERING)	SENIOR LECTURER
2.	CHIN LIP HAN (Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
3.	CHONG YUAN FOONG (IR.)	BACHELOR	SPECIALIST
4.	FARRA WAHIDA BINTI SHAARANI	MASTER OF SCIENCE	SENIOR LECTURER
5.	NOOR AINA BINTI MOHD NAZRI (Dr.)	PhD IN ENGINEERING (GAS)	SENIOR LECTURER
6.	NOR NABIHA BINTI MD ZAN	MASTER (ENGINEERING SCIENCE)	LECTURER
7.	RAPIDAH BINTI OTHMAN (Dr)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
8.	SITI NURUL ATIKAH BINTI ABD HALIM (Dr.)	PhD (CHEMICAL ENGINEERING)	SENIOR LECTURER
9.	YUHANEEES BINTI MOHAMED YUSOF (Dr.)	PhD (APPLIED SCIENCE)	SENIOR LECTURER
10.	SUZANA BINTI WAHIDIN (Dr)	PhD (BIOPROCESSING ENGINEERING)	SENIOR LECTURER

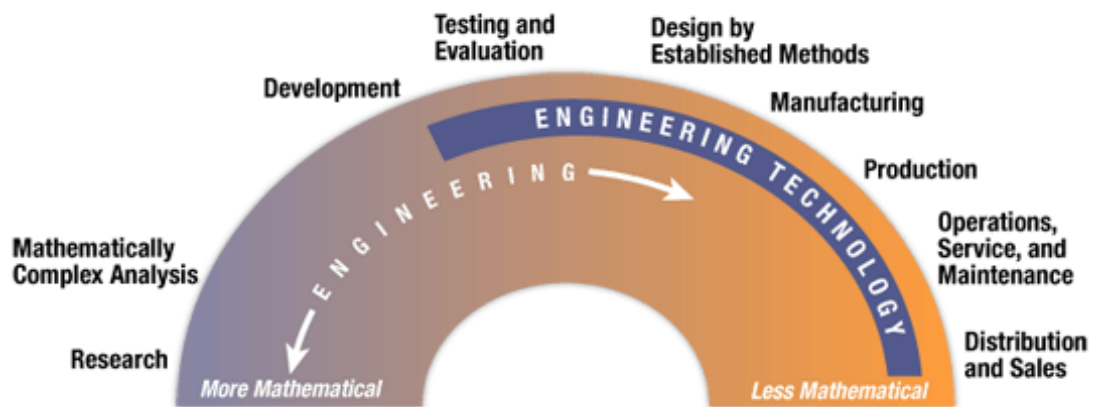
STUDENT DEVELOPMENT SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE
			DESIGNATION
1.	AZU FARHANA BINTI ANUAR (Head of Section)	MASTER OF ARTS (ENGLISH COURSE)	LECTURER
2.	ANISAH BAHYAH AHMAD (Dr.)	PhD (ISLAMIC CIVILIZATION)	SENIOR LECTURER
3.	AZMAN BIN YUSOF (Assoc. Prof. Dr.)	PhD (PHILOSOPHY AND CIVILIZATION STUDIES)	ASSOCIATE PROFESSOR
4.	INTAN NORJAHAN BINTI AZMAN	MASTER OF ARTS IN ENGLISH LANGUAGE	LECTURER
5.	MARIATI BINTI MOHD SALLEH	MASTER OF EDUCATION	LECTURER
6.	NOORHAYATI BINTI SAHARUDDIN	MASTER OF ARTS IN ENGLISH LANGUAGE	SENIOR LECTURER
7.	ROSIAH BINTI OTHMAN	MASTER OF CORPORATE COMMUNICATION	LECTURER
8.	SA'ADIAH BINTI HUSSIN	MASTER OF SCIENCE (CORPORATE COMMUNICATION)	SENIOR LECTURER

IIP SECTION

NO.	NAME	HIGHEST QUALIFICATION	SL: STUDY LEAVE
			DESIGNATION
1.	ABD RAZAK BIN HAJI MOHD YUSOFF	MASTER OF BUSINESS ADMINISTRATION	LECTURER
2.	NORAZMI BIN OMAR	MASTER OF BUSINESS ADMINISTRATION	LECTURER

Differences between Engineering Programme and Engineering Technology Programme



	Engineering Technology	Engineering
Accreditation Body	BEM – ETAC	BEM – EAC
Theory vs Practical	Theory – 40%	Theory – 80%
	Practical – 60%	Practical – 20%

ENGINEERING TECHNOLOGY PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1	UniKL graduates who are knowledgeable, competent, and innovative, who will contribute to the human capital in the industry related to chemical engineering technology.
PEO2	UniKL graduates who have effective leadership and team work skills, as well as verbal, non-verbal, and interpersonal communication skills to support their role in the industry.
PEO3	UniKL graduates who are committed towards the importance of lifelong learning and continuous improvement.
PEO4	UniKL graduates who practice professionalism with ethics and social responsibility.
PEO5	UniKL graduates who are capable of embarking on business and technopreneurial activities.

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Apply the knowledge of mathematics, science and engineering technology fundamentals and specialization specialisation principles to well-defined applied engineering technology procedures, processes, systems or methodologies in chemical engineering technology.
PLO2	Plan and conduct experimental investigations of broadly-defined problems using data from relevant sources.
PLO3	Select and apply appropriate techniques, resources and modern engineering tools, including prediction and modelling, to broadly-defined engineering activities, with an understanding of the limitations.
PLO4	Identify, formulate, research literature, and solve broadly-defined chemical engineering technology problems, reaching substantiated conclusions using analytical tools appropriate to the area of specialisation.
PLO5	Design solutions to broadly-defined problems and contribute to the design of systems, components or processes related to chemical engineering technology for sustainable development.
PLO6	Communicate effectively with the engineering technology community and society.
PLO7	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities and norms of chemical engineering technology practice.
PLO8	Understand the impact of engineering technology solutions in a societal context and demonstrate knowledge of and the need for sustainable development.
PLO9	Function effectively as an individual, and as a member and/or leader in diverse technical teams.
PLO10	Understand and commit to professional ethics and, responsibilities, and norms of chemical engineering technology practice.
PLO11	Recognise the requirements for and the need of for professional development and to engage in independent and lifelong learning.
PLO12	Demonstrate an awareness and understanding of management, business practices, and technopreneurial competencies, as well as identify business opportunities.

NATIONAL REQUIREMENT

MPU 3113 HUBUNGAN ETNIK
MPU 3173 PENGAJIAN MALAYSIA 3
MPU 3123 TAMADUN ISLAM & TAMADUN ASIA (TITAS)
MPU 3143 BAHASA MELAYU KOMUNIKASI 2
MPU 3333 ISU-ISU KONTEMPORARI MUSLIM DI
MALAYSIA/
MPU 3343 CULTURE AND LIFESTYLE IN MALAYSIA
MPU3412 CAREER GUIDANCE 2
MPU3422 COMMUNITY SERVICE 2
MPU3432 CULTURE 2
MPU3442 RAKAN MASJID 2
MPU3452 SISWA-SISWI BOMBA DAN PENYELAMAT 2
MPU3462 SISWA-SISWI PERTAHANAN AWAM 2
MPU3472 SPORTS MANAGEMENT 2

MPU 3113 Hubungan Etnik

Rationale for inclusion of the course in the program:

Kursus ini membincangkan konsep asas, latar belakang dan realiti sosial masa kini hubungan etnik di Malaysia dari perspektif kesepaduan sosial. Tujuan kursus ini ialah memberikan kesedaran dan penghayatan dalam mengurus kepelbagaian ke arah pengukuhan negara bangsa. Pengajaran dan pembelajaran akan dilaksanakan dalam bentuk pembelajaran berasaskan pengalaman melalui aktiviti individu, berpasukan dan semangat kesukarelaan. Pada akhir kursus ini, pelajar diharapkan dapat mengamalkan nilai-nilai murni, mempunyai jati diri kebangsaan dan menerima kepelbagaian sosio budaya etnik di Malaysia

Learning Outcomes:

Upon completion of this course students should be able to:

1. Menghuraikan isu dan cabaran dalam konteks hubungan etnik di Malaysia.
2. Menilai kepentingan jati diri kebangsaan dan kesukarelaan dalam pelbagai konteks ke arah mewujudkan warganegara yang bertanggungjawab.
3. Membina dan memupuk hubungan dan interaksi sosial pelbagai etnik.

MPU 3173 Pengajian Malaysia 3

Rationale for inclusion of the course in the program:

This unit focuses on the history and politics, the constitution of Malaysia, community and solidarity, development and other issues of national concern. The objective of this unit is to produce students who understand the socio-cultural society, the process of nation-building and political structure in Malaysia as well as to appreciate the role of Malaysia at the international level.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe and discuss the diversity of society.
2. Explain the importance of Malaysia's identity towards nurturing the spirit of universality.
3. Build social relationship and interaction among students.

MPU 3123 Tamadun Islam & Tamadun Asia (TITAS)

Rationale for inclusion of the course in the program:

Kursus ini membincangkan ilmu ketamadunan yang meliputi pengenalan ilmu ketamadunan, perkembangan dan interaksi ketamadunan dalam tamadun Islam, Melayu, China, India serta isu ketamadunan kontemporari dalam Tamadun Islam dan Tamadun Asia. Kursus ini bertujuan memberi kefahaman mengenai setiap elemen tersebut dan implikasi terhadap proses pembangunan negara. Selain itu, perbincangan dan perbahasan dalam kursus ini turut berperanan dalam usaha melahirkan pelajar yang mengetahui warisan sejarah negara, memupuk nilai murni, mempunyai jati diri kebangsaan dan menghargai kepelbagaian.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Menghuraikan peranan nilai ketamadunan dalam pembentukan sistem nilai masyarakat Malaysia.
2. Mempamerkan kebolehan komunikasi social dalam kepelbagaian lanskap budaya.
3. Membahaskan elemen ketamadunan dengan isu kemasyarakatan semasa.

MPU 3143 Bahasa Melayu Komunikasi 2

Rationale for inclusion of the course in the program:

Kursus ini melatih pelajar antarabangsa untuk berkomunikasi dalam bahasa Melayu asas yang meliputi situasi kehidupan harian. Pelajar akan diperkenalkan dengan pertuturan dan penulisan bahasa Melayu mudah. Pengajaran dan pembelajaran akan dilaksanakan dalam bentuk kuliah, tutorial, tugas dan pengalaman pembelajaran pelajar di dalam dan di luar kelas. Pada akhir kursus ini, pelajar diharapkan dapat berkomunikasi dan menggunakan ayat mudah dengan berkesan.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Menerangkan kansungan teks penuh yang menggunakan ayat mudah dan ayat berlapis.
2. Bertutur dalam pelbagai situasi dengan menggunakan ayat mudah dan ayat berlapis.
3. Menyusun idea secara kreatif dan sistematik dalam penulisan karangan pendek.

MPU 3333 Isu-Isu Kontemporari Muslim Di Malaysia

Rationale for inclusion of the course in the program:

Kursus ini memberikan pengetahuan berkaitan isu-isu kontemporari yang melingkari masyarakat Islam di Malaysia. Sejarah dan perkembangan Islam, ideologi dan fahaman yang mempengaruhi umat Islam turut dikupas dalam kursus ini. Isu-isu yang berkaitan dengan kepenggunaan, institusi keluarga dan masyarakat turut diperbincangkan. Begitu juga sains dan teknologi serta masa depan Islam dan implikasinya diperjelaskan dengan sandaran dalil wahyu dan reality semasa.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Menerangkan sejarah dan aspek-aspek perkembangan Islam di Malaysia
2. Menghuraikan realiti isu-isu yang melingkungi umat Islam di Malaysia
3. Melaksanakan tanggungjawab dari kewajipan beragama demi masa depan masyarakat Islam dalam konteks semasa.

MPU 3343 Culture And Lifestyle In Malaysia

Rationale for inclusion of the course in the program:

The main objective of this course is to expose students to the rich culture and lifestyle in Malaysia. This is to foster and instill national unity. It will introduce various cultures to the local as well as the international students. This course will help to bridge the gap among students as well as further develop the understanding and respect for Malaysian culture and lifestyle.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Compare acceptable cultural practices, norms and lifestyle in Malaysia
2. Organize program on cultural values, ethnicity and lifestyle in Malaysia
3. Analyse information on cultural and lifestyles issues

MPU 3412 Career Guidance 2

Rationale for inclusion of the course in the program:

This module will assist students in identifying their personality traits and their future career options. Besides that, it also helps students to enhance their competency in soft skills future career planning.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Performs appropriate interpersonal skills.
2. Differentiate their self-concept and self-image which reflect their personalities
3. Demonstrate ability to plan their future career and targets.

MPU 3422 Community Service 2

Rationale for inclusion of the course in the program:

This course provides opportunities for the students to enhance their skills in planning, organizing and implementing community service programmes and activities. This course also helps to build towering personalities among the students as they become more sensitive towards the environment others individuals or groups in a community.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Write a proposal for a community service project(s).
2. Organize a large scale/ high impact community service project(s).
3. Demonstrate the benefits and values of organizing community service project(s).

MPU 3432 Culture 2**Rationale for inclusion of the course in the program:**

This course is one of the co-curriculum modules offered to develop well-rounded individuals through involvement in social and community activities. Specifically, it aims to develop students' personality and social interaction skills, as well as foster closer relationships among the students in the university through the organization of and participation in cultural activities.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply knowledge gained in planning and organizing a cultural event
2. Demonstrate appropriate skills in organising a culture event
3. Evaluate the effectiveness of the management of a cultural event.

MPU3442 Rakan Masjid 2**Rationale for inclusion of the course in the program:**

This course familiarises students with significant events in Islam and gives them the opportunity to organise activities in relation to these events. This course also explores Islamic institutions in Malaysia which serve different functions, including provision of Islamic counselling services.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain about the importance of religious programmes implemented in Malaysia
2. Practice activities in relation to significant events in Islam
3. Recognise the functions of agencies/bodies relevant to the development of Islam in Malaysia

MPU3452 Siswa Siswi Bomba & Penyelamat 2**Rationale for inclusion of the course in the program:**

Kursus ini membolehkan pelajar memahami peranan dan fungsi Jabatan Bomba dan Penyelamat, Teknik kawad kaki dan asas rawatan kecemasan. Selain daripada itu, pelajar didedahkan kepada perancangan dan pelaksanaan penyelamatan, rawatan kecemasan dan aktiviti keselamatan kebakaran.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Berkomunikasi dan menunjukkan kemahiran kepimpinan dan kerjasama melalui aktiviti BOMBA (penyelamatan, keselamatan kebakaran dan rawatan kecemasan)
2. Menganjurkan projek (teori dan praktikal mengenai aktiviti BOMBA)

3. Mengamalkan asas pengetahuan berkaitan penyelamatan, keselamatan kebakaran dan rawatan kecemasan..

MPU3462 Pasukan Siswa-Siswi Pertahanan Awam 2

Rationale for inclusion of the course in the program:

Kursus ini memfokuskan perbincangan tentang peranan dan fungsi Angkatan Pertahanan dan mengaplikasikan ilmu pengetahuan dalam pertolongan cemas dan kawad kaki. Melalui aktiviti seperti ini, pelajar dapat membuat perancangan, pelaksanaan tugas, pertolongan kecemasan dan aktiviti kebakaran.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Memberi peluang kepada pelajar mendapat pengetahuan dan kemahiran untuk membantu diri sendiri dan orang lain.
2. Memupuk nilai/ sikap hormat-menghormati, menurut perintah, berdisiplin, berkerjasama, bertanggungjawab, berhemah, kejujuran, keyakinan diri dan kepimpinan.
3. Menanam semangat kesedaran sivik, ketaatan dan cintakan negara serta penjagaan alam sekitar.
4. Mempertingkatkan ketahanan fizikal, mental dan daya kerohanian yang seimbang.

UNIVERSITY REQUIREMENT

WEB10302 Fundamental English
WEB20202 Professional English 1
WEB20302 Professional English 2

MPU3242 Innovation Management

WMD10101 Mandarin 1
WMD10201 Mandarin 2
WAD10101 Arabic 1
WAD10201 Arabic 2

WIB41009 Industrial Training

WEB 10302 Fundamental English

Rationale for inclusion of the course in the program:

This course aims to improve students' ability as language learners. This course equips students with pertinent vocabulary skills (suffixes, prefixes, contextual clues and dictionary skills). Apart from that, students are also exposed to basic sentence structures (simple, compound and complex) and basic sentence errors (fragments, dangling modifiers, etc). As a final assessment, they are required to prepare an article review based on the text they have chosen. During this final assessment, they are required to utilise vocabulary and writing skills taught at the initial stage. They are then tasked to present their opinions and suggestions concerning their article review using appropriate and effective presentation techniques.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Construct sentences using proper sentence structures and vocabulary.
2. Produce an article review based on a chosen text
3. Present using appropriate presentation techniques based on presentation outline.

WEB 20202 Professional English 1

Rationale for inclusion of the course in the program:

This module covers the important aspects of workplace communication. Students are first introduced to business correspondence which covers several important workplace communication tasks like writing business letters, proposals, documents in a meeting. This module trains students to apply effective meeting skills and exposes them to event organisation.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Recognize appropriate mechanics in writing business letter and proposals.
2. Demonstrate the ability to conduct, participate and compile relevant information for meeting
3. Organise an event based on the proposal.

WEB 20302 Professional English 2

Rationale for inclusion of the course in the program:

This module focuses on equipping students with appropriate technical communication skills and skills in writing a technical report. Students are required to contract a personnel from the industry. Once the person is identified, students are then to correspond with him/ her formally, which involves them setting a meeting to interview the person they have chosen

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply appropriate language for report writing
2. Produce reports with their necessary components by incorporating skills.
3. Present information orally

MPU3242 Innovation Management

Rationale for inclusion of the course in the program:

This course is aimed to identify the importance of innovation in a organization. It analyses the different types of innovation, product classes and the impact to industry. It helps students in developing viable innovative projects, by identifying the innovation processes and key challenges.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyse the different types of innovation, products classes and the impact to the industry.
2. Describe steps in innovation processes.
3. Classify the key challenges to innovation.
4. Develop a viable innovative project.

WMD10101 Mandarin 1

Rationale for inclusion of the course in the program:

This course introduces the basic grammatical structures of Chinese sentences to acquire the basic oral and written communication skills. The contents of this course are Chinese writing system (including Pinyin), numbers, useful Chinese expressions to greet others, to introduce oneself and family members, date time, food and beverages.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Use words, phrases and sentences in Pinyin system and/ or Chinese characters.
2. Practise basic Chinese language for daily communication within the limits of vocabularies and sentence structures acquired in the course.
3. Perform learned Chinese vocabularies, phrases or short sentences in limited contexts.

WMD 10201 Mandarin 2**Rationale for inclusion of the course in the program:**

This course introduces the basic grammatical structures of Chinese sentences in order to acquire the basic oral and written communication skills. The contents of this course are useful expressions in Mandarin to activities in university, hobby and interest, shopping and purchases, locations, direction, seeing a doctor and holiday activities.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Use Chinese words, phrases, short sentences about learned topics.
2. Practice Chinese language for daily communication within the limits of vocabularies and sentence structures acquired in the course.
3. Perform learned Chinese vocabularies

WAD 10101 Arabic 1**Rationale for inclusion of the course in the program:**

This course is intended to expose the student with conversation skill of beginner-level Arabic language. Students will be familiarized with elemental Arabic grammar and be able to construct a Arabic report and essay. This course seeks to develop passionate of students to the course, alphabetical, vocabulary, industrial terms, nouns, verbs, basic grammar and explain the benefit of learning Arabic to the students. Student are also expected to be able to write an Arabic sentences.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain basic Arabic grammar within the scope of the course.
2. write basic Arabic sentences and questions based on what they have learnt in the course.
3. Communicate orally in Arabic at a beginner's level.

WAD 10201 Arabic 2**Rationale for inclusion of the course in the program:**

This course is intended to familiarize students with conversational skills in Arabic at a beginner level. It exposes students with basic Arabic grammar in order to enhance their ability to construct a report and essay in the language. This course seeks to develop passionate and self- motivated students of Arabic by enhancing their basic grammatical knowledge in the language as well as their knowledge of daily and industry focused terms and phrases in an Arabic-speaking setting.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Produce written work using Arabic knowledge and skills learnt in the course.
2. Communicate in basic Arabic language in written and verbal form.
3. Prepare project using content and skills learnt in the course.

WIB41009 Industrial Training

Rationale for inclusion of the course in the program:

This course is aimed at exposing students to real industrial environment and the opportunity to practice the knowledge and skills acquired during their academic years.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply the skills and knowledge that they have gained throughout their academic years in the companies that they are attached to.
2. Explain new knowledge and skills acquired during Industrial attachment
3. Handle and perform specific task with minimum supervision and achieve the companies' expectation.
4. Display safety and health practices in industry.
5. Show good analytical and problem solving skills.
6. Demonstrate the ability to work in team either as a leader or team member and good communication skills.

COMMON CORE

CLB 19203 Mathematics 1
WBB20103 Technopreneurship
CLB 10703 Physical Chemistry
CLB 19303 Mathematics 2
CLB 10803 Analytical & Organic Chemistry
CLB40002 Engineering Technologist in Society

CLB19203 Mathematics 1

Rationale for inclusion of the course in the program:

This course is aimed to prepare the student to be well versed in the mathematical knowledge needed for applying the concepts of calculus in applications of science and engineering. They should also be well prepared for courses in differential equations, linear algebra and advanced calculus.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Solve mathematical equations using exponents and logarithms techniques.
2. Apply differentiation techniques to solve application of derivative problems.
3. Apply integration techniques to solve related problems.

WBB20103 Technopreneurship

Rationale for inclusion of the course in the program:

The module will enhance student's knowledge and skills in business planning, financial management, business operations and marketing. The focus will be on attributes of Technopreneurs, searching for viable opportunities, taking into considerations the trends and new challenges in the business world; and gathering the resources necessary to convert a viable opportunity into a successful business.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe business environment and management within the scope of the course
2. Estimate operation capacity and material requirement planning
3. Prepare sale forecast and financial projection statement.
4. Develop a viable business plan and be involved in entrepreneurship activities.

CLB10703 Physical Chemistry**Rationale for inclusion of the course in the program:**

This course will provide students with knowledge and hands on skill in physical chemistry. They will be equipped with knowledge in thermodynamic, equilibrium as well as kinetic study. It will create awareness on importance of physical chemistry in chemical engineering technology and its related application.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply the basic physical chemistry principles such as thermodynamic, equilibrium concept and chemical kinetic.
2. Perform experimental work based on basic energy concept in the following topics: thermodynamic, equilibrium and chemical kinetics.
3. Assist effectively as a team member and perform good laboratory techniques such as planning, running, observing, recording, interpreting, evaluating and data reporting.

CLB19303 Mathematics 2**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with the fundamental concepts in advanced calculus which is applicable for chemical engineering technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Solve differential equations by using partial derivatives methods.
2. Apply numerical integration method in problems related to area and volumes of curves.
3. Solve first order and second order differential equations by using the undetermined coefficient and the properties of the Laplace Transform.

CLB10803 Analytical & Organic Chemistry**Rationale for inclusion of the course in the program:**

This course provides students with the basic concepts in chemistry as well as the analytical techniques used in the field of chemistry.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Differentiate the phenomena, concepts, laws and principles in organic and analytical chemistry.
2. Perform experimental works effectively related to analytical and organic chemistry.
3. Assist affectively as a team member in performing good laboratory technique

CLB40002 Engineering Technologist in Society**Rationale for inclusion of the course in the program:**

Engineering Technology is devoted not only to the acquisition of technical skills, but is also concerned with the appreciation of the place and potential of technologies in society. There are many challenges in society derive from the expansion of knowledge, expertise and information. The acquisitions of skills enable students to develop problem solving strategies and procedures of paramount importance. The ability to discern the key problems in a given task will benefit the student greatly and will ultimately lead to increased innovation in the work place.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the scope of engineering ethics and its connection with the career of an engineering technologist.
2. Revise the potential issues on career of an engineering technologist in various aspects such as job aspects, job requirements, job challenges, job markets, politics, economics, society, public, personal matter, morality, environmental and others.
3. Relate the ethics solution on the respective issues.
4. Assemble the information of the issue on engineering technologist in term of safety and risk using quantitative risk assessment (QRA) software.

DISCIPLINE CORE

CEB20003 Introduction to Environmental Engineering
CLB10402 Fundamental of Electric & Electronics
CLB10903 Engineering Drawing and Computing
CLB10904 Chemical Process Principles
CLB11003 Fluid Mechanics
CLB20903 Engineering Statistics
CLB21403 Engineering Design
CLB21303 Process Instrumentation and Control
CKB20104 Reaction Engineering
CKB30103 Industrial Safety & Health
CLB20403 Thermodynamics
CLB21204 Transport Process Principles

CPB 49804 Final Year Project (Proposal)
CPB 49806 Final Year Project (Implementation)

CEB20003 Introduction to Environmental Engineering Technology

Rationale for inclusion of the course in the program:

The course introduces students with basic principles of environmental engineering technology with the relation to natural system of the environment, principles of pollution and treatment/control methods of various environmental pollutants. Several important law and regulations will enhance student's knowledge on institutional environment.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Able to distinguish knowledge in applied engineering processes, mathematics, and sciences to manage environmental challenges.
2. Demonstrate problem-solving skills by means of information gathering, social interaction within team and communication of results to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations
3. Display technical savvy as an individual, and as a member or a leader in a group environment.

CLB10402 Fundamental of Electric & Electronics

Rationale for inclusion of the course in the program:

This is an introductory course aimed at providing students with the fundamentals concept and knowledge of electrical technology. This course will provide students with skills and understanding to operate electrical tools and machines safely and effectively.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe basic principles and practices from electrical fundamental disciplines to solve electrical problems.
2. Perform experiments and project according to the standard operating procedure given.
3. Apply basic principles of electricity, circuit theorems, electrical and electronics system, and electrical machinery.

CLB10903 Engineering Drawing And Computing**Rationale for inclusion of the course in the program:**

This introductory course aimed at providing students with the basic concepts of computer applications used in the current practice and its application in chemical engineering technology. This course will equip students with concepts and knowledge that are essential to encounter any related problems that need to be solved using a computer application including using computer for engineering design.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the basic terminology, symbols, tools and features used in computing and engineering drawing.
2. Demonstrate the understanding of computer application, technical drawing and chemical process diagram.
3. Demonstrate the usage of Microsoft Office and CAD software.

CLB10904 Chemical Process Principles**Rationale for inclusion of the course in the program:**

This is an introductory course aimed at providing students with the fundamental concepts of chemical process which form the foundation for their study in later years. These concepts are essential in preparing students to formulate and solve material and energy balances on chemical process systems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. evaluate and solve pertinent data on process variables for material and energy balance problems in individual and multiple-unit processes.
2. Analyze the process materials for single and multiphase systems by applying to the physical properties and fundamental principles of mass and energy balance.
3. Follow experimental procedures accurately and conduct experiments safely.

CLB11003 Fluid Mechanics**Rationale for inclusion of the course in the program:**

This course is an introduction to fluid mechanics and emphasizes fundamental concepts and problem solving techniques. Topics to be covered include fluid properties, pressure and fluid statics, control volume analysis and internal flow (flow in pipes and conduits), external flow (drag and lift) and equipments in fluid flow. The student also will be familiarized with the basic concepts in selecting and analyzing components of fluid systems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the fundamental concepts in fluid static and dynamic.
2. Conduct experiments related to fluid static and dynamic by following standard operation procedure and safety awareness.
3. Apply the basic theory of fluid in solving problems related to fluid static and dynamic.

CLB20903 Engineering Statistics**Rationale for inclusion of the course in the program:**

This course is aimed at introducing students to the appropriate statistical methods in engineering.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Select appropriate statistical models to calculate the probability of an event
2. Apply appropriate statistical methods to solve statistical problems
3. Interpret the outcome from statistical software output with the statistical concept

CLB21403 Engineering Design**Rationale for inclusion of the course in the program:**

This course provides fundamental background in utilizing Computer Aided Drafting and Design (CADD) in engineering drawing to the students which will enable them to work more effectively in the various fields of engineering.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply appropriate tools, features and design environment of design software.
2. Duplicate design of parts and assembly drawing to meet technical standard.
3. Produce a complex drawing of a process plant layout.

CLB21303 Process Instrumentation and Control

Rationale for inclusion of the course in the program:

This course will impart knowledge to the students on various aspects on fundamental of instrumentation and basic control system in the chemical industries.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply various types of process instrumentation and control system based on real applications in chemical industries.
2. Analyse the importance of employing appropriate process instrumentation and control in chemical industries.
3. Perform laboratory experiments safely.

CKB20104 Reaction Engineering**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with the understanding of basic principles and fundamentals in chemical reaction kinetics, types of reactor and its design characteristics, and heterogeneous reactions. This knowledge is vital since students will use these fundamentals in applications of chemical engineering technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyze problems related to chemical reactions based on the fundamental concepts.
2. Design chemical reactors for isothermal and non-isothermal processes.
3. Perform laboratory experiments safely.

CKB30103 Industrial Safety & Health**Rationale for inclusion of the course in the program:**

To impart the knowledge and demonstrate an awareness of industrial safety and health by implementing the techniques, legal, society and cultural issues in making the work place as safe as possible.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Display the ability to recognize type of hazards related to occupational safety and health, determine an appropriate control measures and evaluate the risks associate with it.
2. Demonstrate the ability to work in team and communicate effectively as a leader or ordinary member.
3. Analyze the safety and health issues at workplace by comparing to Malaysian laws and regulations.

CLB20403 Thermodynamics**Rationale for inclusion of the course in the program:**

The course is aimed at providing students with the basic understanding on theory and application of chemical engineering thermodynamics. It is essential for engineering technology students to acquire this fundamental concept since thermodynamics is one of the pillars supporting the engineering science.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Solve problems related to the application of thermodynamics.
2. Analyse engineering problem solving based on thermodynamics principles and concepts by using thermodynamics property tables and figures.
3. Perform laboratory experiments safely.

CLB21204 Transport Process Principles**Rationale for inclusion of the course in the program:**

This is an introductory course aimed at providing students with the study of heat transfer by conduction, convection, and radiation with relative to engineering application. Students also will learn on several chemical process like distillation, absorption and extraction process. The course will provide students with the knowledge related to the utilization and application of a process heat transfer and mass transfer in an industrial area. Students will apply the knowledge of heat and mass transfer in designing related major equipment.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyse problems using heat and mass transfer principles.
2. Design heat and/or mass transfer equipment by applying the heat and mass transfer knowledge.
3. Perform laboratory experiment safely.

CPB49804 Final Year Project (Proposal)

Rationale for inclusion of the course in the program:

This course allows students to demonstrate their ability and skills in conducting a technical project based (practice-oriented and/or industry-based) related to their specialization area. It provides students with practical, technical writing and presentation skills.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Demonstrate the ability to plan and to work.
2. Analyse related literature for the proposed research problems.
3. Propose specific research method to solve the research problems.
4. Produce a feasible project proposal in accordance to the specified project format.
5. Present and defend project proposal in a clear and concise manner.

CPB49806 Final Year Project (Implementation)

Rationale for inclusion of the course in the program:

A continuation of Final Year Project 1, this course enhances students' competencies in conducting a technical project based (practice-oriented and/or industry-based) related to their specialization area. The course will further develops their practical, skills, technical writing and presentation skills.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Manage a proposed project plan in solving research problem.
2. Measure and analyse project results using appropriate technique or tools.
3. Produce a project report in accordance with the specified standard format.
4. Defend project outcomes effectively during presentation.

BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN BIOSYSTEM

1. Program Structure

2. Major Courses

- subject to amendments

PROGRAM STRUCTURE

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	WBB20103	Technopreneurship	3	10	20	0	2	88	120
3	WEB 20202	Professional English 1	2	10	16	0	5	49	80
4	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
5	WEB10302	Fundamental English	2	10	16	0	4	50	80
		TOTAL	13	68	76	0	63	313	520

YEAR 1: INTER-SEMESTER

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB 11103	Biology of Cell	3	22	0	50	6	42	120
2	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
		TOTAL	5	36	0	73	11	80	200

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
2	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
3	CLB 19303	Mathematics 2	3	28	24	0	6	62	120
4	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
5	MPU3113/ MPU3173	Hubungan Etnik / Pengajian Malaysia 3	3	17	0	0	25	78	120
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
		TOTAL	17	100	38	138	22	183	680

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB21403	Engineering Design	3	15	30	36	9	30	120
2	CLB10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	MPU34*2	Co-curriculum	2						80
5	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/ Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
6	CSB29403	Engineering Properties of Biological Material	3	30	0	47	3	40	120
7	CLB20303	Biosystem Engineering	3	17	18	22	5	58	120
		TOTAL	20	174	82	190	48	386	800

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB21303	Process Instrumentation & Control	3	28	5	52	5	30	120
2	WEB 20302	Professional English 2	2	13	13	0	2	52	80
3	CLB20603	Heat and Mass Transfer in Biosystem	3	30	0	47	3	40	120
4	WMD10101	Mandarin 1	1	21	0	0	4	25	50
5	CBB 20003	Principle of Microbiology	3	30	0	47	3	40	120
6	CSB20404	Biodiversity and Ecosystem Sustainability	4	34	0	64	13	49	160
7	CBB20303	Biochemistry	3	30	0	47	3	40	120
		TOTAL	19	186	18	257	33	276	770

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CBB30204	Bioseparations Engineering Technology	4	30	0	60	7	63	160
2	CKB30203	Industrial Safety & Health	3	28	8	26	5	53	120
3	CSB30303	Scale up Process & Optimization	3	32	0	44	3	41	120
4	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
5	CBB30503	Biopharmaceutical	3	32	0	45	3	40	120
6	CSB31003	Microbial Physiology	3	28	0	36	5	51	120
		TOTAL	19	178	36	211	31	304	760

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CSB31203	Biosystem Design Project 1	3	34	0	57	5	24	120
2	CLB30103	Introduction to Environmental Engineering Technology	3	26	13	10	9	62	120
3	CSB30003	Quality Assurance in Bio Product	3	21	0	36	5	58	120
4	CPB49804	Final Year Project (Proposal)	4	5	0	110	1	44	160
5		Elective 1	3						120
6		Elective 2	3						120
		TOTAL	19	86	13	213	20	188	760

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB49906	Final Year Project (Implementation)	6	5	0	205	1	29	240
2	CSB40104	Biosystem Design Project 2	4	34	0	54	2	70	160
3	MPU3242	Innovation Management	2	15	30	0	5	30	80
4	WMD10201	Mandarin 2	1	21	0	0	4	25	50
5		Elective 3	3						120
6		Elective 4	3						120
		TOTAL	19	75	30	259	12	154	770

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB41009	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

Additional Module (Credit not included in Total Credit to Graduate –TCG)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

Total Credit to Graduate (TCG): 140 Credit Hours

Electives**
Elective A (Primary Commodity Product)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB30003	Palm Oil Technology 1	3	21	6	51	7	35	120
2	CJB40003	Palm Oil Technology 2	3	20	8	51	6	35	120
3	CPB30303	Oil & Fat Process Technology	3	16	10	37	5	52	120
4	CSB31103	Oil Palm Biomass Products	3	19	0	36	5	60	120

Elective B (Pharmaceutical Product)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB30403	Product Formulation & Dosage Form	3	21	0	36	5	58	120
2	CJB30503	Product Development Process	3	28	0	36	6	50	120
3	CJB40203	Validation & Regulation of Pharmaceutical Product	3	21	0	36	5	58	120
4	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120

Elective C (Industrial Biotechnology)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CEB31003	Environmental Biotechnology	3	28	0	36	9	47	120
2	CBB20503	Principles of Bioprocess Technology	3	28	0	50	7	35	120
3	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
4	CBB30303	Biomolecular Technique	3	28	0	45	7	40	120

Co-Curriculum*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3412	Career Guidance 2	2	17	6	2	4	51	80
2	MPU 3422	Community Service 2	2	17	0	0	12	51	80
3	MPU 3432	Culture 2	2	20	0	12	0	48	80
4	MPU 3442	Rakan Masjid 2	2	17	0	0	8	55	80
5	MPU 3452	Siswa-siswi Bomba & Penyelamat 2	2	17	0	20	0	43	80
6	MPU 3462	Siswa-siswi Pertahanan Awam 2	2	17	0	16	0	47	80
7	MPU 3472	Sports Management 2	2	17	0	16	0	47	80
8	MPU 3482	Personal Financial Management 2	2	17	0	18	3	42	80
9	MPU 3492	Askar Wataniah	2	17	0	23	0	40	80

Note :

1. *Additional Module - MPU2213 Bahasa Kebangsaan A**

- a. For local students without credit in B. Melayu (SPM) only and the credit is not included in program Total Credit to Graduate (TCG).

2. Legend :

- a. (L) – For Local Students
 b. (I) - For International Students
 c. (L-M) – For Local Muslim Students
 d. (L-NM) – For Local Non-Muslim Students

3. Passing mark for all MPU Compulsory subjects is 50 marks (C).

MAJOR COURSES

BACHELOR OF ENGINEERING TECHNOLOGY (HONS) IN BIOSYSTEM

CLB11003 Biology of Cells
CLB20303 Biosystem Engineering
CSB29403 Engineering Properties of Biological Material
CBB20003 Principles of Microbiology
CBB20303 Biochemistry
CLB20603 Heat and Mass Transfers in Biosystem
CSB20404 Biodiversity and Ecosystem Sustainability
CBB30204 Bioseparations Engineering Technology
CBB30503 Biopharmaceutical
CSB30303 Scale up Process & Optimization
CSB31003 Microbial Physiology
CSB30003 Quality Assurance in Bio-Product
CSB31203 Biosystem Design Project 1
CSB40104 Biosystem Design Project 2

CLB11103 Biology of Cells

Rationale for inclusion of the course in the program:

This is an introductory course aimed at providing students with the fundamental concepts of biology of cells components which form the foundation for their study in later years. These concepts are essential since the students will encounter these knowledge in others high level courses.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the structure and functions of prokaryotes and eukaryotes cells and explain theoretical aspect of plant, animal, genetic and ecology including the importance of biodiversity element.
2. Perform biology laboratory procedures
3. Collaborate with team members in planning and performing scientific investigation.

CLB20303 Biosystem Engineering

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skills in material and energy balance of unit operations.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Calculate problems in unit operations which involved mass and energy balance.
2. Practice the common unit operation involved in biosystem engineering.
3. Attain and communicate effectively in team while conducting the engineering operation.

CSB29403 Engineering Properties of Biological Material

Rationale for inclusion of the course in the program:

To provide students with the importance of engineering properties of biological materials in design systems. It is inclusive of physical, structure & composition, mechanical, rheological, thermal, electrical and optical properties of materials. Response of the material will also being covered in different condition.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyze properties of materials for various engineering applications.
2. Measure properties of materials by using appropriate procedures.
3. Demonstrate ability to work in team either as a leader or ordinary member.

CBB20003 Principles of Microbiology**Rationale for inclusion of the course in the program:**

To introduce the principles of structure, diversity and characterization of microorganisms and the application of microorganisms in industries.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the classification and characteristics of microorganisms, and their applications in various industries.
2. Explain microbiological concepts clearly, both verbally and in writing.
3. Report microbiological experimental results concisely, including accurately reporting observations and analysis.
4. Display competency in routine and specialized microbiological laboratory skills.

CLB20303 Biochemistry**Rationale for inclusion of the course in the program:**

To introduce biochemistry to the students by exposing them to the structure and functions of biomolecules, enzyme characteristics and reactions, metabolism and bioenergetics, and biological information flow.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the fundamental structure and dynamic of biomolecules, enzymes characteristics and reactions, metabolism and bioenergetics.
2. Perform Biochemistry laboratory with accurate and highly coordinated skills.
3. Integrate team work ability in practical work or mini project either as a leader or an ordinary member.
4. Apply Biochemistry related practical skills to solve given bioengineering issues.

CLB20603 Heat and Mass Transfers in Biosystem**Rationale for inclusion of the course in the program:**

This module is mainly to impart basic understanding on theory and application of heat and mass transfer.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain principles of heat and mass transfer in solving engineering problems.
2. Perform laboratory works related to heat and mass transfer concepts.
3. Demonstrate ability to work in a team either as a leader or ordinary member.

CSB20404 Biodiversity and Ecosystem Sustainability

Rationale for inclusion of the course in the program:

This is an in-depth course aimed at providing students with the concepts of ecological knowledge, which forms the basis for many other ecologically oriented disciplines, such as forestry, agriculture, wildlife, and environmental. These concepts are essential since the students will utilize these knowledge in more specific courses. This course also exposed students to investigate how all living organisms interact with each other and their environment.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the technical aspect of ecology and biodiversity including the importance of biodiversity element.
2. Perform scientific biological survey and experiments.
3. Collaborate with team members in planning and performing scientific investigation.

CBB30204 Bioseparations Engineering Technology

Rationale for inclusion of the course in the program:

The students should be able to define and apply various techniques in bioproduct recovery technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Justify the appropriate techniques in bioproduct recovery stages.
2. Perform the operation in downstream processing.
3. Organize work in team either as a leader or ordinary member.
4. Perform the common unit operation involved in bioseparation to solve problems using data from relevant source.

CBB30503 Bio-Pharmaceutical

Rationale for inclusion of the course in the program:

The objective of this course is to provide the students with a knowledge related to the development process of biopharmaceutical products. Furthermore, it's also aim to provide an overview of the biopharmaceutical industry and also good manufacturing practice (GMP)..

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the manufacturing processes involved in biopharmaceutical products together with the product reaction mechanisms and verify the recently developed processes of biopharmaceutical products using data from relevant sources.
2. Conduct the laboratory works based on the theory learned.
3. Demonstrate the ability to work in a team either as a leader or an ordinary member.
4. Perform the common unit operation involved in bioseparation to solve problems using data from relevant source.

CSB30303 Scale Up Process And Optimization

Rationale for inclusion of the course in the program:

The students will be exposed to the scale up process and modeling activity as well as optimization of chemical and biological applied system.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the application of scale up process in solving engineering problem.
2. Perform scaling up and optimization for biochemical process.
3. Demonstrate ability to work in team either as a leader or ordinary member.

CSB31003 Microbial Physiology

Rationale for inclusion of the course in the program:

The students will be exposed to various physiological metabolic processes of bacteria with emphasis on growth, nutrition, synthesis of cellular constituents and energy yielding processes.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe how the different biochemical and physiological functions are integrated, coordinately regulated, and expressed within the cell.
2. Perform and explain the basic procedures used in studying microbial physiology.
3. Demonstrate ability to work in team either as a leader or ordinary member.
4. Apply the knowledge of microbial physiology to solve scientific problems arise in the biological industries.

CSB30003 Quality Assurance in Bio- Product

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in imparting the knowledge on quality assurance in processing, end product as well as standardization methods involved together with regulations.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyse the quality characteristics of bio products and quality management systems implementation in bio products manufacturing process.
2. Perform the quality control analysis by applying selected quality management process and tools to maintain the quality of bio products.
3. Justify the importance of quality assurance towards ethical production of bio products.

CSB31203 Biosystem Design Project 1

Rationale for inclusion of the course in the program:

To impart the design concepts in biosystem plant and develop students' knowledge of contemporary issues related to bioproduct processing and process design.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Determine the fundamental knowledge and skills of biosystem engineering in designing bioproduct plant during preliminary stage.
2. Calculate the mass and energy balances to design a biosystem plant in order to produce a high profitable product.
3. Organize in teams by work effectively in problem solving and participate in regular project status meetings.

CSB40104 Biosystem Design Project 2

Rationale for inclusion of the course in the program:

To impart the design concepts in biosystem plant and develop students' knowledge of contemporary issues related to bioproduct processing and process design.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Construct the conceptual design equipment for biosystem plant design that solves the safety and environmental issues.
2. Construct the design using computational tools (software) which is simulation program.
3. Determine the profitability analysis and prepare a biosystem design report that covers the professional oral and written communication skills.
4. Demonstrate ability to work in team either as a leader or ordinary member by work effectively in problem-solving and participate in regular project status meetings.

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN PROCESS

1. Program Structure

2. Major Courses

PROGRAM STRUCTURE

- *subject to amendments*

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
3	WEB20202	Professional English 1	2	10	16	0	5	49	80
4	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
5	WEB 10302	Fundamental English	2	10	16	0	4	50	80
6	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
7		Foreign Language 1	1	21	0	0	4	25	50
		TOTAL	16	108	86	59	79	318	650

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
2	CLB19303	Mathematics 2	3	28	24	0	6	62	120
3	CLB21403	Engineering Design	3	15	30	36	9	30	120
4	MPU3113/ MPU3173	Hubungan Etnik / PENGAJIAN MALAYSIA 3	3	17	0	0	25	78	120
5	CLB10904	Chemical Process Principles	4	28	14	59	7	53	161
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
7		Foreign Language 2	1	21	0	0	4	25	50
		TOTAL	20	154	82	183	62	330	811

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
2	CLB10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	CLB21204	Transport Process Principles	4	28	18	29	5	80	160
5	CEB20003	Introduction to Environmental Engineering Technology	3	22	0	43	9	46	120
6	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/ Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
		TOTAL	18	123	36	174	61	326	720

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WEB20302	Professional English 2	2	13	13	0	2	52	80
2	CPB40003	Introduction Renewable Energy	3	14	14	10	9	73	120
3	CKB20104	Reaction Engineering	4	28	20	56	6	50	160
4	CPB21404	Separation Process	4	28	28	78	7	19	160
5	MPU34*2	Co-curriculum	2	16	6	2	6	30	60
6	CKB30103	Industrial Safety & Health	3	28	8	28	5	51	120
		TOTAL	18	127	89	174	35	275	700

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB30004	Process Dynamics & Control	4	24	4	46	6	80	160
2	CPB20203	Numerical Methods in Chemical Engineering	3	22	30	0	10	52	114
3	CPB30703	Design Project 1 (Design & Feasibility Study of Plant)	3	14	0	28	2	76	120
4	CPB20403	Plant Utilities & Maintenance	3	17	17	29	7	50	120
5	CLB21303	Process Instrumentation & Control	3	22	0	33	5	60	120
6	WBB20103	Technopreneurship	3	10	20	0	2	88	120
		TOTAL	19	77	51	103	25	258	514

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB30404	Design Project 2 (Plant & Process Optimization)	4	34	0	96	0	30	160
2	CPB30503	Petrochemical & Petroleum Refining Technology	3	26	0	32	5	57	120
3	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
4	CLB30003	Oil & Fat Process Technology	3	16	10	37	5	52	120
5	CPB49804	Final Year Project 1	4	5	0	110	1	44	160
6		Elective 1	3	34	17	0	5	64	120
		TOTAL	20	143	55	275	24	303	800

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB49906	Final Year Project 2	6	5	0	205	1	29	240
2	CPB30603	QA & QC in Chemical Engineering	3	28	24	0	6	62	120
3	MPU3242	Innovation Management	2	15	30	0	5	30	80
4	CPB30103	Biochemical Engineering	3	23	0	34	5	58	120
5		Elective 2	3	28	28	0	8	56	120
6		Elective 3	3	34	17	0	4	65	120
		TOTAL	20	133	99	239	29	300	800

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB41009	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

*****Additional Module (Credit not included in Total Credit to Graduate –TCG)**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

140 credit

Total Credit to Graduate (TCG): 140 Credit Hours

Foreign Language*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WMD10101	Mandarin 1	1	21	0	0	4	25	50
2	WMD10201	Mandarin 2	1	21	0	0	4	25	50
3	WAD10101	Arabic 1	1	21	0	0	4	25	50
4	WAD10201	Arabic 2	1	21	0	0	4	25	50

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CFB31303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	120
10	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
11	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
12	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

Co-Curriculum*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU3412	Career Guidance 2	2	17	6	2	4	51	80
2	MPU3422	Community Service 2	2	17	0	0	12	51	80
3	MPU3432	Culture 2	2	20	0	12	0	48	80
4	MPU3442	Rakan Masjid 2	2	17	0	0	8	55	80
5	MPU3452	Siswa-siswi Bomba & Penyelamat 2	2	17	0	20	0	43	80
6	MPU3462	Siswa-siswi Pertahanan Awam Malaysia 2	2	17	0	16	0	47	80
7	MPU3472	Sports Management 2	2	17	0	16	0	47	80
8	MPU3482	Personal Financial Management 2	2	17	0	18	3	42	80
9	MPU3492	Askar Wataniah	2	17	0	23	0	40	80

Note :

***Additional Module - MPU2213 Bahasa Kebangsaan A

a. For local students without credit in B. Melayu (SPM) only and the credit is not included in program Total Credit to Graduate (TCG).

MAJOR COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN PROCESS

CPB21404 Separation Process
CPB20203 Numerical Methods in Chemical Engineering
CPB20403 Plant Utilities & Maintenance
CPB30004 Process Dynamics & Control
CPB 30303 Oil & Fat Process Technology
CPB30703 Design Project 1 (Design & Feasibility Study of Plant)
CPB30103 Biochemical Engineering
CPB30404 Design Project 2
CPB30503 Petrochemical & Petroleum Refining Technology
CPB40003 Introduction Renewable Energy
CPB30603 QA & QC in Chemical Engineering

CPB21404 Separation Process**Rationale for inclusion of the course in the program:**

Separation processes are crucial in chemical engineering because almost all industrial chemical processes include operations for separating chemicals contained in the process feed(s) and/or produced in reactors within the process. This course is intended to impart the students with the basic principles and operations of separation methods, such as humidification, drying, crystallization, adsorption, and filtration.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the basic principles of humidification, drying, crystallization, adsorption and filtration operations.
2. Apply formula related to the humidification, drying, crystallization, adsorption and filtration processes.
3. Use psychometrics chart to determine the properties in air-water system.
4. Perform laboratory works related to mass transfer operation using semi-pilot rigs, describe the data results, and manipulate the parameters for each experiment.

CPB20203 Numerical Methods in Chemical Engineering**Rationale for inclusion of the course in the program:**

This is an introductory course aimed at providing students with fundamental concepts of biology of cells' components which form the foundation for their study in later years. These concepts are essential as students will encounter them at higher-level courses.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply numerical methods to various types of problems in solving a system of linear equations and nonlinear equations
2. Select appropriate numerical methods to solve problems in chemical engineering using regression, interpolation and numerical differentiation of data and functions
3. Apply numerical solution algorithms to solve the ordinary differential equations
4. Apply numerical solution algorithms to solve the 1-D/2-D heat equation and 2-D wave equation

CPB20403 Plant Utilities & Maintenance**Rationale for inclusion of the course in the program:**

The course is aimed at providing students with the basic knowledge in supporting equipments or facilities found in chemical processing plants and also to provide students with the framework in plant maintenance.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Differentiate Plant Utilities System and plant management in chemical processing plants.
2. Demonstrate ability to work in team either as a leader or ordinary group member.
3. Apply standard monitoring and critical analysis on typical maintenance during commissioning, plant operation and shutdown.

CPB30004 Process Dynamics & Control**Rationale for inclusion of the course in the program:**

This course will impart knowledge to the students on the various aspects of fundamental process control and its applications in the chemical industries.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Develop an understanding of process dynamics and control system.
2. Distinguish the results, graph and control tuning data obtained from practical session.
3. Analyze process behaviour in various control strategies in chemical process.
4. Construct a mathematical modelling of dynamic process with selected software.

CPB30303 Oil & Fat Process Technology**Rationale for inclusion of the course in the program:**

This course introduces students to the Oils and Fat Technology and practises. The course encompass source of oils, common methods of extraction, refining, modification, usage and nutritional perspective. Furthermore, Malaysia is one of the major producer of palm oil which contributes half of global oils and fats market

Learning Outcomes:

Upon completion of this course students should be able to:

1. Integrate basic chemistry and engineering courses to Oil and Fat Technology fundamental.
2. Demonstrate pilot plant experiments with relevant apparatus and standards given to produce desire products.
3. Develop potential products or modification process as entrepreneurship projects.

CPB30703 Design Project 1 (Design & Feasibility Study of Plant)

Rationale for inclusion of the course in the program:

This course is aimed at providing students with the understanding of basic principles and fundamentals in the various aspects of designing a chemical plant. It also aims at introducing the use of computer aided process design software in solving engineering problems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply basic fundamentals and concepts in chemical engineering in developing solutions to chemical engineering design problems.
2. Perform preliminary design of a chemical processing plant.
3. Use design computational tools for employ process simulation program.
4. Effectively perform in process design team to plan and modify a design process as needed.

CPB30103 Biochemical Engineering

Rationale for inclusion of the course in the program:

This course introduces the fundamental biochemical engineering concepts primarily to chemical engineers. To accommodate those who do not have the biological background, the course will first introduce the basic ideas from microbiology, biochemistry, and biology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyse different biochemical engineering concepts and ways of thinking.
2. Perform laboratory works related to the enzyme activity and microbial growth according to standard operating procedure and safety working procedure.
3. Evaluate biochemical engineering process and reactors in terms of analysis, design, operation and monitoring.

CPB30404 Design Project 2**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with the understanding of basic principles and fundamentals in the various aspects of designing a chemical plant. It also aims at introducing the use of computer aided process design software in solving engineering problems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Perform chemical engineering design solution by applying chemical engineering principles.
2. Conduct equipment design for an industrial chemical process.
3. Demonstrate an awareness and understanding of social, safety and health, environment consideration and economic impacts in solving chemical engineering design.
4. Demonstrate the ability to work in team and communicate effectively as a leader or team members to discuss and plan the design.

CPB 30503 Petrochemical & Petroleum Refining Technology**Rationale for inclusion of the course in the program:**

Petrochemical & Petroleum Refining Technology is one of the most important fields in chemical industry. This course will impart knowledge on fundamentals of petroleum refining, petrochemical technology and natural gas processing technology. The topics include theoretical and practical for Petroleum Products Testing and Natural Gas Analysis.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Compare the process involved in petroleum refining, natural gas and petrochemicals synthesis.
2. Solve the problems involve in petroleum refining, natural gas and petrochemical synthesis using data/information given.
3. Analyse properties of crude oil and petroleum products based on results obtained by crude assays, laboratory experiments and Material Safety Data Sheet (MSDS).
Propose solutions on problems or effects related to petroleum refining, natural gas processing and petrochemical industries.

CPB 40003 Introduction Renewable Energy

Rationale for inclusion of the course in the program:

This is an introductory course aiming to provide students with a basic understanding of renewable energy technology, the current and forecasted energy requirement scenarios and the roles of renewable energies in Malaysia.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Assess the sources and importance of renewable energy technology for sustainable development.
2. Relate the processes of converted renewable energy to useful forms.
3. Discuss their opinions on issues relating the renewable energy.

CPB 30603 QA & QC in Chemical Engineering

Rationale for inclusion of the course in the program:

This course is aimed at providing students with the concept of controlling chemical process and products via quality control and statistical techniques.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the concept of statistical quality control (SQC), statistical process control (SPC) and the process capability study.
2. Construct the quality tools to solve quality problems in conducting quality improvement activities.
3. Explain the process outcome based on control charts and acceptance sampling.

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN ENVIRONMENT

- 1. Program Structure**
- 2. Major Courses**

PROGRAM STRUCTURE

- *subject to amendments*

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
3	WEB20202	Professional English 1	2	10	16	0	5	49	80
4	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
5	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
6	WEB10302	Fundamental English	2	10	16	0	4	50	80
7		Foreign Language 1	1	21	0	0	4	25	50
		TOTAL	16	108	86	59	79	318	650

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB21403	Engineering Design	3	15	30	36	9	30	120
2	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
3	CLB19303	Mathematics 2	3	28	24	0	6	62	120
4	MPU3113/ MPU3173	Hubungan Etnik / Pengajian Malaysia 3	3	17	0	0	25	78	120
5	CLB12004	Chemical Process Principles	4	28	14	59	7	53	161
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
7		Foreign Language 2	1	21	0	0	4	25	50
		TOTAL	20	154	82	183	62	330	811

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
2	CLB 10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	CLB21204	Transport Process Principles	4	28	18	29	5	80	160
5	CEB20003	Introduction to Environmental Engineering Technology	3	22	0	43	9	46	120
6	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
		TOTAL	18	123	36	174	61	326	720

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WEB20302	Professional English 2	2	13	13	0	2	52	80
2	CFB20002	Introduction to Food Science and Technology	2	32	0	0	7	41	80
3	CFB20603	Chemical Food Analysis	3	26	0	39	13	42	120
4	CFB20303	Food Microbiology	3	28	0	42	7	43	120
5	MPU34*2	Co-curriculum	2	16	6	2	6	30	60
6	CKB30103	Industrial Safety & Health	3	28	8	28	5	51	120
7	CFB20703	Food Chemistry	3	28	0	42	5	45	120
		TOTAL	18	171	27	153	45	304	700

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CFB 40403	Instrumental Food Analysis	3	27	0	44	6	43	120
2	WBB20103	Technopreneurship	3	10	20	0	2	88	120
3	CFB31003	Food Quality & Safety Management System	3	47	0	6	8	59	120
4	CLB21303	Process Instrumentation & Control	3	22	0	33	5	60	120
5	CFB30203	Food Packaging Technology	3	28	0	42	7	46	123
6	CFB30103	Food Sensory and Evaluation	3	28	0	42	5	45	120
		TOTAL	18	162	20	167	33	341	723

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WPB49804	Final Year Project 1	4	5	0	110	1	44	160
2	CFB30104	Food Processing and Innovation	4	30	0	54	8	68	160
3	CFB31103	Food Process Engineering	3	19	18	21	7	55	120
4	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
5	CLB30003	Oil & Fat Process Technology	3	16	10	37	5	52	120
6		Elective 1	3						120
		TOTAL	20	98	56	222	29	275	800

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WPB49906	Final Year Project 2	6	5	0	205	1	29	240
2	CFB40104	Food Plant Design	4	36	0	45	8	71	160
3	MPU3242	Innovation Management	2	15	30	0	5	30	80
4	CFB30803	Halal Technology	3	28	0	42	7	43	120
5		Elective 2	3						120
6		Elective 3	3						120
		TOTAL	21	84	30	292	21	173	840

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB39909	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

*****Additional Module (Credit not included in Total Credit to Graduate –TCG)**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

TCG 140 credit

Total Credit to Graduate (TCG): 140 Credit Hours

Foreign Language*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WMD10101	Mandarin 1	1	21	0	0	4	25	50
2	WMD10201	Mandarin 2	1	21	0	0	4	25	50
3	WAD10101	Arabic 1	1	21	0	0	4	25	50
4	WAD10201	Arabic 2	1	21	0	0	4	25	50

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CJB30303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	122
9	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
10	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
11	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

Co-Curriculum*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3412	Career Guidance 2	2	17	6	2	4	51	80
2	MPU 3422	Community Service 2	2	17	0	0	12	51	80
3	MPU 3432	Culture 2	2	20	0	12	0	48	80
4	MPU 3442	Rakan Masjid 2	2	17	0	0	8	55	80
5	MPU 3452	Siswa-siswi Bomba & Penyelamat 2	2	17	0	20	0	43	80
6	MPU 3462	Siswa-siswi Pertahanan Awam 2	2	17	0	16	0	47	80
7	MPU 3472	Sports Management 2	2	17	0	16	0	47	80
8	MPU 3482	Personal Financial Management 2	2	17	0	18	3	42	80
9	MPU 3492	Askar Wataniah	2	17	0	23	0	40	80

Note :

***Additional Module - MPU2213 Bahasa Kebangsaan A

a. For local students without credit in B. Melayu (SPM) only and the credit is not included in program Total Credit to Graduate (TCG).

MAJOR COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN ENVIRONMENT

CEB20303 Environmental Microbiology and Chemistry

CEB20103 Surface and Groundwater Hydrology

CEB30003 Environmental Management System

CEB30403 Air Pollution Control Technology

CEB30503 Waste Water Treatment Technology

CEB31303 Life Cycle Analysis for Environmental Eng.

Technology

CEB30103 Pollution Prevention & Industrial Waste Minimization

CEB30703 Water Treatment Technology

CEB30903 Solid and Hazardous Waste Management

CEB40503 Remote Sensing and Geographic Information System

in Environmental Engineering

CEB40004 Environmental Engineering Design

CEB20303 Environmental Microbiology & Chemistry**Rationale for inclusion of the course in the program:**

This course introduces the fundamental concepts of chemistry and microbiology with application to the environment. The students are introduced to the existence, characteristics, behavior and effects of harmful chemical substances in the environment medium and the control of it. They are also trained on basic principles and practical applications of microbiology to current environmental problems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply concepts of chemical and microbial processes occurring in the environment and their scientific basis.
2. Display basic laboratory skills in studying chemical and microbial processes in the environment. Demonstrate ability to work in a team and professional communication skills.

CEB20103 Surface and Groundwater Hydrology**Rationale for inclusion of the course in the program:**

The overall course objective is to educate students on surface water hydrology with special emphasis on extreme hydrologic phenomena, understand how elements of the hydrologic cycle impact environmental engineering systems, understand how to use hydrology to design hydraulic systems, understand the importance of a probabilistic approach of analysis, understand how observations of the hydrologic cycle are made and how they can be appropriately used and to predict risks and reliabilities of flood control systems.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain in detail how surface and groundwater systems function.
2. Use hydrographs to distinguish overland flow and interflow from base flow, and make inferences about the climate of an area.
3. Perform water quality sampling procedures including collection, transportation of samples, chain of custody paperwork, preservation of samples, and reporting.
4. Apply modelling tools for water cycle systems

CEB30003 Environmental Management System**Rationale for inclusion of the course in the program:**

To provide students with the knowledge of the current practices and policies pertaining to the development, implementation and maintenance of environmental management system (EMS) in an organization. ISO standards will be examined and case studies will be used to highlight the key factors involved with EMS implementation. The process of assessing environmental impacts and aspects and implementing continuous improvement measured will be addressed. Comparable Environmental Quality Act (EQA) 1974 will be examined to reinforce management system concepts.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Assess and analyze research literature to be able to solve broadly defined chemical engineering technology problems reaching substantiated capacity towards maintaining of an existing environmental management system, or assisting in developing a new system.
2. Increase proficiency in the academic knowledge of the subject area, and also to formulate environmental management systems through working in partnership with a 'real-life' client organization.
3. Select and manipulate the applicable tools appropriate to area of specialization and help develop environmental management systems, with an understanding of the limitations.

CEB30403 Air Pollution Control Technology**Rationale for inclusion of the course in the program:**

To provide students with strong fundamental knowledge of the sources of air, noise and vibration pollution, monitoring and control techniques and parameters addressed in Malaysia's Clean Air Regulation, Industry Code of Practice on Indoor Air Quality and Factory and Machinery Act.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply the principle of air quality control equipment and analyze the factors that would affect the efficiency of the equipment in terms of performance and cost effectiveness..
2. Perform air quality and noise monitoring and evaluate the results based on their engineering judgement.
3. Identify the sources of air pollutions and evaluate the requirement of Malaysian laws related to it.
4. Demonstrate good communication, teamwork, leadership, problem solving and lifelong learning.

CEB30503 Waste Water Treatment Technology

Rationale for inclusion of the course in the program:

To provide students with strong fundamental knowledge of wastewater treatment techniques and to provide students in understanding the differences between chemical and biological treatment in wastewater treatment. Other than that, to provide students with basic design of wastewater treatment technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply basic understandings of physical, chemical, and biological phenomena to the successful design and operation of industrial wastewater treatment plants.
2. Perform the wastewater samples using standard test procedures and ascertain the quality of the sample.
3. Communicate effectively through the preparation of reports or technical papers

CEB31303 Life Cycle Analysis for Environmental Engineering Technology

Rationale for inclusion of the course in the program:

To provide student knowledge about Life Cycle Analysis (LCA), a framework for evaluation of the environmental footprints of various systems and technologies. Application of Life Cycle Analysis on various energy, product and transport technologies and system.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Assess and analyze research literature to be able to solve broadly defined chemical engineering technology problems reaching substantiated capacity towards the development and application of techniques and methodologies at advanced level.
2. Increase proficiency in the academic knowledge of the subject area, and also to formulate environmental management systems through properly evaluating the environmental impact or sustainability of a process or product
3. Select and manipulate the applicable tools appropriate to area of specialization and help assessing and quantifying sustainability by using particularly suitable multicriteria decision techniques.

CEB30103 Pollution Prevention & Industrial Waste Minimization**Rationale for inclusion of the course in the program:**

This course provides an in-depth coverage of waste inventories at macro- and mesoscale, emission monitoring and estimation methods, and techniques to identify critical waste streams as targets for pollution prevention and waste minimization programs. Once identified, generic methods including raw material selection (LCA), solvent loss prevention in cleaning operations and from storage, pollution reduction techniques (reaction pathway engineering) for reactors, heat exchangers and separation units with focus on the chemical and petrochemical industries are discussed and applied. Focusing on a particular industrial sector allows for a fairly comprehensive treatment of waste reduction methods. Emphasis on chemical industry is relevant because these industries are responsible for the majority of scheduled waste in Malaysia and other industrialised nations. Once the pollution prevention options have been identified using appropriate tools (e.g. LCA), they are evaluated based on their economics (e.g. by using the total cost assessment or life cycle cost methods.) The group work in the form of a mini-project is designed to foster team work skills, apply and practice software, literature search and data analysis skills to arrive at a technically and economically sound solution to the given industrial problem.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Develop concepts and solutions for industrial pollution prevention and waste minimization at macro- and mesoscale using appropriate resources.
2. Examine the types and role of legislative acts related to pollution prevention and waste minimization towards sustainable development.
3. Evaluate waste management alternatives based on financial methods (e.g. total cost assessment, financial forecast and planning).
4. Demonstrate ability to work in a team.

CEB 30703 Water Treatment Technology**Rationale for inclusion of the course in the program:**

This course aimed to provide students with strong fundamental knowledge of water treatment techniques and basic design of water treatment technology to produce quality drinking water required by World Health Organization (WHO) standard and Environmental Quality Act (EQA) 1974.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Differentiate the types of water treatment processes using basic design approach.
2. Measure the water quality and construct a report.
3. Shows the ability to propose a plan to mitigate the problems related to water quality issues in Malaysia.

CEB30903 Solid and Hazardous Waste Management

Rationale for inclusion of the course in the program:

This course is important for the household and industrial management waste for the students to embark in their career. It is crucial to have basic in the management of both solid and hazardous waste in industry for sustainable development.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the principles of waste management, handling, processing, treatment, transformation, recovery and disposal operations, relevant issues, implications from improper waste management and potential solutions towards an improved condition.
2. Organize suitable waste management program or project or demonstration to include correct minimization principles, handling techniques and storage of solid or hazardous waste or potential value added of waste resources.
3. Accommodate team members in planning, executing and performing literature search on engineering technology solutions in the society and the demands on sustainable development waste management.

CEB40503 Remote Sensing and Geographic Information System in Environmental Engineering

Rationale for inclusion of the course in the program:

This basic course highlighted the advantages of remote sensing assistance in the ability to learn about the Earth's surface and atmosphere from a distance (or those of other planets), and it allows us to study large regions more easily than we could do on the ground. This course is an introduction to the techniques of observing the Earth from air- and space-borne instruments. Some basic issues of geometry and scale associated with making these measurements, electromagnetic properties of Earth surface materials, the range of instruments used to observe the Earth, and applications of satellite remote sensing to geological and environmental questions will be covered.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Investigate the current issues and the importance terms using remote sensing and geographic information system.
2. Explain the concepts of GIS and spatial methods including digital imagery, data acquisition, interpretation, processing, storage and retrieval as modern tool.
3. Relate the theoretical knowledge with the actual uses of remote sensing and GIS during field work.
4. Identify problem and solve using appropriate engineering method.

CEB40003 Environmental Engineering Design

Rationale for inclusion of the course in the program:

To guide students through Senior Design Project effort through consultation, and interaction with student groups in formal presentation and informal bi-weekly meeting setting. Develop an understanding of Professional Practice issues related to Professional Ethics and Liability, relationship with Owner/Operators and Constructors, Professional Licensing, and products of engineering design projects.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Recommend the best solution in engineering problem.
2. Design the environmental treatment facilities.
3. Write process design report that covers the professional oral and written communication skills.
4. Demonstrate ability to work in team either as a leader or ordinary member by work effectively in problem-solving and participate in regular project status meetings.

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN POLYMER

- 1. PROGRAM STRUCTURE**
- 2. MAJOR COURSES**

PROGRAM STRUCTURE

- subject to amendments

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	WEB20202	Professional English 1	2	10	16	0	5	49	80
3	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
4	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
5	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
6	WEB 10302	Fundamental English	2	10	16	0	4	50	80
7		Foreign Language 1	1	21	0	0	4	25	50
		TOTAL	16	108	86	59	79	318	650

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
2	CLB19303	Mathematics 2	3	28	24	0	6	62	120
3	CLB 21403	Engineering Design	3	15	30	36	9	30	120
4	MPU3113/ MPU3173	Hubungan Etnik / Pengajian Malaysia 3	3	17	0	0	25	78	120
5	CLB10904	Chemical Process Principles	4	28	14	59	7	53	161
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
7		Foreign Language 2	1	21	0	0	4	25	50
		TOTAL	20	154	82	183	62	330	811

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
	CEB20003	Introduction to Environmental Engineering Technology	3	22	0	43	9	46	120
2	CLB 10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	CLB21204	Transport Process Principles	4	28	18	29	5	80	160
6	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
		TOTAL	18	123	36	174	61	326	720

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WEB20302	Professional English 2	2	13	13	0	2	52	80
2	CRB20003	Introduction to Polymer Science & Technology	3	16	0	28	6	67	117
3	CKB20104	Reaction Engineering	4	28	20	56	6	50	160
4	CRB30003	Composite Technology	3	27	0	43	8	42	120
5	MPU34*2	Co-curriculum	2	16	6	2	6	30	60
6	CKB30103	Industrial Safety & Health	3	28	8	28	5	51	120
7	CRB30203	Plastics Processing	3	33	0	45	6	36	120
		TOTAL	20	161	47	202	39	328	777

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CRB30103	Polymer Synthesis	3	26	0	49	6	46	127
2	WBB20103	Technopreneurship	3	10	20	0	2	88	120
3	CRB 20103	Latex Technology	3	23	0	27	8	64	122
4	CLB21303	Process Instrumentation & Control	3	22	0	33	5	60	120
5	CRB30603	Polymer Rheology	3	26	0	36	9	49	120
6	CRB 30303	Rubber Technology	3	23	0	39	8	49	119
		TOTAL	18	130	20	184	38	356	728

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CRB30803	Polymeric Material Design 1	3	14	0	42	2	64	125
2	CRB 30403	Polymer Reaction Engineering	3	26	0	38	9	47	123
3	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
4	CPB49804	Final Year Project 1	4	5	0	110	1	44	160
5	CLB30003	Oil & Fat Process Technology	3	16	10	37	5	52	120
6		Elective 1	3						120
		TOTAL	19	89	38	227	25	263	768

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB49906	Final Year Project 2	6	5	0	205	1	29	240
2	MPU3242	Innovation Management	2	15	30	0	5	30	80
3	CRB40603	Polymeric Material Design 2	3	14	0	42	2	64	122
4	CRB40003	Mold & Die Design	3	30	0	24	9	56	119
5		Elective 2	3						120
6		Elective 3	3						120
		TOTAL	20	64	30	271	17	179	801

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB41009	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

*****Additional Module (Credit not included in Total Credit to Graduate –TCG)**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

TCG 140 credit

Total Credit to Graduate (TCG): 140 Credit Hours

Foreign Language*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WMD10101	Mandarin 1	1	21	0	0	4	25	50
2	WMD10201	Mandarin 2	1	21	0	0	4	25	50
3	WAD10101	Arabic 1	1	21	0	0	4	25	50
4	WAD10201	Arabic 2	1	21	0	0	4	25	50

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CFB31303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	122
9	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
10	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
11	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CFB31303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	122
9	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
10	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
11	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

MAJOR COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN POLYMER

CRB20003 Introduction to Polymer Science & Technology
 CRB20103 Latex Technology
 CRB30003 Composite Technology
 CRB30103 Polymer Synthesis
 CRB30203 Plastic Processing
 CRB30303 Rubber Technology
 CRB30403 Polymer Reaction Engineering
 CRB30603 Polymer Rheology
 CRB30803 Polymeric Material Design 1
 CRB40003 Mold & Die Design
 CRB40603 Polymeric Material Design 2

CRB 20003 Introduction to Polymer Science & Technology**Rationale for inclusion of the course in the program:**

This is an important course aimed at providing students with the fundamental principles of polymeric materials; the various polymerization mechanism and methods; rubbers, plastics, thermoplastic elastomers and composites key characteristics, applications as well as their manufacturing techniques. This course is essential for students majoring in polymer as these fundamental concepts are a must for subsequent semesters.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Summarize commercial rubbers, plastics, thermoplastic elastomers and composites – their characteristics, applications and manufacturing techniques
2. Differentiate between number average and weight average molecular weight of polymers; polymerization types and polymerization techniques
3. Propose suitable general manufacturing techniques of polymer products based on the current scenario
4. Demonstrate role as individual or team members effectively in assignment work.

CRB20103 Latex Technology**Rationale for inclusion of the course in the program:**

This is a fundamental course to provide students with latex science and technology knowledge. This course covers skills in preparation, testing and evaluation of latex concentrate and compounded latex. Latex products and processing are also discussed.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the mechanism of stabilization of latex, latex compounding ingredients and their preparation methods and latex products manufacturing techniques.
2. Analyze data obtained from various test related to latex technology i.e. incoming data, processing and outgoing data, using fundamental knowledge of latex science and technology.
3. Demonstrate laboratory works of latex concentrate according to the relevant processing and test methods.

CRB 30003 Composite Technology**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with information on the fundamental characteristics of polymer composites and their applications. Materials that can be used to produce polymer composites are discussed. Composite design, manufacturing processes and their shortcomings are highlighted.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyze the components of polymer composites, their advantages, their commercial applications and composite design
2. Summarize between the different types of reinforcement, fibres and polymer composites manufacturing
3. Propose remedies for common composite defects
4. Performs the preparation and processing of polymer composites according to different processing techniques and requirement, embedding technopreneurial element in selected polymer composite laboratory works
5. Demonstrate ability to work in a team either as a leader or ordinary member.

CRB30103 Polymer Synthesis**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with information on; various polymerization processes; copolymerization processes and the methods to control it. Students also carry out the polymerization processes in laboratory sessions.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Compare the types of polymers and polymerization
2. Evaluate the differences between step-growth polymerization, chain-growth polymerization and co-polymerization in terms of its mechanisms, kinetics and modes of polymerization
3. Perform suitable polymerization steps according to different polymerization methods safely
4. Work effectively as individuals and team members in laboratory sessions.

CRB30203 Plastic Processing

Rationale for inclusion of the course in the program:

This course provides students with detailed concepts of plastics processing which include details of selection and operation of the processing equipment. These concepts are essential in selecting different types of plastics processing methods used in the plastics industry.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Evaluate the various plastics materials, additives and their properties.
2. Evaluate the various plastics processing techniques.
3. Organize the preparation and processing of plastics products according to different processing techniques and requirements; embedding technoprenurial elements as part of the requirement.
4. Demonstrate role as a leader or a team member effectively.

CRB30303 Rubber Technology

Rationale for inclusion of the course in the program:

This course is aimed at providing students with the fundamental principles of rubber technology and skills in compounding, testing and evaluating compounded rubber. Rubber processing techniques are also covered.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Evaluate the structure, properties and application of various types of commercial rubber.
2. Evaluate the rubber processing methods, remedies for typical defects, rubber compound and rubber vulcanizate performances.
3. Demonstrate typical rubber processing and testing on rubber compounds and/or rubber vulcanizates.
4. Demonstrate entrepreneurial elements in selected laboratory report

CRB30403 Polymer Reaction Engineering**Rationale for inclusion of the course in the program:**

This course aims to provide students with information on types of reactors and conceptual reactor modelling in step-growth and chain-growth polymerization. Impact of process variables, on-line monitoring and control are also highlighted.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Summarize the principles of processes, reactor modelling concept as well as effect of types of reactors for step-growth and chain-growth polymerizations.
2. Predict major issue arises in industry in various polymerization techniques and effects of major polymerization process variables.
3. Propose suitable on-line monitoring and control in polymerization process.
4. Join effective group discussion in completing assignment.

CRB30603 Polymer Rheology**Rationale for inclusion of the course in the program:**

This course aimed to provide students basic rheology concept and shear viscosity relationship. Types of rheometry are also highlighted. Effects of additives to the rheology behaviour were also discussed. Polymer rheology behaviour during processing is explained.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Summarize the flow phenomena of polymeric fluid and types of rheometry.(C5)
2. Perform calculation on the capillary rheometer correction.(C4)
3. Predict the effects of chemical structure, molecular structure, temperature, pressure and presence of additives to the rheological behaviour of polymer melts in typical thermoplastic processing techniques.(C5)
4. Work effectively as individuals and team member.

CRB30803 Polymeric Material Design 1**Rationale for inclusion of the course in the program:**

This course aims to provide students with information on types and functions of various additives. Students are then expected to propose general compounding formulation for specific applications using appropriate additives ingredients.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Summarize the material selection based on the role of materials, properties chart, process-design models and indices.
2. Propose the suitable polymer modifier, formulation, performance and analysis of polymer blends.
3. Prepare either polymer additives or blends using suitable methods in mini projects.
4. Demonstrate the ability to work with members of the team to discuss and plan the design.

CRB40003 Mold & Die Design**Rationale for inclusion of the course in the program:**

The aim of this subject is to provide students with in-depth knowledge in the design and manufacture of moulds and dies for polymer engineering components, the related performance of moulds and dies as well as processes, and their effects on the quality of finished products.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identifies proper techniques, tooling principles and design criteria for mould and die construction.
2. Justifies mould and die tools design criteria.
3. Construct product, mould and die drawing using CAD methods; including technopreneurial elements in the mini-projects.
4. Work effectively in a team either as a leader or team member.

CRB40603 Polymeric Material Design 2**Rationale for inclusion of the course in the program:**

This course aims to provide students with information of design and fabrication of polymeric materials. Selection of processing methods, testing and characterization are also discussed.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Evaluate the suitable processing method and testing and/or characterization in polymeric material design.
2. Perform processing testing and/or characterization in mini-project
3. Generate cost saving budget element in mini project.
4. Demonstrate the ability to work with members of the team to discuss and plan the design.

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN BIOPROCESS

- 1. PROGRAM STRUCTURE**
- 2. MAJOR COURSES**

PROGRAM STRUCTURE

- subject to amendments

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
3	WEB20202	Professional English 1	2	10	16	0	5	49	80
4	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
5	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
6	WEB10302	Fundamental English	2	10	16	0	4	50	80
7		Foreign Language 1	1	21	0	0	4	25	50
		TOTAL	16	87	86	59	75	293	600

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
2	CLB19303	Mathematics 2	3	28	24	0	6	62	120
3	MPU3113/ MPU3173	Hubungan Etnik / Pengajian Malaysia 3	3	17	0	0	25	78	120
4	CLB10904	Chemical Process Principles	4	28	14	59	7	53	161
5	CLB21403	Engineering Design	3	15	30	36	9	30	120
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
7		Foreign Language 2	1	21	0	0	4	25	50
		TOTAL	20	154	82	183	62	330	811

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
2	CLB10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	CLB21204	Transport Process Principles	4	28	18	29	5	80	160
5	CEB20003	Introduction to Environmental Engineering Technology	3	22	0	43	9	46	120
6	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/ Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
7	CLB11103	Biology of Cell	3	22	0	50	6	42	120
		TOTAL	21	145	36	224	67	368	840

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CBB20503	Principles of Bioprocess Technology	3	28	0	50	7	35	120
2	WEB20302	Professional English 2	2	13	13	0	2	52	80
3	CKB20104	Reaction Engineering	4	28	20	56	6	50	160
4	CKB30103	Industrial Safety & Health	3	30	0	47	3	40	120
5	MPU34*2	Co-curriculum	2						80
6	CBB20003	Principle of Microbiology	3	30	0	47	3	40	120
7	CBB20303	Biochemistry	3	28	8	28	5	51	120
		TOTAL	20	157	41	228	26	268	800

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB21303	Process Instrumentation & Control	3	22	0	33	5	60	120
2	CBB31104	Bioprocess Development & Equipment	4	30	0	45	7	58	140
3	WBB20103	Technopreneurship	3	10	20	0	2	88	120
4	CSB30603	QA & QC in Bio Product	3	21	0	36	5	58	120
5	CBB30204	Bioseparations Engineering Technology	4	30	0	60	7	63	160
6	CBB30303	Biomolecular Technique	3	28	0	45	7	40	120
		TOTAL	20	141	20	219	33	367	780

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CBB31003	Bioplant Design Project 1	3	34	0	57	5	24	120
2	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
3	CPB49804	Final Year Project 1 (Design Proposal)	4	5	0	110	1	44	160
4	CLB30003	Oil & Fat Process Technology	3	16	10	37	5	52	120
5		Elective 1	3						120
6		Elective 2	3						120
		TOTAL	19	83	38	204	19	176	760

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CPB49906	Final Year Project 2	6	5	0	205	1	29	240
2	CBB40104	Bioplant Design Project 2	4	34	0	54	2	70	160
3	MPU3242	Innovation Management	2	15	30	-	5	30	80
5		Elective 3	3						120
		TOTAL	15	54	30	259	8	129	600

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB41009	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

Additional Module (Credit not included in Total Credit to Graduate –TCG)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

Total Credit to Graduate (TCG) : 140 credit

Total Credit to Graduate (TCG): 140 Credit Hours

Foreign Language*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WMD10101	Mandarin 1	1	21	0	0	4	25	50
2	WMD10201	Mandarin 2	1	21	0	0	4	25	50
3	WAD10101	Arabic 1	1	21	0	0	4	25	50
4	WAD10201	Arabic 2	1	21	0	0	4	25	50

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CFB31303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	120
10	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
11	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
12	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

Co-Curriculum*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU3412	Career Guidance 2	2	17	6	2	4	51	80
2	MPU3422	Community Service 2	2	17	0	0	12	51	80
3	MPU3432	Culture 2	2	20	0	12	0	48	80
4	MPU3442	Rakan Masjid 2	2	17	0	0	8	55	80
5	MPU3452	Siswa-siswi Bomba & Penyelamat 2	2	17	0	20	0	43	80
6	MPU3462	Siswa-siswi Pertahanan Awam Malaysia 2	2	17	0	16	0	47	80
7	MPU3472	Sports Management 2	2	17	0	16	0	47	80
8	MPU3482	Personal Financial Management 2	2	17	0	18	3	42	80
9	MPU3492	Askar Wataniah	2	17	0	23	0	40	80

Note :

***Additional Module - MPU2213 Bahasa Kebangsaan A

- a. For local students without credit in B. Melayu (SPM) only and the credit is not included in program Total Credit to Graduate (TCG).

MAJOR COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN BIOPROCESS

CLB11103 Biology of Cell
CBB20003 Principles of Microbiology
CBB20303 Biochemistry
CBB20503 Principles of Bioprocess Technology
CBB20104 Principles of Bioprocess Engineering Technology
CBB30204 Bioseparations Engineering Technology
CBB30303 Biomolecular Techniques
CSB30603 QA & QC in Bio Products
CBB31003 Bioplant Design Project 1
CBB31104 Bioprocess Development & Equipment
CBB40104 Bioplant Design Project 2

CLB11103 Biology of Cell

Rationale for inclusion of the course in the program:

This is an introductory course aimed at providing students with the fundamental concepts of biology of cells components which form the foundation for their study in later years. These concepts are essential since the students will encounter these knowledge in others high level courses.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the structure and functions of prokaryotes and eukaryotes cells and explain theoretical aspect of plant, animal, genetic and ecology including the importance of biodiversity element.
2. Perform biology laboratory procedures.
3. Collaborate with team members in planning and performing scientific investigation.

CBB20003 Principles of Microbiology

Rationale for inclusion of the course in the program:

To introduce the principles of structure, diversity and characterization of microorganisms and the application of microorganisms in industries.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the classification and characteristics of microorganisms, and their applications in various industries.
2. Explain microbiological concepts clearly, both verbally and in writing.
3. Report microbiological experimental results concisely, including accurately reporting observations and analysis.
4. Display competency in routine and specialized microbiological laboratory skills

CBB20303 Biochemistry

Rationale for inclusion of the course in the program:

To introduce biochemistry to the students by exposing them to the structure and functions of biomolecules, enzyme characteristics and reactions, metabolism and bioenergetics, and biological information flow.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Identify the fundamental structure and dynamic of biomolecules, enzymes characteristics and reactions, metabolism and bioenergetics.
2. Perform Biochemistry laboratory with accurate and highly coordinated skills.
3. Integrate team work ability in practical work or mini project either as a leader or an ordinary member.
4. Apply Biochemistry related practical skills to solve given bioengineering issues.

CBB20503 Principles of Bioprocess Technology

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in bioprocess technology in order to exploit microbial, plant and animal cell systems as products of valuable commodities.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the principles of bioprocess engineering technology.
2. Demonstrate ability to work in team either as a leader or ordinary member.
3. Execute experimental activities associate with bioprocess engineering technology

CBB30204 Bioseparations Engineering Technology

Rationale for inclusion of the course in the program:

The students should be able to define and apply various techniques in bioproduct recovery technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Justify the appropriate techniques in bioproduct recovery stages.
2. Perform the operation in downstream processing.
3. Organize work in team either as a leader or ordinary member.

CBB30303 Biomolecular Techniques

Rationale for inclusion of the course in the program:

This is an intermediate level course aimed at providing and emphasis on cell and molecular biology concepts. These concepts are essential since the students will encounter these at higher level. This is to produce capable graduates equipped with both knowledge and skills in molecular biology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Infer the fundamental and advance knowledge in biomolecular techniques.
2. Perform biomolecular techniques and methodologies based on the theory learned.
3. Demonstrate competency in presenting information in verbal and written forms which encompasses a critical analysis of findings.

CSB30603 QA & QC in Bio Products

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in imparting the knowledge on quality assurance in processing, end product as well as standardization methods involved together with regulations.

Learning Outcomes:

Upon completion of this course students should be able to:

5. Analyse the quality characteristics of bio products and quality management systems implementation in bio products manufacturing process
6. Perform the quality control analysis by applying selected quality management process and tools to maintain the quality of bio products.
7. Justify the importance of quality assurance towards ethical production of bio products.

CBB31003 Bioplant Design Project 1

Rationale for inclusion of the course in the program:

To impart the design concepts in bioprocess plant and develop students knowledge of contemporary issues related to bioproduct processing and process design.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Determine the fundamental knowledge and skills of bioprocess engineering in designing bioproduct plant during preliminary stage.
2. Calculate the mass and energy balances to design a bioprocess plant in order to produce a high profitable product.
3. Organize in teams by work effectively in problem solving and participate in regular project status meetings.

CBB31104 Bioprocess Development & Equipment.

Rationale for inclusion of the course in the program:

This course is aimed to provide students with the knowledge on the principles of bioproduct and bioprocess development which will enable them to work effectively in bioengineering as well as chemical and field.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the stages and equipment used in bioprocess development
2. Conduct the lab scale production of bioproduct by operating bioprocess equipment and utilities
3. Collaborate with team members effectively as an individual, and as a member and/or leader in conducting lab work and completing mini projects.
4. Recognize the importance of sustainability and economic assessment in bioproduct and bioprocess development by considering the presence of limitation

CBB20503 Principles of Bioprocess Engineering Technology

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in bioprocess technology in order to exploit microbial, plant and animal cell systems as products of valuable commodities.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the principles of bioprocess engineering technology.
2. Demonstrate ability to work in team either as a leader or ordinary member.
3. Execute experimental activities associate with bioprocess engineering technology.

CBB40104 Bioplant Design Project 2

Rationale for inclusion of the course in the program:

To impart the design concepts in bioprocess plant and develop students knowledge of contemporary issues related to bioproduct processing and process design.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Construct the conceptual design equipment for bioprocess plant design that solves the safety and environmental issues.
2. Construct the design using computational tools (software) which is simulation program.
3. Determine the profitability analysis and prepare a bioprocess design report.
4. Demonstrate ability to communicate and work effectively in team either as a leader or ordinary member in bioplant design project.

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN FOOD

1. Program Structure

2. Major Courses

- *subject to amendments*

PROGRAM STRUCTURE

YEAR 1: SEMESTER 1

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB19203	Mathematics 1	3	28	24	0	6	62	120
2	CLB40002	Engineering Technologist in Society	2	14	0	23	5	38	80
3	WEB20202	Professional English 1	2	10	16	0	5	49	80
4	MPU3123/ MPU3143	Tamadun Islam & Tamadun Asia (TITAS)/ Bahasa Melayu Komunikasi 2	3	10	0	0	46	64	120
5	CLB10903	Engineering Drawing & Computing	3	15	30	36	9	30	120
6	WEB10302	Fundamental English	2	10	16	0	4	50	80
7		Foreign Language 1	1	21	0	0	4	25	50
		TOTAL	16	108	86	59	79	318	650

YEAR 1: SEMESTER 2

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB21403	Engineering Design	3	15	30	36	9	30	120
2	CLB10703	Physical Chemistry	3	17	14	37	6	46	120
3	CLB19303	Mathematics 2	3	28	24	0	6	62	120
4	MPU3113/ MPU3173	Hubungan Etnik / Pengajian Malaysia 3	3	17	0	0	25	78	120
5	CLB12004	Chemical Process Principles	4	28	14	59	7	53	161
6	CLB11003	Fluid Mechanics	3	28	0	51	5	36	120
7		Foreign Language 2	1	21	0	0	4	25	50
		TOTAL	20	154	82	183	62	330	811

YEAR 2: SEMESTER 3

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CLB10402	Fundamental of Electric & Electronics	2	14	0	27	4	35	80
2	CLB 10803	Analytical & Organic Chemistry	3	30	0	38	7	45	120
3	CLB20403	Thermodynamics	3	17	18	37	6	42	120
4	CLB21204	Transport Process Principles	4	28	18	29	5	80	160
5	CEB20003	Introduction to Environmental Engineering Technology	3	22	0	43	9	46	120
6	MPU3333/ MPU3343	Isu-isu Kontemporari Muslim di Malaysia/Culture and Lifestyle in Malaysia	3	12	0	0	30	78	120
		TOTAL	18	123	36	174	61	326	720

YEAR 2: SEMESTER 4

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WEB20302	Professional English 2	2	13	13	0	2	52	80
2	CFB20002	Introduction to Food Science and Technology	2	32	0	0	7	41	80
3	CFB20603	Chemical Food Analysis	3	26	0	39	13	42	120
4	CFB20303	Food Microbiology	3	28	0	42	7	43	120
5	MPU34*2	Co-curriculum	2	16	6	2	6	30	60
6	CKB30103	Industrial Safety & Health	3	28	8	28	5	51	120
7	CFB20703	Food Chemistry	3	28	0	42	5	45	120
		TOTAL	18	171	27	153	45	304	700

YEAR 3: SEMESTER 5

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CFB 40403	Instrumental Food Analysis	3	27	0	44	6	43	120
2	WBB20103	Technopreneurship	3	10	20	0	2	88	120
3	CFB30104	Food Processing and Innovation	4	30	0	54	8	68	160
4	CLB21303	Process Instrumentation & Control	3	22	0	33	5	60	120
5	CFB30203	Food Packaging Technology	3	28	0	42	7	46	123
6	CFB30103	Food Sensory and Evaluation	3	28	0	42	5	45	120
		TOTAL	19	145	20	215	33	350	763

YEAR 3: SEMESTER 6

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WPB49804	Final Year Project 1	4	5	0	110	1	44	160
2	CFB31003	Food Quality & Safety Management System	3	47	0	6	8	59	120
3	CFB31103	Food Process Engineering	3	19	18	21	7	55	120
4	CLB20903	Engineering Statistics	3	28	28	0	8	56	120
5	CLB30003	Oil & Fat Process Technology	3	16	10	37	5	52	120
6		Elective 1	3						120
		TOTAL	19	115	56	174	29	266	760

YEAR 4: SEMESTER 7

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WPB49906	Final Year Project 2	6	5	0	205	1	29	240
2	CFB40104	Food Plant Design	4	36	0	45	8	71	160
3	MPU3242	Innovation Management	2	15	30	0	5	30	80
4	CFB30803	Halal Technology	3	28	0	42	7	43	120
5		Elective 2	3						120
6		Elective 3	3						120
		TOTAL	21	84	30	292	21	173	840

YEAR 4: SEMESTER 8

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WIB39909	Industrial Training	9	0	0	320	4	36	360
		TOTAL	9	0	0	320	4	36	360

***Additional Module (Credit not included in Total Credit to Graduate –TCG)

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3213	Bahasa Kebangsaan A	3	17	0	0	44	59	120
		TOTAL	3	17	0	0	44	59	120

TCG 140 credit

Total Credit to Graduate (TCG): 140 Credit Hours

Foreign Language*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	WMD10101	Mandarin 1	1	21	0	0	4	25	50
2	WMD10201	Mandarin 2	1	21	0	0	4	25	50
3	WAD10101	Arabic 1	1	21	0	0	4	25	50
4	WAD10201	Arabic 2	1	21	0	0	4	25	50

Electives**

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	CJB40303	Management for Chemical Engineering Technologist	3	28	28	0	8	56	120
2	CJB40503	Marketing for Chemical Engineering Technologist	3	34	17	0	4	65	120
3	CJB40803	Chemical Engineering Technologist Organizational Behavior	3	34	17	0	5	64	120
4	CBB30703	Enzyme Technology	3	30	0	47	3	40	120
5	CJB40303	Phytopharmaceutical Technology	3	30	0	47	5	38	120
6	CJB30303	Hazard Analysis Critical Control Point (HACCP)	3	28	0	42	5	45	120
7	CRB40203	Rubber Engineering	3	28	0	45	9	38	120
8	CRB40503	Biopolymer	3	23	0	42	4	53	122
9	CEB30203	Environmental Impact Assessment	3	36	0	40	11	33	120
10	CEB30403	Air Pollution Control Technology	3	21	0	45	4	50	120
11	CEB30503	Wastewater Treatment Technology	3	32	0	53	3	32	120

Co-Curriculum*

NO	COURSE CODE	COURSE	CREDIT	F2F				NON F2F	TOTAL SLT
				L	T	P	O		
1	MPU 3412	Career Guidance 2	2	17	6	2	4	51	80
2	MPU 3422	Community Service 2	2	17	0	0	12	51	80
3	MPU 3432	Culture 2	2	20	0	12	0	48	80
4	MPU 3442	Rakan Masjid 2	2	17	0	0	8	55	80
5	MPU 3452	Siswa-siswi Bomba & Penyelamat 2	2	17	0	20	0	43	80
6	MPU 3462	Siswa-siswi Pertahanan Awam 2	2	17	0	16	0	47	80
7	MPU 3472	Sports Management 2	2	17	0	16	0	47	80
8	MPU 3482	Personal Financial Management 2	2	17	0	18	3	42	80
9	MPU 3492	Askar Wataniah	2	17	0	23	0	40	80

Note :

***Additional Module - MPU2213 Bahasa Kebangsaan A

- a. For local students without credit in B. Melayu (SPM) only and the credit is not included in program Total Credit to Graduate (TCG).

MAJOR COURSES

BACHELOR OF CHEMICAL ENGINEERING TECHNOLOGY (HONS) IN FOOD

CFB20002 Introduction to Food Science and Technology
CFB20303 Food Microbiology
CFB20703 Food Chemistry
CFB20703 Food Chemistry
CFB40503 Instrumental Food Analysis
CFB30103 Food Sensory and Evaluation
CFB30203 Food Packaging Technology
CFB30104 Food Processing and Innovation
CFB20603 Food Analysis 1
CFB30004 Food Processing and Preservation Technology
CFB31003 Food Quality & System Management System
CFB31103 Food Process Engineering
CFB30803 Halal Technology
CFB40104 Food Plant Design

CFB20002 Introduction To Food Science And Technology

Rationale for inclusion of the course in the program:

This course aimed to provide students the basic knowledge and understanding of food science and technology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss briefly the science and technology of the nature of food, its processing and preservation technique.
2. Conduct a discussion on related issues regarding food science and technology.
3. Collaborate with team members in planning and performing scientific inquiry.

CFB20303 Food Microbiology

Rationale for inclusion of the course in the program:

This course aimed to provide the students with understanding of the basic function, activity, classification of microorganisms, microbiological quality of food products and food safety. The student will also obtain a good understanding of laboratory practices in food microbiology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Examine and explain the theories and concepts of microorganisms in relationship with the factors that influence microbial growth, microorganisms in foods, food spoilage and food borne diseases.
2. Observe, predict, conduct, interpret and analyze results of analysis in food microbiology.
3. Collaborate with team members in planning and performing a scientific inquiry.

CFB20703 Food Chemistry

Rationale for inclusion of the course in the program:

This course aimed to provide students with the knowledge of food and biochemistry with emphasis on the structure, properties and functions of water, carbohydrates, lipids, proteins, enzymes, vitamins, minerals, pigments and other food additives as well as regulatory control.

Learning Outcomes:

Upon completion of this course students should be able to:

Upon completion of the course, students should be able to:

1. Discuss the structure, properties and functions of major food constituents such as water, food macromolecules, vitamins, minerals, pigments and other food additives.
2. Perform laboratory experiments related to food chemistry and biochemistry.
3. Organize problems given in a form of mini project leading to a plausible solution.
4. Organize with team members in performing and reporting a scientific project and experimental report.

CFB40503 Instrumental Food Analysis

Rationale for inclusion of the course in the program:

This course aimed to provide students the knowledge in modern laboratory management system, theory and application of instrumentation in testing of food materials.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Apply the principles and procedures for the laboratory management and instrumental analysis of food
2. Apply knowledge from this course when execute the actual analysis of food samples in the laboratory
3. Collaborate with team members in planning, performing and reporting a scientific inquiry/assignment related to instrumental analysis of food.

CFB30103 Food Sensory and Evaluation

Rationale for inclusion of the course in the program:

To provide students with the basic principles and requirements of sensory evaluation of food.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the foundations of sensory function, threshold determination, colour and texture in evaluation of food.
2. Observe, conduct and discuss the appropriate techniques and methods that match the requirements of a sensory task including the use of sensory in marketing research.
3. Display the results of experiment by using appropriate statistical methods to guide product development and assure quality of food.
4. Discuss (in depth) with team members in planning and performing sensory test as a project.

CFB30104 Food Processing and Innovation

Rationale for inclusion of the course in the program:

To impart knowledge and technical skills in processing of various food products and to incorporate the technologies especially in development of new food products and simulated current test markets.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the knowledge of principle of food processing techniques applied at low, ambient or high temperature and the effect of processing techniques towards food products/ingredients that important in developing new product.
2. Demonstrate the working principle of food processing equipment/machinery and the ability of handling and troubleshooting of the equipment/machinery.
3. Demonstrate with team members in planning, performing and reporting a scientific inquiry, practical and mini project in developing new food products.
4. Create the awareness of entrepreneurial resources and sustainability in develop a new food product.

CFB31003 Food Quality & Safety Management System

Rationale for inclusion of the course in the program:

To provide students with knowledge of quality assurance and quality control, requirement, implementation and audit in food industries as well as quality management system that commonly applied in food industries and provide students with the principles of food safety in food manufacturing as well as food legislations and standards.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the importance of quality assurance and quality control in manufacturing of food products.
2. Relate international and national food law, food quality & hygiene standards and practices to the production of safe food products.
3. Demonstrate among team members the ability for self-directed learning and reflective practice in the work place through development of a model HACCP plan for a food industry.

CFB31103 Food Process Engineering

Rationale for inclusion of the course in the program:

To provide knowledge on the application of fluid mechanics, thermodynamics, heat and mass transfer, and chemical process principles to food processes. It incorporates the latest technologies and advances in a cohesive overview of all aspects of food process engineering and design of simple operations.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Evaluate the basic principles in food engineering processes such as heating, cooling, concentration, drying and etc. through given case studies or situation
2. Demonstrate the working principle of food processing engineering equipment/machinery and the ability of handling and troubleshooting of the equipment/machinery
3. Collaborate with team members in interpreting practical engineering problems associated with food process operations.
4. Perform an investigation of food processing engineering problems using data from relevant sources.

CFB30803 Halal Technology

Rationale for inclusion of the course in the program:

To provide students good understanding of Halal concept, implementation and monitoring by government agency, halal and current quality system and its integration. Exposed students with in-depth understanding to conduct analysis of certain non halal component in food.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Outline halal guidelines and its implementation according to Islamic law for food industry.
2. Perform analysis for the determination of non-halal substances with team members.
3. Discuss the current issues regarding halal as a system and practices in the food industry.

CFB40104 Food Plant Design

Rationale for inclusion of the course in the program:

To combine all experiences as an engineering technologist into a more coherent package and develop understanding of the engineering design process and the food industry. Sanitary principles will be introduced in the design process.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the fundamentals engineering economics (i.e. time value of money, cash flow, return of investment), drafting and project budgeting.
2. Explain integrating design solutions for selection of food process operations and alternatives for a food processing plant.
3. Practice of ethical consequences in design aspect and ethical behaviour in line with professional code of conduct requirement.
4. Prepare a feasibility study or business plan on the food plant project.
5. Display the technical model for the selected food plant design professionally.

ELECTIVE COURSES

CSB31103 Oil Palm Biomass Products
CJB30003 Palm Oil Technology 1
CJB40003 Palm Oil Technology 2
CJB30403 Product Formulation & Dosage Form
CJB30503 Product Development Process
CJB40203 Validation & Regulation of Pharmaceutical Product
CJB40303 Phytopharmaceutical Technology
CBB20503 Principles of Bioprocess Technology
CBB30303 Biomolecular Techniques
CBB30703 Enzyme Technology
CEB 31003 Environmental Microbiology
CFB31303 Hazard Analysis Critical Control Point

CEB31503 Environmental Toxicology and Public Health
CEB30203 Environmental Impact Assessment
CEB40603 Introduction to Renewable Energy

CJB40403 Management for Chemical Engineering Technologist
CJB40503 Marketing for Chemical Engineering Technologist
CJB40803 Chemical Engineering Technologist Organizational Behaviour

CRB40203 Rubber Engineering
CRB40503 Bio-Polymer

CSB31103 Oil Palm Biomass Products**Rationale for inclusion of the course in the program:**

Provide students with knowledge and hands on skill in utilization of oil palm biomass to produce value added products such as biofuels and biobased chemicals by using thermochemical and biological conversion technologies.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the types of oil palm biomass, logistics and the processing technologies involved in the production of products.
2. Appraise various methods of oil palm biomass utilization for the production of value-added products.
3. Relate the overall oil palm biomass exploitation with sustainable development.

CJB30003 Palm Oil Technology 1**Rationale for inclusion of the course in the program:**

To impart knowledge on the oil palm upstream activities consists of crop production, crude palm oil and palm kernel production.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the upstream processing technology in palm oil industry from nursery, plantations and palm oil mills.
2. Execute experimental activities associate with palm oil technology with correct techniques.
3. Develop potential products or modification process as entrepreneurship projects.

CJB 40003 Palm Oil Technology 2**Rationale for inclusion of the course in the program:**

To impart knowledge on the palm oil refinery processes consists of properties of edible oils, common methods of extraction, refining, modification, usage and nutritional perspective. Furthermore, Malaysia is one of the major producer of palm oil which contributes half of global oils and fats market.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the properties of palm oil and its derivatives and refinery processing technology.
2. Execute experimental activities associate with refinery process of palm oil with correct techniques
3. Relate the overall oil palm industries with the need of sustainable development.

CJB30403 Product Formulation & Dosage Form

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in formulating and designing different dosage forms of phytopharmaceutical products.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Decide the suitable product formulation and dosage forms based on physicochemical characteristics and biopharmaceutical information of the drug compound
2. Identify the product formulation and dosage forms that meets the requirements by the society
3. Perform the analytical and experimental skills to come out with the appropriate formulation and dosage forms

CJB 30503 Product Development Process

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in developing and producing of phytopharmaceutical products.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Discuss the product development process, its quality and stability attributes and relevant standards and regulations.
2. Conduct experiment related to pharmaceutical product development and its relevant analysis.
3. Formulate new product development of high value herbal product.

CJB 40203 Validation & Regulation of Pharmaceutical Product

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in preparing protocols and validating of pharmaceutical process.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Evaluate the validation process and compliance with regulations to decide the validity of pharmaceutical manufacturing process.
2. Performs the analysis for validation and compliance of the manufacturing process with regulations.
3. Prepare relevant documents to support validation and inspection process.

CJB40303 Phytopharmaceutical Technology

Rationale for inclusion of the course in the program:

The rationale is to impart knowledge on various types and form of phytopharmaceutical including product processing and quality control.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Design production line consisting of processing steps of phytopharmaceutical product and its quality assurance determination.
2. Perform selected product processing of phytopharmaceuticals including operating machineries involved in phytopharmaceuticals production.
3. Demonstrate the accomodation of knowledge and skill of phytopharmaceutical technology in solving certain industrial demand.

CBB20503 Principles of Bioprocess Technology

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and hands on skill in bioprocess technology in order to exploit microbial, plant and animal cell systems as products of valuable commodities.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Describe the principles of bioprocess engineering technology.
2. Demonstrate ability to work in team either as a leader or ordinary member.
3. Execute experimental activities associate with bioprocess engineering technology.
4. Perform purification process with appropriate equipment and techniques.

CBB30303 Biomolecular Techniques

Rationale for inclusion of the course in the program:

This is an intermediate level course aimed at providing and emphasis on cell and molecular biology concepts. These concepts are essential since the students will encounter these at higher level. This is to produce capable graduates equipped with both knowledge and skills in molecular biology.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Infer the fundamental and advance knowledge in biomolecular techniques.
2. Perform biomolecular techniques and methodologies based on the theory learned.
3. Demonstrate competency in presenting information in verbal and written forms which encompasses a critical analysis of findings (CTPS).

CBB30703 Enzyme Technology

Rationale for inclusion of the course in the program:

This course will provide relevant principle or theory of enzymology and techniques use in enzyme application.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Develop an understanding of enzyme fundamentals and attribute these knowledge in the applications of enzymes.
2. Conduct the experimental work on enzymatic activity assay, enzyme production and purification as well as carry out immobilization of an enzyme.
3. Discuss the applications of enzyme technology towards production high value products.

CEB31003 Environmental Microbiology

Rationale for inclusion of the course in the program:

This course will provide an overview of the important microbes involved in environmental microbiology including the detection and monitoring approach.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Interpret the principles and characteristics on microorganisms in environment.
2. Perform the methods used in screening and identification of environmental microorganisms.
3. Demonstrate understanding on the impact of environmental microbiology towards sustainable development.

CFB31303 Hazard Analysis Critical Control Point

Rationale for inclusion of the course in the program:

This course will provide students with knowledge and application of Good Manufacturing Practice (GMP) and the implementation of Hazard Analysis Critical Control Point (HACCP) in Food Industry including quality assurance and quality control, requirement, implementation, and audit in food industries as well as quality management system that commonly applied in food industries.

Learning Outcomes:

Upon completion of the course, students should be able to:

1. Produced HACCP manuals based on the principles, methodologies, techniques and tools of MS 1480:2007 (HACCP) (C6)
2. Perform internal audit for GMP and HACCP in premise (P4).
3. Display among team members the ability for self-directed learning and reflective practice in the work place through the development of a model HACCP plan for food industry (A5)

CEB31503 Environmental Toxicology and Public Health

Rationale for inclusion of the course in the program:

The goals of this course is to develop an understanding of toxicological principles and their application to both human and ecological risk assessment as they pertain to environmental cleanup. The principle and methodologies for risk assessment will be presented within the context of state and federal environmental regulation.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Develop the concepts and components of toxicology and types of environmental risk and analysis.
2. Relate the concept and components of toxicology and risk assessment to real-life example.
3. Demonstrate the ability to work in a team.

CEB30203 Environmental Impact Assessment

Rationale for inclusion of the course in the program:

To provide students with the knowledge of the current practices and policies pertaining to the development, implementation and maintenance of environmental management system (EMS) in an organization. ISO standards will be examined and case studies will be used to highlight the key factors involved with EMS implementation. The process of assessing environmental impacts and aspects and implementing continuous improvement measured will be addressed. Comparable Environmental Quality Act (EQA) 1974 will be examined to reinforce management system concepts.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyze the concept, application and legislation of environmental impact assessment
2. Perform an environmental impact assessment report in accordance to the standard requirement
3. Measure the environmental impacts due to differing types of development projects
4. Analyze and make decision with problem regarding on environmental impact.

CEB40603 Introduction to Renewable Energy

Rationale for inclusion of the course in the program:

This is an introductory course aiming to provide students with a basic understanding of renewable energy technology, the current and forecasted energy requirement scenarios and the roles of renewable energies in Malaysia.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Analyse the sources of renewable energy and the means by which the sources can be exploited for energy generation.
2. Demonstrate the ability to work in team and communicate effectively.
3. Deliver their opinions on issues relating the renewable energy based on oral or written.

CJB40403 Management for Chemical Engineering Technologist**Rationale for inclusion of the course in the program:**

This course is aimed at providing students with the knowledge for the student to use in workplace. Management is the process of managing several related projects, often with the intention of improving an organization's performance. In practice and in its aims it is often closely related to systems engineering. In today's global and fast paced business environment, success on complex projects cannot be guaranteed by technical competence alone. These environments require reality based project management skills and expertise. Budget constrained, schedule critical chemical engineering projects, often executed by virtual teams operating from different parts of the world, require team based project planning to guarantee success.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the basic management functions and process, as well as the management terms and concepts.
2. Discuss the managerial decision process globally and culturally.
3. Justify the interactions among communications and management practice.
4. Practise the applications of management in the workplace of chemical engineering technology and society.

CJB40503 Marketing for Chemical Engineering Technologist**Rationale for inclusion of the course in the program:**

This is an introductory course in marketing for chemical engineers which covers the basic principles of marketing. This course provides knowledge for the student to examine the role and practice of marketing.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Explain the social functions of marketing, market role in product design and consumers' decision.
2. Compare the difference between sales and market orientation and their importance for marketing performance.
3. Analyze the need market segmentation, market targeting, market positioning, product distribution through various channels.
4. Recognize pricing strategies and best practice in promotion strategies.

CJB40803 Chemical Engineering Technologist Organizational Behaviour**Rationale for inclusion of the course in the program:**

This course serves as an introduction to the field of organizational behaviour. It is designed to expose students to the fundamental principles with which to understand human behaviour inside public organizations. The course examines various theories developed in an attempt to explain and predict employee behaviour in an organizational context.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Demonstrate the knowledge of behavioural aspects in management, concept of an organization's corporate culture and its effects on the behavior of individuals and groups in organizations.
2. Demonstrate the abilities to develop reasonable solutions to organizational behavior problems using appropriate facts, concepts, principles, analytic techniques, and theories from this organizational behavior course.
3. Demonstrate the understanding of relation between behavioural aspects in management towards management, business practices and technopreneurial competencies.

CRB40203 Rubber Engineering**Rationale for inclusion of the course in the program:**

This course aimed to provide students information of rubber applications; included the mathematical concept in rubber engineering. Force deformation and dynamic mechanical behaviour of rubbers will also be covered.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Calculate rubber performance using suitable mathematical equations
2. Summarize bulk properties, effect of shape factor, lamination, static and dynamic force deformations of rubber
3. Correlate applications of rubber to its bulk properties and force deformation
4. Demonstrate ability to work in a team in completing assignment in the area of rubber engineering.

CRB 40503 Bio-polymer

Rationale for inclusion of the course in the program:

This course is aimed at introducing students to the advantages and applications of biopolymer in the bio system industry. An advanced introduction to the importance of bio based plastics in pharmaceutical and biomedical application will be imparted during the course.

Learning Outcomes:

Upon completion of this course students should be able to:

1. Appraise between polymeric, bio-polymeric materials and the functions of additives in products.
2. Summarize the functions of bio-polymer materials in pharmaceutical and biomedical applications.
3. Organize suitable preparation of various laboratory works in safely manner.
4. Work effectively as individuals and team member.

ENGINEERING PROGRAMME

BACHELOR OF CHEMICAL ENGINEERING WITH HONOURS

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

After 3 – 5 years of graduation, the graduates are expected to become Chemical Engineers who are:

PEO1	Competent to contribute towards the human capital in the national strategic industries.
PEO2	Effective leaders with good communication and teamwork skills.
PEO3	Able to advance themselves in industry or academia.
PEO4	Practising professionalism with ethical, social and environmental responsibilities.
PEO5	Capable of embarking on business and technopreneurial activities.

PROGRAMME LEARNING OUTCOMES (PLO)

PLO1	Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and chemical engineering to the solution of complex chemical engineering problems.
PLO2	Problem Analysis: Identify, formulate, research literature and analyse complex chemical engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PLO3	Design/ Development of Solutions: Design solutions for complex chemical 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.
PLO4	Investigation: 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.
PLO5	Modern Tool Usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex chemical engineering activities, with an understanding of limitations.
PLO6	The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PLO7	Environment and Sustainability: Evaluate the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PLO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO9	Communication: Communicate effectively on complex chemical 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.
PLO10	Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PLO11	Life Long Learning: 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.
PLO12	Project Management and Finance: Demonstrate knowledge and understanding of chemical 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.

PROGRAM STRUCTURE

- *subject to amendments*

Semester 1			Semester 2		
Course Code	Course Title	SLT Credit	Course Code	Course Title	SLT Credit
CCB 10201	Engineering Practice and Professionalism	1	CCB 21102	Fundamentals of Electrical and Electronics Engineering	2
WEB 10302	Fundamental English	2	CCB 11003	Mathematics for Engineers 2	3
WEB 20202	Professional English 1	2	CCB 10303	Physical Chemistry	3
MPU 3123 / MPU 3143	Tamadun Islam dan Tamadun Asia / Bahasa Melayu Komunikasi 2	3	CCB 10402	Chemical Engineering Laboratory 1	2
CCB 10003	Mathematics for Engineers 1	3	MPU 3113 / MPU 3173	Hubungan Etnik / Pengajian Malaysia 3	3
CCB 10103	Analytical and Organic Chemistry	3	CCB 10702	Material Balance	2
CCB 10603	Fluid Mechanics	3	MPU 34*2	Co-curriculum 2	2
Total SLT Credits		17	Total SLT Credits		17

Semester 3			Semester 4		
Course Code	Course Title	SLT Credit	Course Code	Course Title	SLT Credit
CCB 20003	Computer Programming for Engineers	3	CCB 20202	Mass Transfer	2
CCB 20102	Introduction to Biochemical Engineering	2	CCB 20602	Reaction Engineering 1	2
CCB 20702	Engineering Drawing	2	CCB 21203	Statistics for Engineers	3
CCB 20803	Thermodynamics	3	CCB 21302	Chemical Engineering Laboratory 2	2
CCB 21002	Energy Balance	2	CCB 21402	Materials Engineering	2
CCB 20303	Process Heat Transfer	3	CCB 30003	Momentum Transfer	3
WMD 10101/ WAD 10101	Mandarin 1/ Arabic 1	1	MPU 3333 / MPU 3343	Isu-isu Kontemporari Muslim di Malaysia / Culture and Lifestyle in Malaysia	3
Total SLT Credits		16	Total SLT Credits		17

Semester 5			Semester 6		
Course Code	Course Title	SLT Credit	Course Code	Course Title	SLT Credit
CCB 30103	Industrial Safety and Health	3	CCB 30803	Process Control and Instrumentation	3
CCB 30403	Numerical Methods in Chemical Engineering	3	CCB 30903	Process Design and Economics	3
CCB 30502	Separation Processes 1	2	CCB 31102	Chemical Engineering Laboratory 3	2
CCB 31403	Introduction to Environmental Engineering	3	CCB 31202	Separation Processes 2	2
CCB 31602	Reaction Engineering 2	2	CCB 31302	Particle Technology	2
WBB 20103	Technopreneurship	3	CCB 31502	Process Analysis and Simulation	2
WMD 10201/ WAD 10201	Mandarin 2/ Arabic 2	1	WEB 20302	Professional English 2	2
Total SLT Credits		17	Total SLT Credits		16

Inter Semester (Between Semester 6 and 7)		
Course Code	Course Title	SLT Credit
CCB 49705	Industrial Training	5
Total SLT Credits		5

Semester 7			Semester 8		
Course Code	Course Title	SLT Credit	Course Code	Course Title	SLT Credit
CCB 40003	Plant Design and Management System	3	CCB 40304	Design Project 2	4
CCB 40103	Design Project 1	3	CCB 49904	Engineering Final Year Project 2	4
CCB 40203	Renewable and Sustainable Energy Engineering	3	CCB 4**02	Elective 2	2
CCB 40402	Management and Marketing for Chemical Engineers	2	CCB 4**02	Elective 3	2
CCB 40602	Engineers in Society	2	MPU 3242	Innovation Management	2
CCB 49802	Engineering Final Year Project 1	2			
CCB 4**02	Elective 1	2			
Total SLT Credits		17	Total SLT Credits		14
TOTAL CREDIT TO GRADUATE (TCG)					136

Electives (Process)		
Course Code	Course Title	SLT Credit
CCB 40502	Plant Utilities and Maintenance	2
CCB 41302	Petrochemicals and Petroleum Refining Technology	2
CCB 41402	Quality Assurance and Quality Control in Chemical Engineering	2

Electives (Environment)		
Course Code	Course Title	SLT Credit
CCB 40702	Solid and Hazardous Waste Management	2
CCB 40802	Air Pollution Control	2
CCB 40902	Wastewater Treatment Engineering	2

*** Conditions for Passing a Technical Course:**

1. A student will pass a technical course in the Bachelor of Chemical Engineering with Honours if the student attains a minimum of 30% of the allocated marks in his final examination.
2. The student shall be awarded grade F if:
 - 2.1. he fails to fulfill the condition in 1 regardless of his attainment in his coursework, or
 - 2.2. he attempts only the final examination but does not have any coursework marks.

MPU Courses

MPU Code	Course Code	Course Title	Note	Credit Hours
U1	MPU 3113	Hubungan Etnik	Local students	3
	MPU 3123	Tamadun Islam dan Tamadun Asia (TITAS)	Local students	3
	MPU 3143	Bahasa Melayu Komunikasi 2	International students	3
	MPU 3173	Pengajian Malaysia 3	International students	3
U2	MPU 3213	Bahasa Kebangsaan A <i>* If without a credit in Bahasa Melayu at SPM level or have not taken and passed Bahasa Kebangsaan A in previous level</i>	Local students	3
	MPU 3242	Innovation Management	All	2
U3	MPU 3333	Isu-isu Kontemporari Muslim di Malaysia	Local Muslim students	3
	MPU 3343	Culture and Lifestyle in Malaysia	Local Non-Muslim & International Students	3
U4	MPU 3412	Career Guidance 2	All (choose 1)	2
	MPU 3422	Community Service 2		
	MPU 3432	Culture 2		
	MPU 3442	Rakan Masjid 2		
	MPU 3452	Siswa-siswi Bomba dan Penyelamat 2		
	MPU 3462	Siswa-siswi Pertahanan Awam 2		
	MPU 3472	Sports Management 2		
	MPU 3482	Personal Financial Management 2		
	MPU 3492	Askar Wataniah		

TECHNICAL COURSES

CCB10003 Mathematics for Engineers 1
CCB10103 Analytical and Organic Chemistry
CCB10201 Engineering Practice and Professionalism
CCB10303 Physical Chemistry
CCB10402 Chemical Engineering Laboratory 1
CCB10603 Fluid Mechanics
CCB10702 Material Balance
CCB11003 Mathematics for Engineers 2
CCB20003 Computer Programming for Engineers
CCB20102 Introduction to Biochemical Engineering
CCB20702 Engineering Drawing
CCB20803 Thermodynamics
CCB21002 Energy Balance
CCB21102 Fundamentals of Electrical and Electronics Engineering
CCB20202 Mass Transfer
CCB20303 Process Heat Transfer
CCB20602 Reaction Engineering 1
CCB21203 Statistics for Engineers
CCB21302 Chemical Engineering Laboratory 2
CCB21402 Materials Engineering
CCB30003 Momentum Transfer
CCB30103 Industrial Safety and Health
CCB30403 Numerical Methods in Chemical Engineering
CCB30502 Separation Processes 1
CCB31403 Introduction to Environmental Engineering
CCB31602 Reaction Engineering 2
CCB30803 Process Control and Instrumentation
CCB30903 Process Design and Economics
CCB31102 Chemical Engineering Laboratory 3
CCB31202 Separation Processes 2
CCB31302 Particle Technology
CCB31502 Process Analysis and Simulation
CCB49705 Industrial Training
CCB40003 Plant Design and Management System
CCB40103 Design Project 1
CCB40203 Renewable and Sustainable Energy Engineering
CCB40402 Management and Marketing for Chemical Engineers
CCB40602 Engineers in Society
CCB49802 Engineering Final Year Project 1
CCB40304 Design Project 2

SEMESTER 1

Course Title	Mathematics for Engineers 1		Semester	1
Course Code	CCB10003		SLT Credit	3
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Solve the systems of linear equations by using linear algebra method. (C3) 2. Apply the concept of complex numbers to convert the complex numbers in various forms. (C3) 3. Evaluate the scalar and vector products in engineering application. (C5) 4. Apply the rules of derivative in differentiating various functions and partial derivatives. (C3) 5. Apply appropriate methods in integrating various functions and multiple integral. (C3) 			
Synopsis	This module offers a fundamental study of linear algebra: solving system of equations by using matrix methods such as Cramer's Rule, Gauss Elimination Method, Gauss Jordan Elimination Method and inverse matrix, as well as evaluating the eigenvalues and eigenvectors. A recall on Complex Numbers is provided as a pre-requisite to convert complex numbers in various forms. The concept of vectors and its properties which are related to the students' field are also provided. This course also provides the fundamental of multi-variable functions involving partial derivatives and multiple integrals.			

SEMESTER 2

Course Title	Analytical and Organic Chemistry		Semester	2
Course Code	CCB 10103		SLT Credit	3
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 4. Explain the principle, operation and industrial applications of analytical equipment. (C2) 5. Determine various functional groups and compounds in organic chemistry. (C4) 6. Propose reactions and mechanisms of organic compounds. (C4) 			
Synopsis	This course provides students with an introduction into organic chemistry and the role of analytical techniques and tools used. The topics include the theory and applications of various analytical tools such as liquid chromatography, gas chromatography, infra-red spectroscopy and atomic absorption spectroscopy.			

Course Title	Engineering Practice and Professionalism		Semester	2
Course Code	CCB 10201		SLT Credit	1
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Explain ethics and responsibilities of an engineer. (A3) 2. Apply professional engineering practices in societal issues. (C3) 3. Demonstrate leadership and teamworking skills. (A3) 4. Discuss issues effectively in oral discussion and written report. (P2) 			
Synopsis	The topics that will be covered in this course are introduction to the engineering profession, including different engineering fields, professional societies, engineering ethics and responsibilities; engineering method and problem solving; critical thinking; leadership and team working; introductory error analysis and statistics; life-long learning skills; word processing, spread sheeting and graph plotting skills; oral presentations and technical report writing skills.			

Course Title	Physical Chemistry		Semester	2
Course Code	CCB 10303		SLT Credit	3

Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Explain the basic concepts of physical chemistry. (C2) 2. Apply the principles of physical chemistry to solve chemical engineering problems. (C3) 3. Analyze the principles of properties of gases, thermodynamics, equilibrium and chemical kinetics to solve chemical engineering problems. (C4)			
Synopsis	This course is designed to prepare engineering students with the knowledge in physical chemistry. It will highlight on the importance of knowledge in thermodynamics, equilibrium concepts and chemical kinetics in relation with chemical engineering. The concept can be used to explain and interpret observations relating to physical and chemical properties of matter. This course will create a better understanding on the application of physical chemistry in chemical engineering and its related application.			

Course Title	Chemical Engineering Laboratory 1			Semester	2
Course Code	CCB 10402			SLT Credit	2
Pre-requisites	Nil				
Assessment Methods	Coursework	100 %	Final Examination		0 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Execute standard operating procedure for laboratory experiments. (C3) 2. Apply the knowledge acquired in previous mathematics, science and chemical engineering courses to analyze and interpret information acquired by operating process equipment. (C3) 3. Analyze the experimental data obtained from the conducted experiments. (C4) 4. Produce and present laboratory reports formatively. (P4)				
Synopsis	This course comprises all the experimental parts of the first year course. The laboratory experiments cover a range of topics related to analytical and organic chemistry, physical chemistry and fluid mechanics.				

Course Title	Fluid Mechanics			Semester	2
Course Code	CCB 10603			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination		60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Explain the properties and behaviour of fluids in both static and motion conditions. (C2) 2. Apply the principles of fluid mechanics in engineering application. (C3) 3. Analyse the engineering problems associated with fluid systems. (C4)				
Synopsis	This course will introduce the basic principles of fluid flow including the phenomena of fluid and theories related to fluid static, incompressible fluid and compressible fluid. Topics to be covered include fluid properties, pressure and fluid statics, mass, Bernoulli and energy equations and Fluid Kinematics.				

Course Title	Material Balance	Semester	2
Course Code	CCB 10702	SLT Credit	2
Pre-requisites	Nil		

Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Determine the dimension of an equation and conversion of units. (C4) 2. Analyze the material balance of process streams, stream components and phase systems based on chemical process principles. (C4) 3. Apply computer software in solving material balance calculations. (C3) 			
Synopsis	This course will introduce students to the knowledge and expertise in material balance related to the process industry. It begins with an introduction to engineering calculations, followed by applying methods used to carry out material balances over a range of equipment and processes encountered in industry. The course also covers the concepts of phase systems. In addition, it introduces students to the material balance calculations with the aid of computer software.			

Course Title	Mathematics for Engineers 2		Semester	2
Course Code	CCB 11003		SLT Credit	3
Pre-requisites	CCB 10003 Mathematics for Engineers 1			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Solve ordinary differential equations and partial differential equations' problems. (C3) 2. Apply Laplace transforms to solve differential equations problems. (C3) 3. Determine Fourier series of given functions. (C4) 			
Synopsis	This course covers ordinary differential equations and partial differential equations. It also provides advanced level engineering mathematics such as Laplace transforms and Fourier series in solving various engineering problems.			

SEMESTER 3

Course Title	Computer Programming for Engineers		Semester	3
Course Code	CCB 20003		SLT Credit	3
Pre-requisites	Nil			
Assessment Methods	Coursework	100 %	Final Examination	0 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Demonstrate the use of control structures (sequential, selection and iteration) in C++ language and MATLAB. (C3) 2. Construct computer programs to solve engineering problems using appropriate data types declaration, and appropriate commands to demonstrate the input, output, control structure, functions, File I/O and array statement. (C3) 3. Apply appropriate compiler and debugger tools to compile and debug program. (C3) 			
Synopsis	This course introduces concepts and techniques for creating computational solutions to problems in engineering. Programming topics include Introduction to C++ Programming, selection and loop statements, functions, file input & output, structure data types, MATLAB programming, and using graphics in MATLAB. Good programming style and computational efficiency are emphasized.			

Course Title	Introduction to Biochemical Engineering		Semester	3
Course Code	CCB 20102		SLT Credit	2
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to:			

	1. Identify the characterization of cells. (C2) 2. Analyze the kinetic parameters of the Michaelis-Menten Equation. (C4) 3. Explain the enzyme actions and enzyme immobilization technology. (C2) 4. Compare the design of bioreactors and product recovery strategies. (C4)
Synopsis	This course covers the introduction of cell structures and different cell types, followed by the description of chemical elements of living cells. It also covers the explanation of enzyme-catalyzed reactions and kinetics, as well as the enzyme immobilization technology applied in the industrial processes. Students will also be introduced to the theories of microbial cell growth, design and analysis of bioreactors, and various product recovery operations.

Course Title	Engineering Drawing		Semester	3
Course Code	CCB 20702		SLT Credit	2
Pre-requisites	Nil			
Assessment Methods	Coursework	100 %	Final Examination	0 %
Course Outcomes	Upon completion of this course, students should be able to: 4. Demonstrate the use of main conventions in engineering drawing. (C2) 5. Identify dimensional views from two-dimensional and three-dimensional objects. (C4) 6. Apply computer software for engineering drawing and process and instrumentation diagram. (C3)			
Synopsis	This course provides students with a basic foundation in technical engineering drawing as well as orthographic and isometric projections of object and chemical process drawing.			

Course Title	Thermodynamics		Semester	3
Course Code	CCB 20803		SLT Credit	3
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60%
Course Outcomes	Upon completion of this course, students should be able to: 1. Analyze engineering problems based on thermodynamic laws and properties. (C4) 2. Evaluate the heat effects of chemical reactions and the performance of thermodynamic cycles. (C5) 3. Perform calculation on vapour-liquid phase equilibrium and solution thermodynamics. (C4)			
Synopsis	This course provides students with the foundation in chemical engineering thermodynamics. It covers the first and second laws of thermodynamics, the P-V-T behaviour of pure substances, ideal and non-ideal gases, heat effects, vapour-liquid equilibrium, phase rules, and solution thermodynamics.			

Course Title	Energy Balance		Semester	3
Course Code	CCB 21002		SLT Credit	2
Pre-requisites	CCB 10702 Material Balance			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Differentiate reactive and non-reactive processes based on chemical process principles. (C4) 2. Evaluate the overall energy balances for chemical engineering processes. (C5) 3. Apply computer software in solving material and energy balance calculations. (C3)			
Synopsis	This course will introduce students to the knowledge and expertise in energy balance related to the process industry. It begins with an introduction to energy balance and tables of thermodynamic, followed by applying methods used to carry out energy balances over a range of equipment and processes encountered in industry. In addition, it introduces students to the energy balance calculations with the aid of computer software.			

Course Title	Fundamentals of Electrical and Electronics Engineering		Semester	3
Course Code	CCB 21102		SLT Credit	2
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %

Course Outcomes	<p>Upon completion of this course, students should be able to:</p> <p>4. Describe basic concept of electricity, circuit theorems, electrical and electronics system, and electrical machines. (C2)</p> <p>5. Apply fundamental principles of electrical and electronics to solve engineering problems. (C3)</p>
Synopsis	<p>This course provides fundamental knowledge in electrical technology such as basic concept of electricity, circuit theorem, simple ac and dc circuit analysis, electronic devices, magnetism, principle of single and three phase system, motor and transformer and their applications.</p>

SEMESTER 4

Course Title	Mass Transfer	Semester	4
Course Code	CCB 20202	SLT Credit	2
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	<p>Upon completion of this course, students should be able to:</p> <p>1. Distinguish the principle of diffusion in steady state, unsteady state and convective mass transfer. (C4)</p> <p>2. Evaluate diffusion coefficients in gas mixtures, liquid mixtures, electrolytes, biological solutes in liquid and solid. (C5)</p> <p>3. Analyze mass transfer in turbulent and laminar flows. (C4)</p> <p>4. Examine problems involving diffusion and mass transfer. (C4)</p>		
Synopsis	<p>This course will introduce the students to the theories of diffusion and mass transfer involving steady state and unsteady state mass transfer, interphase mass transfer and convective mass transfer.</p>		

Course Title	Process Heat Transfer	Semester	4
Course Code	CCB 20303	SLT Credit	3
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	<p>Upon completion of this course, students should be able to:</p> <p>1. Justify the concepts and laws related to heat transfer process. (C5)</p> <p>2. Apply empirical correlations for heat transfer and determine the amount of heat transfer rates. (C3)</p> <p>3. Examine engineering problems related to heat transfer. (C4)</p>		
Synopsis	<p>This course covers the basic principles of heat transfer. This course covers the three modes of heat transfer heat transfer through conduction, convection and radiation and the application of process heat transfer in industry such as in heat exchangers.</p>		

Course Title	Reaction Engineering 1	Semester	4
Course Code	CCB 20602	SLT Credit	2
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	<p>Upon completion of this course, students should be able to:</p> <p>1. Solve problems for batch and flow reactors based on fundamentals of reaction engineering. (C4)</p>		

	2. Analyze rate data to determine kinetic constant and reaction order. (C4) 3. Perform preliminary design of isothermal and non-isothermal reactors. (C5)
Synopsis	This course covers the basic concepts of reaction kinetics, conversion as well as the design of isothermal and non-isothermal batch and flow reactors. In addition, students will be exposed to data interpretation for batch and flow reactors.

Course Title	Statistics for Engineers	Semester	4
Course Code	CCB 21203	SLT Credit	3
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60%
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply the fundamental concepts of probability and statistics in engineering. (C3) 2. Analyse engineering data using statistical methods in decision making. (C4) 3. Generate statistical solution using computer software. (C6) 4. Interpret the outcome from statistical software output with the statistical concept. (C5)		
Synopsis	This course covers the introduction to probability, probability distribution and sampling distribution, test of hypothesis, analysis of variance, linear regression and correlation and factorial design.		

Course Title	Chemical Engineering Laboratory 2	Semester	4
Course Code	CCB 21302	SLT Credit	2
Pre-requisites	CCB 10402 Chemical Engineering Laboratory 1		
Assessment Methods	Coursework	100 %	Final Examination 0 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Execute operating procedure for laboratory experiments. (C3) 2. Apply the knowledge acquired in previous mathematics, science and chemical engineering courses to conduct experiments by the operating process requirements. (C3) 3. Analyze the experimental data obtained from the conducted experiments. (C4) 4. Produce and present laboratory reports formatively. (P4)		
Synopsis	This course comprises all the experimental parts of the second year courses. The laboratory experiments cover a range of topics related to thermodynamics, mass transfer, process heat transfer and reaction engineering.		

Course Title	Materials Engineering	Semester	4
Course Code	CCB 21402	SLT Credit	2
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60%
Course Outcomes	Upon completion of this course, students should be able to: 1. Determine the stress and strain properties in material. (C4) 2. Discuss the atomic structure and interatomic bonding in materials. (C2) 3. Analyze the failure modes, corrosion and degradation of materials. (C4)		
Synopsis	This course provides students with a basic foundation in materials engineering as well as the fundamentals in atomic structure and interatomic bonding. The course covers the basic principles of corrosion and degradation of materials, mechanical properties of metals, modes of deformation and failure, thin shells under pressure and mechanical design of process equipment.		

SEMESTER 5

Course Title	Momentum Transfer	Semester	5
Course Code	CCB 30003	SLT Credit	3
Pre-requisites	CCB 10603 Fluid Mechanics		
Assessment Methods	Coursework	40 %	Final Examination 60%
Course Outcomes	Upon completion of this course, students should be able to:		

	1. Apply the control volume analysis associated with fluid flow. (C3) 2. Evaluate the differential equations of mass and momentum conservation. (C5) 3. Analyze problems involving incompressible flow of Newtonian fluids using Navier-Stokes equation. (C4)
Synopsis	This course introduces the phenomena of fluid and theories related to incompressible fluid. This course covers flow in pipes, differential analysis of fluid flow, approximate solutions of the Navier-Stokes and flow over bodies in chemical engineering.

Course Title	Industrial Safety and Health			Semester	5
Course Code	CCB 30103			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Demonstrate knowledge and understanding of the importance of safety in industry. (C3) 2. Identify different types of hazards and its' control. (C4) 3. Apply hazard identification and analysis in industrial safety. (C3) 4. Recognize relevant regulations in industrial safety and health. (C4)				
Synopsis	This course covers the introduction to industrial safety and health, hazards and risk assessment, chemical safety, hazard control measures and emergency planning, and industrial safety and health regulations.				

Course Title	Numerical Methods in Chemical Engineering			Semester	5
Course Code	CCB 30403			SLT Credit	3
Pre-requisites	CCB 11003 Mathematics for Engineers 2				
Assessment Methods	Coursework	100 %	Final Examination	0 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply an appropriate numerical method for a particular problem of interpolation, integration, as well as for solving single nonlinear equations and linear systems of equations. (C3) 2. Solve engineering problems using numerical method. (C4) 3. Use software to solve numerical problems. (C3)				
Synopsis	This course is designed to provide students with a background in modern numerical methods. The topics covered are numerical linear algebra, numerical solution of ordinary and partial differential equations, numerical methods for solving systems of non-linear equations and the introduction to optimization. Numerical computation software will be introduced in solving numerical problems.				

Course Title	Separation Processes 1			Semester	5
Course Code	CCB 30502			SLT Credit	2
Pre-requisites	CCB 10702 Material Balance				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply fundamentals of phase equilibrium to estimate compositions in equilibrium in liquid/liquid and liquid/vapour separation units. (C3) 2. Differentiate the design fundamentals for separation processes. (C4)				

	3. Evaluate the number of equilibrium stages in absorption, distillation and liquid-liquid extraction processes. (C5)
Synopsis	This course provides students with the various types of separation processes available in chemical engineering. The topics cover mass transfer and the design criteria of processes such as distillation, absorption, and liquid-liquid extraction.

Course Title	Introduction to Environmental Engineering			Semester	5
Course Code	CCB 31403			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Identify the impact of development on the environment and ecosystem. (C4) 2. Recommend the appropriate method or treatment system in solving environmental problems. (C5) 3. Practise the relevant legislation and decision making in environmental engineering. (C3) 				
Synopsis	This course covers the current environmental issues as well as the importance of waste treatment systems including industrial wastewater and sludge treatment, control of air pollutants, solid waste and hazardous waste management and disposal method.				

Course Title	Reaction Engineering 2			Semester	5
Course Code	CCB 31602			SLT Credit	2
Pre-requisites	CCB 20602 Reaction Engineering 1				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Identify the properties of a catalyst and the steps in a catalytic reaction. (C4) 2. Calculate the conversion or catalyst weight for packed bed reactor. (C4) 3. Determine the effects of external and internal diffusions on the heterogeneous reactions. (C4) 				
Synopsis	This course covers the basic concepts of heterogeneous catalytic reaction. Students will be exposed to the calculation of packed bed reactor. In addition, the topics also cover the effects of mass transfer (external and internal diffusions) on the overall rate of catalytic reaction.				

SEMESTER 6

Course Title	Process Control and Instrumentation			Semester	6
Course Code	CCB 30803			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Identify main components in the control system. (C4) 2. Differentiate the control strategies in the chemical process application. (C4) 				

	3. Develop solutions based on the fundamental principles of process control and instrumentation in chemical processes. (C6)
Synopsis	This course introduces the various aspects of fundamental process control and control strategies. Besides, this course also introduces the working principles of control system instrumentation and advanced process control.

Course Title	Process Design and Economics			Semester	6
Course Code	CCB 30903			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination		60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply the knowledge in preparing the flow sheet for process design. (C3) 2. Formulate the steps in process design and basic considerations in equipment design. (C5) 3. Justify the capital and manufacturing costs of a process design project. (C4)				
Synopsis	This course is first started with an introduction on how to define and begin a process design project, followed by the steps used in process design. It also covers the descriptions of flow sheet preparation and the basic concepts of process equipment design. In the second part of the course, it will introduce students to the important knowledge of economic and cost analysis of a process design project including capital and manufacturing costs estimation, economic optimization, and profitability analysis.				

Course Title	Chemical Engineering Laboratory 3			Semester	6
Course Code	CCB 31102			SLT Credit	2
Pre-requisites	CCB 21302 Chemical Engineering Laboratory 2				
Assessment Methods	Coursework	100 %	Final Examination	0 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Develop appropriate experimental procedures based on chemical engineering knowledge. (C6) 2. Execute the experimental procedures for laboratory experiments. (C3) 3. Analyze the experimental data obtained from the conducted experiments. (C4) 4. Produce and present laboratory reports formatively. (P4)				
Synopsis	This course comprises all the experimental parts of the third year courses. The laboratory experiments cover a range of topics related to separation processes, process control and instrumentation, and environmental engineering.				

Course Title	Separation Processes 2			Semester	6
Course Code	CCB 31202			SLT Credit	2
Pre-requisites	CCB 30502 Separation Processes 1				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply separation process principles to solve problems related to separation processes that involve a solid phase, barrier and solid agent. (C3) 2. Analyse separation operations including leaching, crystallization, evaporation, drying, membrane and adsorption processes. (C4)				

	3. Evaluate the equilibrium stage requirements for single and multistage counter-current in solid-liquid extraction. (C5)
Synopsis	This course provides students with the various types of separation processes available in chemical engineering. The topics cover mass transfer and the design criteria of processes such as evaporation, drying, leaching, crystallization, adsorption, ion exchange, and membrane processes.

Course Title	Particle Technology		Semester	6
Course Code	CCB 31302		SLT Credit	2
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Distinguish the methods used in particle size measurement and phenomenon involving slurry transport and colloids and fine particles. (C4) 2. Analyze for the problems involving separation and transport of particle in fluids (C4) 3. Determine the health effects of fine powders. (C4) 			
Synopsis	This course provides students with a basic foundation in particle technology, which includes particle size analysis, pneumatic transport, separation of particles from a gas and health effects of fine powders.			

Course Title	Process Analysis and Simulation		Semester	6
Course Code	CCB 31502		SLT Credit	2
Pre-requisites	CCB 20902 Material Balance CCB 21002 Energy Balance			
Assessment Methods	Coursework	100 %	Final Examination	0%
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Apply knowledge of process analysis and simulation to the solution of chemical engineering problems. (C3) 2. Analyze the performance of chemical processes using principles of simulation. (C4) 3. Select the appropriate computer software for the analysis and simulation of various chemical processes. (C5) 			
Synopsis	This course explains the basic concepts of process analysis and simulation in solving chemical engineering problems. This course covers introduction to simulation software, flowsheeting and model analysis tools, as well as the analysis and simulation of various chemical processes.			

INTER SEMESTER 6 & 7

Course Title	Industrial Training		Semester	6 – 7
Course Code	CCB 49705		SLT Credit	5
Pre-requisites	Attained CGPA \geq 2.00, gained 80 SLT credits			
Assessment Methods	Coursework	100 %	Final Examination	0 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Demonstrate the ability to work professionally with consideration on safety and health during the training. (C3) 2. Apply engineering knowledge in performing assigned task during the Industrial Training. (C3) 			

	3. Follow responsibly assigned task with minimum supervision and in accordance to the quality required. (A3) 4. Appraise work experience gained on skills and knowledge during the Industrial Training in oral and writing. (P3)
Synopsis	This course provides students a venue to apply their knowledge and skills acquired during their studies. Students will be placed for 10 weeks in relevant industry to expose with all aspects of working environment especially towards to be competent engineer. The experience is essential to ensure the student is ready to work after completing his/her study. The student is also required to compile the experience gained by writing a formal report and present the report adequately.

SEMESTER 7

Course Title	Plant Design and Management System			Semester	7
Course Code	CCB 40003			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	100 %	Final Examination	0 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply knowledge and tools of engineering and management system in chemical process plant. (C3) 2. Examine plant drawings and specification in the design of chemical plant. (C4) 3. Construct 3-Dimensional plant model for chemical engineering processes. (C6)				
Synopsis	This course provides students with knowledge in plant design and management system. This course covers a fundamental study on plant development and design. The design is enhanced using a 3D computers modeling of a process plant.				

Course Title	Design Project 1			Semester	7
Course Code	CCB 40103			SLT Credit	3
Pre-requisites	CCB 10702 Material Balance CCB 21002 Energy Balance				
Assessment Methods	Coursework	100 %	Final Examination	0 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Develop preliminary design of a chemical plant based on fundamentals and concepts in chemical engineering. (C6) 2. Practice of ethical consequences in design aspect and ethical behaviour in line with professional code of conduct requirement. (A5) 3. Evaluate the feasibility on technical and economic of a chemical plant. (C5) 4. Perform cost estimation of a chemical plant. (C4) 5. Produce and present reports for the plant design. (P4) 6. Develop 2D and 3D engineering drawings of a chemical plant. (C6) 7. Demonstrate team work skills to complete an assigned task with responsibility. (A3)				
Synopsis	This course introduces students to the principles of designing chemical processes and process equipment design. It includes the design problem, process selection, plant design consideration and material balance of the process.				

Course Title	Renewable and Sustainable Energy Engineering			Semester	7
Course Code	CCB 40203			SLT Credit	3
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Identify the conventional energy problems and various types of renewable energy sources. (C3) 2. Analyse the potential of renewable energy technologies in different contexts for sustainable development. (C4) 3. Perform the preliminary of heat integration design in a chemical processing plant (C4) 4. Optimize the process performance based on pinch analysis. (C5).				

Synopsis	This course will introduce students to the conventional energy problem and the potential of renewable energy sources such as solar power, wind energy, hydroelectric, wave and tidal power, geothermal energy and biomass energy. This course also provides students with a basic foundation in process heat integration based on Pinch Analysis principles. The course covers the introduction to process heat integration, pinch analysis and synthesis.
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Course Title	Management and Marketing for Chemical Engineers	Semester	7
Course Code	CCB 40402	SLT Credit	2
Pre-requisites	Nil		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Explain the elements and principles of marketing relative to chemical engineering project and chemical commodities (C2) 2. Evaluate the concept and principles of management in identifying bottlenecks and restructuring the operation related to chemical industry. (C5) 3. Relate the interactions between the environment, technology and organizations in order to achieve high performance. (P4) 		
Synopsis	This course will expose the student to type of management practices and constrains. Students will be taught on management skills to run and improve an organization using proven tools. Students will also be exposed to the knowledge of marketing chemical engineering projects and chemical commodities.		

Course Title	Engineers in Society	Semester	7
Course Code	CCB 40602	SLT Credit	2
Pre-requisites	CCB 10201 Engineering Practice and Professionalism		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 5. Identify ethical and professionalism issues in engineering. (A4) 6. Evaluate the decisions related to contemporary issues from an engineering standpoint. (C4) 7. Demonstrate the knowledge and the ability to engage in independent lifelong learning. (C4) 		
Synopsis	This course will cover topics on the link between engineers and society, ethical and professional practice, occupational safety, health and environment, intellectual property, project management, standards and quality.		

Course Title	Engineering Final Year Project 1	Semester	7
Course Code	CCB 49802	SLT Credit	2
Pre-requisites	Gained minimum 90 of total SLT credits [Total SLT Credit = Cumulative Credits Gain (CCG) + Industrial Training (INTRA) + Credits Transfer (CT)]		
Assessment Methods	Coursework	100 %	Final Examination 0 %
Course Outcomes	Upon completion of this course, students should be able to: <ol style="list-style-type: none"> 1. Demonstrate the abilities to plan and work effectively. (C3) 2. Analyse the research gap using the fundamental engineering theory. (C4) 3. Perform critical review of the research project. (C4) 4. Propose a specific research methodology to solve the research problem. (C5) 		

	5. Evaluate the impact of engineering parameters to determine the engineering behavior of the system or equipment. (C5) 6. Apply suitable tools and techniques to analyse and solve complex engineering problem. (C3) 7. Produce a feasible project proposal. (P3) 8. Present and defend the project proposal effectively. (P3)
Synopsis	This course comprises of research abstract, literature review, problem statement, objectives and appropriate methodology to enhance the student's abilities in solving complex engineering problems. Students present their proposals and produce proposal reports individually.

SEMESTER 8

Course Title	Design Project 2		Semester	8
Course Code	CCB 40304		SLT Credit	4
Pre-requisites	CCB 40103 Design Project 1			
Assessment Methods	Coursework	100 %	Final Examination	0 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Design a chemical engineering related plant. (C6) 2. Perform equipment design for a chemical plant. (C4) 3. Evaluate engineering economic analysis of a chemical plant. (C5) 4. Optimize chemical processes for the plant design. (C4) 5. Demonstrate knowledge and understanding of safety in chemical plant design. (C3) 6. Produce and present reports for the plant design. (P4) 7. Demonstrate team work skills to complete an assigned task with responsibility. (A3)			
Synopsis	This course introduces students to the principles of designing chemical processes and process equipment design. It includes the equipment selection, specification and design, material of construction, safety and loss prevention, and plant design costing and evaluation.			

Course Title	Engineering Final Year Project 2		Semester	8
Course Code	CCB 49904		SLT Credit	4
Pre-requisites	CCB 49802 Engineering Final Year Project 1			
Assessment Methods	Coursework	100 %	Final Examination	0 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Analyse complex engineering problem using the fundamental engineering theory. (C4) 2. Manage the project to solve complex engineering problem. (C5) 3. Evaluate the impact of engineering parameters to determine the behavior of the system or equipment and to draw essential engineering findings. (C5) 4. Apply the project using appropriate techniques and tools. (C3) 5. Perform independent critical review and embed conclusion with recommendation for the research findings. (C4) 6. Produce a project report according to the specified standard format. (P4) 7. Present and defend the project effectively. (P4)			
Synopsis	This course will determine student ability to apply the engineering knowledge and practice. Students are required to conduct research analysis, discuss and interpret research findings, and draw conclusions and possible recommendation. Students are also required to present their project outcomes.			

ELECTIVE COURSES

ELECTIVE 1 (PROCESS)

Course Title	Plant Utilities and Maintenance		Semester	7
Course Code	CCB 40502		SLT Credit	2
Pre-requisites	Nil			
Assessment Methods	Coursework	40 %	Final Examination	60 %
Course Outcomes	Upon completion of this course, students should be able to:			

	1. Identify the basic principles and operation of supporting equipment or facilities in chemical processing plants. (C4) 2. Apply maintenance strategies in new and old plant including applying standard monitoring and critical analysis during plant operation and shutdown. (C3) 3. Distinguish the benefits of plant utilities and their safety aspects. (C2)
Synopsis	This course gives an overview of the different types of plant utilities normally found in chemical processing plants, its description and safe operations. This course also covers the basic management principles and techniques in plant maintenance.

ELECTIVE 2 (PROCESS)

Course Title	Petrochemicals and Petroleum Refining Technology			Semester	8
Course Code	CCB 41302			SLT Credit	2
Pre-requisites	CCB 40502 Plant Utilities and Maintenance				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Recognize the processes involved in petroleum refining and natural gas processing. (C4) 2. Identify the characteristics of crude oil and petroleum products based on crude assays and Material Safety Data Sheet (MSDS). (C4) 3. Classify the natural gas and petrochemicals produced from various processes. (C4)				
Synopsis	The students will be able to understand the operations of downstream processing units of petroleum refining plant and natural gas treating processes. The student will learn about crude oil and petroleum products properties and specifications. The student will gain knowledge about the operation of petroleum refinery and natural gas processing units.				

ELECTIVE 3 (PROCESS)

Course Title	Quality Assurance and Quality Control in Chemical Engineering			Semester	8
Course Code	CCB 41402			SLT Credit	2
Pre-requisites	CCB 40502 Plant Utilities and Maintenance				
Assessment Methods	Coursework	40 %	Final Examination	60 %	
Course Outcomes	Upon completion of this course, students should be able to: 1. Apply the basic concepts of quality improvement to solve quality problems. (C3) 2. Construct and explain the process outcome base on control charts to solve quality problems in conducting quality improvement activities. (C5) 3. Analyze the process outcome using process capability method to solve engineering problem. (C4)				
Synopsis	This course covers the concept of fundamental of quality, statistical process control, control charts for variables data, control charts for attributes data, process capability and time weighted charts.				

ELECTIVE 1 (ENVIRONMENT)

Course Title	Solid and Hazardous Waste Management			Semester	7
Course Code	CCB 40702			SLT Credit	2
Pre-requisites	Nil				
Assessment Methods	Coursework	40 %	Final Examination	60%	
Course Outcomes	Upon completion of this course, students should be able to: 1. Describe the basic principles of waste management system including waste identification, characterization, collection, storage, processing, treatment and disposal of waste. (C2)				

	2. Analyse the processes of waste management including waste generation, handling and minimization techniques of solid and hazardous waste generated from municipal and industry. (C4) 3. Apply the suitable methods of solid and hazardous waste treatment, remediation and disposal. (C3) 4. Identify the potentials of waste in economic value. (C4)
Synopsis	This course will introduce students to solid and hazardous waste management, emphasizing on waste accumulation, laws and regulations, generation rates, handling, storage and separation techniques. This course also introduces students to 3R's concepts, landfills design and operation especially thermal treatment system, site remediation and radioactive waste treatment system.

ELECTIVE 2 (ENVIRONMENT)

Course Title	Air Pollution Control	Semester	8
Course Code	CCB 40802	SLT Credit	2
Pre-requisites	CCB 40702 Solid and Hazardous Waste Management		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Analyze the major sources and types of air pollution. (C4) 2. Recommend air pollution control designs and working principles for particulate and gaseous that complied acts and regulations. (C5) 3. Measure pollutant concentrations and emissions by using the pollutant dispersion model. (C5)		
Synopsis	This course covers air pollution and its control methods as well as the regulatory requirements for atmospheric pollutants. The air pollution control methods include particulates control and gas control.		

ELECTIVE 3 (ENVIRONMENT)

Course Title	Wastewater Treatment Engineering	Semester	8
Course Code	CCB 40902	SLT Credit	2
Pre-requisites	CCB 40702 Solid and Hazardous Waste Management		
Assessment Methods	Coursework	40 %	Final Examination 60 %
Course Outcomes	Upon completion of this course, students should be able to: 1. Identify water quality standards and wastewater characteristics used in the water quality determination. (C4) 2. Analyze the processes involved in physical, chemical and biological treatments of wastewater. (C4) 3. Propose effective wastewater treatment process. (C5)		
Synopsis	Topics to be discussed are water quality parameters, wastewater characteristic, water quality act and standardization, wastewater treatment principle and design.		

Who to See For Advice

ISSUES		WHO TO SEE
1.	Could not adapt with the teaching style of a lecturer	Lecturer concern / Head of Section
2.	Concern about labs, workshops, classrooms (safety, comfort, lack of equipment, lack of components, lack of practical, etc)	Lecturer concern / Head of Section

3.	Non-academic related problems that may affect academic achievement such as financial, family, social, emotional, spiritual, cannot get along with colleagues, cannot focus on study in the hostel due to environment, etc	Academic Advisor/Counsellor
4.	Weak in certain subjects, pre-requisites	Lecturer concern / Academic Advisor
5.	Academic related problems (study plan, add subject, drop subject, quit, etc)	Academic Advisor